June 2013
Online Print Version

International Journal of Scientific and Research Publications

Print Version, Volume 3, Issue 6
June 2013 Edition – Volume II
ISSN 2250-3153

IJSRP
www.ijsrp.org

International Journal of Scientific and Research Publications

GENERAL INFORMAION:
IJSRP, International Journal of Scientific and Research Publications publish monthly journal under ISSN 2250-3153.

ONLINE VERSION
http://www.ijsrp.org/e-journal.html

PRINT VERSION
http://www.ijsrp.org/print-journal.html

Contact Information:
Editor: editor@ijsrp.org
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Neuro Object Oriented Programming Approach and Design

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Abstract- Our object oriented programming approach have great ability to improve the programming behavior for modern system and software engineering but it does not give the proper interaction of real world .In real world , programming required powerful interlinking among properties and characteristics towards the various objects. Basically this approach of programming gives the better presentation of object with real world and provide the better relationship among the objects. I have explained the new concept of my neuro object oriented approach .This approach contains many new features like originty , new concept of inheritance , new concept of encapsulation , object relation with dimensions , originty relation with dimensions and time , category of NOOPA like high order thinking object and low order thinking object , differentiation model for achieving the various requirements from the user and a rotational model .

Index Terms- Originity, F-inheritance, NF – inheritance, Acquisition, Differentiation, Dimension, Weak coupled, Tightly coupled, State, Stationary state, Motion-able state, Global Entity Local entity, Main entity, Impulsive entity , Interface entity, Controlled entity, Modularity, Random Nature , Public permission, Private Permission

I. INTRODUCTION

It is the process of defining and designing the object on the basis of their unique characteristics and properties.

Example = consider a simple family relationship ,

let a family consist two children , mother and father

then

let a Class Father Family

{

Data types

Functions

.

.

.

}

let a Class One child

{

By default some characteristics from mother and father class

+

Characteristics of object means , How object reacts , How single object behaves with respect to the other objects on the basis of certain functions and with variables and followed the vice versa.

In this approach , the object generally describes the knowledge entities are expected to acquire or construct.

Characteristics consists special features of object like movement of object and state of object.

Movement of Object

" Reaction of object towards other object and interaction with other objects".

State

These are those points or persist properties of object when they occur under certain period of time.

(=State of object are divided into two category=)

Motion able State

When object are ready to interaction with other objects under some circumstances .

This is simply like linking of multiple objects through global class.

let a Class Mother Family

{

Data types

Functions

.

.

.

}

let a Class Second child

{

same like one class

Additional Properties of child also
including with the existing properties

} }

Stationary State

When object does not ready to interaction with other objects under some circumstances.

This basically define the objects behavior of multiple objects with Local classes.
Example = consider a predefined limited algorithm behavior based Class

```
Class Car
{
    .
    .
    .

}
```

Object :

These are those type of unique entity which change their properties on the basis of other object that why these are divided into four main category.

Properties of Object

These are those type of behavior of objects that define object constraints with respect to surrounding.

Basically, its abstraction of important features of objects inside the system . properties contain almost all the object oriented programming concept

***Originity**
***Inheritance**
***Encapsulation**
***Modularity**
***Class**
***Polymorphism**
***Classification**
***Generalization**
***Specialization**
***Composition**
***Random nature**

II. ORIGINITY

Originity => refer to way , "How to find the objects from the real world under the certain period of time with the collection of limited resources.".

Its completely depends on the number of dimensions which is define for objects.

On the basis of the dimensions , we can easily find as much as large number of object within a certain time period.

originity of object is directly proportional to the n-number of dimensional and also proportional to time period required for finding the objects.

According to dimensional analysis on the basis of originity , " the originity of object is directly proportional to the number of dimension present in the system and inversely proportional to the time period required to finding the object with respect to surroundings ".

$$\text{Originity} \propto \text{Dimension}$$
$$\text{Originity} \propto \text{Time}$$
$$\text{Originity} \propto \text{Dimension} * \text{Time}$$
$$\text{Originity} = K\ \text{Dimension} * \text{Time}$$

Where K , is proportionality constant and its value depends on complexity ratio around the objects

Complexity ratio depends on two main properties

MICRO Complexity ratio => One , Two and Three Dimensions

MACRO Complexity ratio => For more than Three Dimensions

*ORIGINITY is the aspect of created or invented works by which new object being created and also provides differentiated features by which cloning of object can be stopped.

The term originity is often applied as a compliment for objects creation and helps the object its properties processing.

III. OBJECT RELATIONSHIP WITH DIMENSIONS

According the Originity behavior , " dimensions of system is directly proportional to the number of objects with respect to their surroundings .

$$\text{Dimension} \propto \text{Object}$$
$$\text{Dimension} = K\ \text{Object}$$

Where K , proportionality constant and its value depends on
If no dimension then , K = infinity
If One dimension then , K = minimum =1 to infinity

$$1 \le K \le \infty$$

If Two dimension then , K = 2

$$2 \le K \le \infty$$

General formula ,
For n – dimensions

$$n \le K \le \infty \qquad n \in N$$

N = natural numbers

Advantage of Originity

- Help in Object finding.
- Time saving process .

- Efficient and simple in nature.

IV. INHERITANCE

"The process of transferring the information from existing object class to the new one object class ."

It's a simple parents and child relationship in which child inherits the properties of their parents.

This is the most powerful feature of NOOP on which the parameters of existing object transfer to the another object class.
In NOOP, the inheritance are divided into two major form

F-Inheritance (Filter Inheritance) = These are those type of inheritance , in which it helps in removing the ambiguity occur during the transfer of information on two or more object classes.
This type of inheritance avoid the transfer of those properties , which cause ambiguity in classes.

Example = This can be done by removing the both variable from the two or more class and make a global variable which can use for both classes.

NF-Inheritance (Non Filter Inheritance) = These are those type of inheritance on which ambiguous features transfer from one existing object class to another existing object class.
This concept based on the old concept of normal inheritance.

(Way of transferring the information and data from one object class to other object class.)

- **Single Inheritance(same as previous)**
- **Multilevel Inheritance(same as previous)**
- **Multiple Inheritance(same as previous)**
- **Hierarchical Inheritance(same as previous)**
- **Hybrid Inheritance(same as previous)**
- **Star Inheritance(new concept)**

Single Inheritance = (Derived class)One or more than one class inherits the properties of base class.
Note : Base class act as a parents .
Derived class act as a Child.

Multilevel Inheritance = it's a continuous process of transferring the properties of one class to another class with n-1 level.

$n \leq 1 \leq \infty$

Multiple Inheritance = In this type of inheritance , any class inherits the properties of two or more classes.

Hierarchical Inheritance = In this type of inheritance , more than two classes inherits the properties of Base class.

Hybrid Inheritance = It's a combination of multiple and multilevel inheritance .

Star Inheritance = This is special type of inheritance which describe the **macro complexity ratio** .

Star inheritance is used for F-inheritance .

Strictly prohibited , for NF-inheritance(Reason star inheritance consists a large number of possibilities of occurrence of ambiguity) .

In star Inheritance , star class properties with their object act as a intense or power object which act as a base object class for all the other subclasses.

Advantage of using star inheritance

1.Make more interconnect-able class.

2.if we are using F-inheritance , then its very powerful and efficient because its uses the limited amount
Data types for variables.

3.Provide fast execution of code system.

4.Secure as compare to other terminology and worked very well if one class does not work (avoid the central class).

V. ENCAPSULATION

In class simply a grouping procedure of behavior , properties and characteristics .

It defines the behavior of class on the basis of their properties and characteristics .

In programming , properties and characteristics are like data types and functions.

Choosing of properties(data types and functions) are like behavior of object.

It reduces the complexity nature of data types with functions.

The need of encapsulation lead to two basic requirements

The basic need to cleanly differentiate between the specification and the implementation of an operation .

Due the need of modularity .

Specification = define object structure and help in implementation of object behavior.

It makes code system more readable and compact .

There are three view of Encapsulation
 # Programming language view
 # Database adaption view
#Combination of programming and database adaption view

In programming language view , an object have two part

- **Interface view**
- **Implementation view**

Interface part = The interface part is the specification of the set of operation that can be performed on the object . it is the only visible part of the object.

Implementation view =implementation part has a data type and a procedure part .The data part is the representation or state of the object and the procedure part describes , in some programming language the implementation of each operation.

Database adaption view = In this view , the object encapsulation both program and data.

In the database world , it is not clear whether the structural part of the type is or is not part of the interface .This is depends on the system , while in the programming language world , the data structure is clearly part of the implementation and not of the interface.

VI. `

Modularity is the procedure of dissociating the nature of objects into n – number of objects nature.

This dissociation of object is completely depends on the behavior of objects with their characteristics.

Basic idea behind the modularity is to break the complexity of object.

Dissociation helps in extraction of object properties.

Dissociation also helps in finding the weakly attached and tightly attached constraints of object under certain period of time.

Modularity are defined on the basis of coupling behavior of objects

Coupling define the interconnection among various objects .

Coupling are divided into two category

 # Weak coupled = By finding , the weak common features of object , then we can easily create the differentiation in properties of objects.

Example = simple relationship of uncle(mama , chacha) relationship with his/her brother son/daughter and if it's a thinkable object then firstly check their surroundings group of objects.

If these are thinkable then apply the thinkable approach otherwise apply the properties of non- thinkable object properties.

 # Tightly coupled = By finding , the most linkable properties of the object , this is very difficult for programmer to find the tightly properties of objects.

Example =simple parents and children relationship .

Main aim of modularity

Polymorphism = > (same as previous)
Generalization => (same as previous)
Specialization = > (same as previous)
Composition => (same as previous)

VII. RANDOM NATURE

Random nature =>refer to the phenomena by which object of other class can handle each and every properties and characteristics of every other object with limited resource's under the organic object oriented approach .

Basically , it act as a global object which have ability to perform each and every action of other object.

- Random nature of object makes its nature more complex for other object , because other object inherits its all properties and characteristics .
- Random nature of object divided into two form :
- **1. Global entity (Global object)**
- **2.local entity (Local object)**

Global object = are those type of object which contain all categories of object like

1. Main object
2. Interface object
3. Impulsive object
4. Controlled object

And perform each and every action of other object using unique state , properties and characteristics of other object.

It provides the convenient way to use the same variables and functions of the other object.

Global object are always public in nature when they access the data types and functions of other objects.

Global object act as a super object of all other object classes.

For instance =

Grand parents
!
Parents
!
children

all the unique and best feature of grand parents comes into parents and it may also be possible some or all feature of grand parents comes in children or sub child of children.

- Grand parents has ability to access all the properties of parents and children with some certain rule .but parents and children does not have right to give any permission to do any work to its parents or grand parents.
- Similarly , children does not have right to give permission to its parents .
- Global object always contain two type of access permission

- **1. Public permission**
- **2.Protected permission**

Public permission = In this permission , object are able to share their properties and behavior with other object classes.

Protected permission = In this permission , object only shared specified properties and behavior with other object under certain rule.

Random nature give us a functionality to handle every object class with free nature behavior .

Rules in random nature

- Global object must inherits all necessary characteristics of some other classes.
- If any properties of global object and child object property intersect , then property will be used or we'll give priority to global object.
- Data type values and variable will always get the prior position in object child object.

Advantage of using the random nature

1.improved performance => because global object handle all the functionality of child object so execution of different -2 process related to child object occur fastly.

2.Removal of ambiguity => because we following the rule of global object under random nature ,so ambiguity automatically reduces.

3.better inheritance

4.reduces the complexity of the local program.

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Anthropogenic Reactions, Its Consequences and Remedial Measures (A Review)

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Abstract- Increase in temperature and radiation hazards appear to be serious salient phenomena affecting human and other biota. Increase in temperature is rightly caused by Green house effect also known as Global warming. Natural radiation hazard is chiefly due to ozone depletion affecting various faunal life. Both incidents in general and ozone depletion in particular has been illustrated in the present paper including their impacts and possible remedial measures.

Index Terms- Temperature adversity, Biodiversity, Ozone depletion, Troposphere, Stratosphere, Anthropogenic problem.

I. INTRODUCTION

Ozone is a natural constituent of the atmosphere. It is composed of three oxygen atoms shield together in their configuration by electrical attraction. This electrovalent bond is much weaker than the covalent bond that holds oxygen. So the molecule is always susceptible to having one of its oxygen atoms stepped by an "oxygen seeking molecule". The reactivity of the chemical is in large part determined by the strength of the bonds between atoms. The week bonds in the ozone molecule make it an even more highly reactive gas than oxygen. An increase in the concentration of ozone at the ground level i.e. troposphere is undesirable because it induces toxicity. However, a decrease in the stratospheric ozone is dangerous to human beings, their lives, and biota of the ecosystem. This is because the stratospheric ozone acts as a protective layer or sheath, which absorbs UV radiations from the sun. Present review deals with the anthropogenic reactions in light of causes of depletion of ozone, its consequence on the living biota including human and possible remedial measures. It also sums up the 11th Dec. 2009 deals held at Copenhagen.

It may be rightly referred that ozone is destructor at troposphere but protector at stratosphere. Ozone is a bluish in color and natural component of the atmosphere and about 90% of all ozone is at the stratosphere . Shoenbein, 1840 coined the term ozone made by ozein = to smell. When found on the surface of the troposphere ozone is considered as dangerous pollutant but when present on stratosphere, it is regarded as protector for the plant and animal life. It is because that the stratospheric ozone layer protects the earth from the ultraviolet rays sent down by the sun. If it is depleted then the effects on the planet could be catastrophic . It shall not be out of place to mention that troposphere ozone alters earths radiation budget and changes oxidizing capacity of the earth. Other deleterious pollutants apart from ozone wiz., CO, NOx, SOx, particulate matters etc. have detrimental impact on living flora and fauna. Further, ozone diurnal variations do not reveal a day time photochemical build up while CO, NOx and SOx are characterized by higher levels during day time and lower levels during night time. Also the seasonal variation in ozone , CO, NOx and SOx reveal maxima during spring and minima during summer and monsoon season.

II. WHY MUCH DISCUSSION ON OZONE DEPLETION

Ozone is an unstable and destroyed mainly in the upper stratosphere through photochemical reactions with UV waves. However, nature maintains equilibrium as shown below.

$O2 + UV\ light\ (wave\ length < 24^2 nm) \rightarrow O + O$

$O + O_2 \quad O_3$
$2O_3 \quad 3O_2$
$O_3 \quad O_2 + O$
$O + O \quad O_2$
$O_2 + O \quad O_3$
$O + O_3 \quad O_2 + O_2$

III. PRINCIPAL CAUSES OF STRATOSPHERIC OZONE DEPLETION

Stratospheric ozone depletion may be or Natural anthropogenic.

1. NATURAL

It is believed that ozone is depleted by reactions with atomic oxygen, reactive hydroxyl radicals and NO (Follows reaction 1st , 2nd & 3rd).

REACTION 1st: $O_3 + O \rightarrow O_2 + O_2$

REACTION 2nd: $O_3 + HO^* \rightarrow O_2 + HOO^*$
$HOO^* + O \rightarrow HO^* + O_2$
*= Excited atom

REACTION 3rd: $O3 + NO \rightarrow NO_2 + O_2$
$NO_2 + O \rightarrow NO + O_2$

Nitric Oxide (NO) is produced in the stratosphere below 300 Km. by the reaction of N2O (Nitrous Oxide) with the excited oxygen atom and above 30 Km. by Ionizing radiation on Nitrogen .

$N_2O + O^* \rightarrow 2NO$
$N_2 + UV\ Radiation \rightarrow N + N$

O_2+N → NO+O

2. ANTHROPOGENIC CAUSE (Release of CFCs & Halons):

CFC is used in refrigerators , home insulation , plastic foams and food containers. CFCs and halons remain inactive in the troposphere. CFCs take about 20-40 years to travel to reach the stratosphere . But after that their intermediate products especially chlorine atom remains active for 75-110 years. Once CFCs and halons reach the stratosphere , the chlorine as a result of interaction with UV radiations in the stratosphere acts as catalyst in splitting up ozone into oxygen molecule and chlorine monoxide (ClO). ClO further splits and damages to ozone.

CFCs + UV → Cl + F + Cl
$Cl + O_3 \rightarrow ClO + O_2$
$ClO + O_3 \rightarrow Cl + 2O_2$

This cycle repeats and notably one chlorine atom may react with one lakh ozone converting it into O2. Even if CFCs were banned, problems would remain. There would still be no way to remove the CFCs that are now present in the environment. Clearly though, something must be done to limit this international problem in the future.

IV. CONCEPT OF OZONE HOLE

Gradual depletion of ozone concentration at Antarctica (South Pole) is more than Arctic (North pole) and it may be due to natural distillation (Data follows):

- 1970 306 DU
- 1971 245 DU
- 1993 240 DU
- 2006 242 DU

V. EFFECTS OF OZONE DEPLETION

Antarctica was an early victim of ozone depletion. A massive hole in the ozone layer right above Antarctica not only that continent but many others that could be victims of Antarctica's melting ice caps. In the future, the ozone problem will have to be solved so that the protective layer can be conserved. Even minor problems of ozone depletion can have major effects. Every time, even a small amount of the ozone layer is lost more UV light from the sun can reach the earth . Every time 1% of the ozone layer is depleted, 2% more UV – B is able to reach the surface of the planet. UV–B increase is one of the most deleterious consequences of ozone depletion because it can cause skin cancer. The increased cancer levels caused by exposure to this UV light could be enormous. The EPA estimates that 60 million Americans born by the year 2075 will be the victim of skin cancer because of depletion of ozone. About one million of these people will die. The increased cancer level caused by exposure to this ultraviolet light could be enormous. The EPA estimates that 60 million Americans born by the year 2075 will get skin cancer because of ozone depletion. About one million of these people will die. In addition to cancer, some research shows that a decreased ozone layer will increase rates of malaria and other infectious diseases. According to the EPA, 17 million more cases of cataracts can also be expected. The environment will also be negatively affected by ozone depletion. The life cycles of planet will change, disrupting the food chain. Effects on animal will also be severe, and are very difficult to foresee. Oceans will be hit hard as well. The most basic microscopic organisms such as plankton may be able to survive. If that happened, it would mean that all the other animals that are above plankton in the food chain would also die out. Other ecosystems such as forests and deserts will also be harmed. The planet's climate could also be affected by depletion of the ozone layer. Wind patterns could change, resulting in climate changes throughout the world.

VI. SALIENT EFFECTS ON HUMAN BEINGS & NATURE

- Basel cell carcinoma
- Squamus cell carcinoma
- Melanoma
- Suppression of immune response
- Sun burns
- Leukemia
- Breast cancer & Eye damage. In addition to cancer, researches reveal that reduced ozone layer will increase rates of Malaria and other infectious diseases. According to EPA, 17 million more cases of cataracts can also be expected.
- Environment will be also negatively affected by ozone depletion.
- The life cycles of the plants will be changed.
- Food chain will disrupted.
- Oceans will hit hard as well.
- Planktons may not be able to survive. If it happened, it would mean that all the other animals above plankton in the food chain would also die out.
- Forests and deserts will also be harmed.
- Wind patterns could changed, resulting in climatic changes through out the world.

VII. SOLUTION FOR OZONE DEPLETION

The discovery of the ozone depletion problem came as great surprise. Now, action must be taken to ensure that the ozone layer is not destroyed. Because CFCs are so widespread and used in such great variety of products, limiting their use is hard. Also, since many products already contain components that use CFCs, it would be difficult if not impossible to eliminate those CFCs already in existence. The CFC problem may be hard to solve because there are already great quantities of CFCs in the environment. CFCs would remain in the stratosphere for another 100 years even if none ere produced again. Despite the difficulties, international action has been taken to limit CFCs. The Montreal Protocol, 30 nations worldwide agreed to reduce usage of CFCs and encouraged other countries to do so as well. However, many environmentalists felt treaty did "too little, too late", as the Natural Resources Defense Council put it. The treaty asked for CFC makers to only eliminate half of their CFC

production, making some people feel it was inadequate. By the year 2000, the US and 12 nations in Europe have agreed to ban all use and production of CFCs. This will be highly significant because these countries produce three quarter of the CFCs in the world. Many other countries have signed treaties and framed the law for restricting the use of CFCs. Modern companies are finding substitutes for CFCs and the people in general becoming more aware of the danger of the ozone depletion.

VIII. FINAL DEAL AT COPENHAGEN WITH U.S. PUSH ON DEC. 18-19, 2009

Eleventh hour deal as a move in the evolution of the fight against the climate change held at Copenhagen is summarized in the following points:

Long-term goals: To reduce global emissions and bring global temperature below 2^0C.

Legally binding deal: A proposal; attached to the accord calls for a legally binding treaty by next year.

Finance: The deal promises short-term financing pledges from developed countries for 2010-2012. EU: $10.6bn, Japan; $11bn, US: $3.6bn.

Emission Cuts: Details of mitigation plans are included in separate annexes, one for developed country targets and one for the voluntary pledges of developing countries.

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Power Quality Improvement of Grid Interconnected 3-phase 4-wire System of Distribution Generation

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Abstract: Renewable energy sources (RES) are being increasingly connected in distribution system utilizing power electronic converters. This paper presents a novel control strategy for achieving maximum benefits from this grid - interfacing inverters when installed in 3-phase 4- wire distribution systems. The inverter is controlled to perform as multi-function device by incorporating active power filter functionality. The inverter can thus be utilized as:1)power converter to inject power generated from RES to the grid, and 2)shunt APF to compensate current unbalance, load current harmonics, load reactive power demand and load neutral current. All of these functions may be accomplished either individually or simultaneously. With such a control, the combination of grid-interfacing inverter and the 3-phase 4wire linear/non –linear unbalanced load at the point of common coupling appears as balanced linear load to the grid. This new control concept is demonstrated with extensive MATLAB/ Simulink simulation studies

Index Terms— Active power filter (APF), distributed generation (DG), distribution system, grid interconnection, power quality (PQ), renewable energy

I. INTRODUCTION

ELECTRIC utilities and end users of electric power are becoming increasingly concerned about meeting the growing energy demand. Seventy five percent of total global energy demand is supplied by the burning of fossil fuels. But increasing air pollution, global warming concerns, diminishing fossil fuels and their increasing cost have made it necessary to look towards renewable sources as a future energy solution. Since the past decade, there has been an enormous interest in many countries on renewable energy for power generation. The market liberalization and government's incentives have further accelerated the renewable energy sector growth.

Distributed generation (DG) systems are presented as a suitable form to offer high reliable electrical power supply [1]. The concept is particularly interesting when different kinds of energy resources are available, such as photovoltaic panels, fuel cells, or speed wind turbines [2], [3]. Most part of these resources need power electronic interfaces to make up local ac grids [4], [5]. This way, inverters or ac-to-ac converters are connected to an ac common bus with the aim to share properly the disperse loads connected to the local grid [6].

The non-linear load current harmonics may result in voltage harmonics and can create a serious PQ problem in the power system network. Active power filters (APF) are extensively used to compensate the load current harmonics and load unbalance at distribution level. This results in an additional hardware cost. However, in this paper authors have incorporated the features of APF in the, conventional inverter interfacing renewable with the grid, without any additional hardware cost. Here, the main idea is the maximum utilization of inverter rating which is most of the time underutilized due to intermittent nature of RES. It is shown in this paper that the grid-interfacing inverter can effectively be utilized to perform following important functions: 1) transfer of active power harvested from the renewable resources (wind, solar, etc.); 2) load reactive power demand support; 3) current harmonics compensation at PCC; and 4) current unbalance and neutral current compensation in case of 3-phase 4-wire system. Moreover, with adequate control of grid-interfacing inverter, all the four objectives can be accomplished either individually or simultaneously. The PQ constraints at the PCC can therefore be strictly maintained within the utility standards without additional hardware cost.

The paper is arranged as follows: Section II describes the system under consideration Section III describes the controller for grid-interfacing inverter. A digital simulation study is presented in Section IV and, finally, Section V concludes the paper.

II. SYSTEM DESCRPTION

The proposed system consists of RES connected to the DC-link of a grid-interfacing inverter as shown in Fig. 1.and the simulink design of distribution system is shown in Fig. 2. The voltage source inverter is a key element of a DG system as it interfaces the renewable energy source to the grid and delivers the generated power. The RES may be a DC source or an AC source with rectifier coupled to dc-link. Usually, the fuel cell and photovoltaic energy sources generate power at variable low dc voltage, while the variable speed wind turbines generate power at variable ac voltage. Thus, the power generated from these renewable sources needs power conditioning (i.e., dc/dc or ac/dc) before connecting on dc-link [6]–[8]. The dc-capacitor decouples the RES from grid and also allows independent control of converters on either side of dc-link. Simulink design of wind energy is shown in Fig. 3.

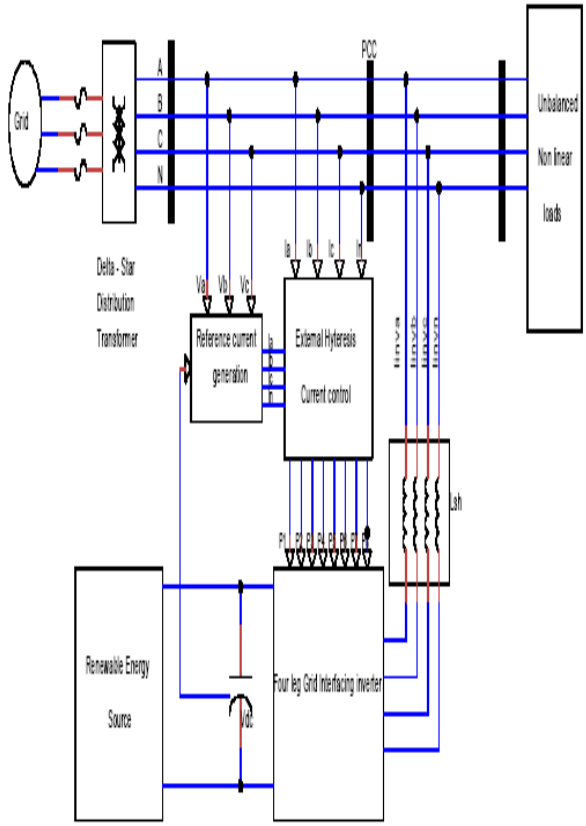

Fig.1 Schematic of Proposed Distributed Generation system

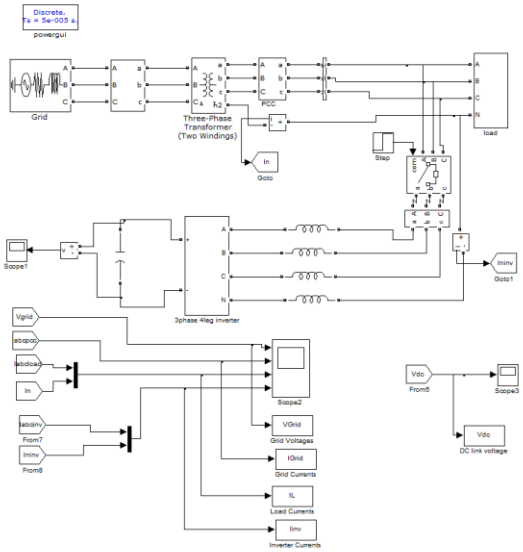

Fig. 2. Simulink Design of Distributed Generation system

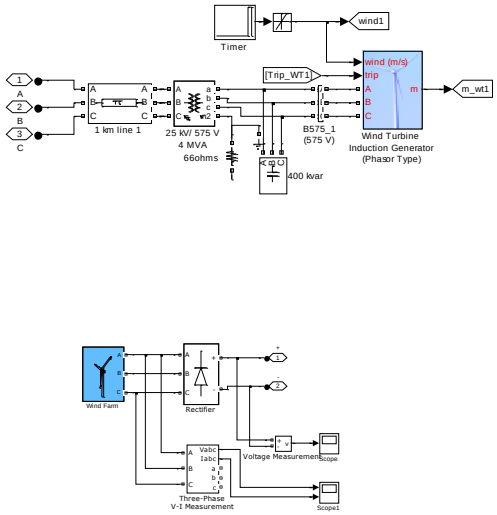

Fig. 3. Simulink Design of Wind Energy system

III. PROPOSED CONTROL STRATEGIES

A. ***DC- Link voltage and Power Control Operation*** Due to the intermittent nature of RES, the generated power is of variable nature. The dc-link plays an important role in transferring this variable power from renewable energy source to the grid. RES are represented as current sources connected to the dc-link of a grid-interfacing inverter. Fig. 4 shows the systematic representation of power transfer from the renewable energy resources to the grid via the dc-link. The current injected by renewable into dc-link at voltage level V_{dc} can be given as

$$\mathbf{I_{dc1} = P_{res} / V_{dc}} \quad \textbf{(1)}$$

where P_{res} is the power generated from RES. The current flow on the other side of dc-link can be represented as,

$$\mathbf{I_{dc2} = P_{inv} / V_{dc} = P_G + P_{Loss} / V_{dc}} \quad \textbf{(2)}$$

where P_{inv}, P_G and P_{Loss} are total power available at grid-interfacing inverter side, active power supplied to the grid and inverter losses, respectively. If inverter losses are negligible then

$$P_{res} = P_G$$

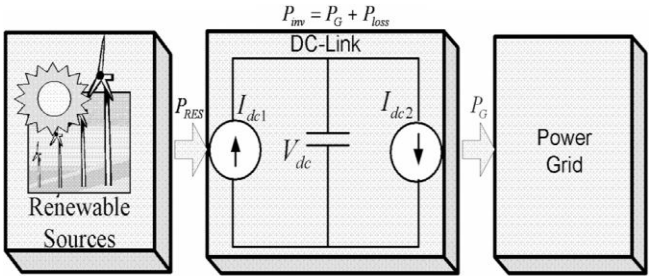

Fig. 4. DC- Link equivalent diagram.

B. Control of Grid Interfacing Inverter

The control diagram of grid- interfacing inverter for a 3-phase 4-wire system is shown in Fig. 5. The fourth leg of inverter is used to compensate the neutral current of load. The main aim of proposed approach is to regulate the power at PCC during: 1) $P_{res=0}$; 2) P_{res} < total load power (P_L); 3) P_{res} > total load power. While performing the power management operation, the inverter is actively controlled in such a way that it always draws/ supplies fundamental active power from/ to the grid. If the load connected to the PCC is non-linear or unbalanced or the combination of both, the given control approach also compensates the harmonics, unbalance, and neutral current.

The duty ratio of inverter switches are varied in a power cycle such that the combination of load and inverter injected power appears as balanced resistive load to the grid.

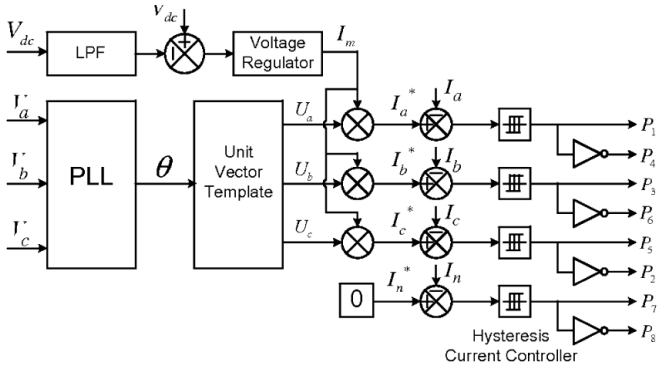

Fig. 5. Block diagram representation of grid-interfacing inverter control

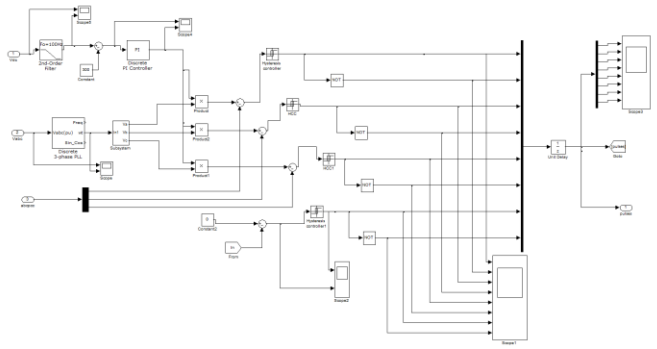

Fig.6. Simulink Design of Grid Interfacing Inverter Control

The regulation of dc-link voltage carries the information regarding the exchange of active power in between renewable source and grid. Thus the output of dc-link voltage regulator results in an active current (I_m). The multiplication of active current component (I_m) with unity grid voltage vector templates (U_a, U_b, and U_c) generates the reference grid currents (I_a^*, I_b^* ,and I_c^*). The reference grid neutral current (I_n^*) is set to zero, being the instantaneous sum of balanced grid currents. The grid synchronizing angle (θ) obtained from phase locked loop (PLL) is used to generate unity vector template as [9]–[11]

$$U_a = \mathrm{Sin}(\theta) \quad (3)$$

$$U_b = \mathrm{Sin}(\theta - 2\Pi/3) \quad (4)$$

$$U_c = \mathrm{Sin}(\theta + 2\Pi/3). \quad (5)$$

The actual dc-link voltage is sensed and passed through a first-order low pass filter (LPF) to eliminate the presence of switching ripples on the dc-link voltage and in the generated reference current signals. The difference of this filtered dc-link voltage and reference dc-link voltage (V_{dc}^*) is given to a discrete-PI regulator to maintain a constant dc-link voltage under varying generation and load conditions. The dc-link voltage error $V_{dcerr(n)}$ at nth sampling instant is given as:

$$V_{dcerr\,(n)} = V_{dc(n)}^* - V_{dc(n)}. \quad (6)$$

The output of discrete-PI regulator at nth sampling instant is expressed as

$$I_{m(n)} = I_{m(n-1)} + K_{PVdc}\,(V_{dcerr\,(n)} - V_{dcerr\,(n-1)}) + K_{IVdc}\,V_{dcerr(n)} \quad (7)$$

where K_{PVdc} = 10 and K_{IVdc}= 0.05 are proportional and integral gains of dc-voltage regulator. The simulink design of grid interfacing inverter using PI controller is shown in Fig. 6. The instantaneous values of reference three phase grid currents are computed as

$$I_a^* = I_m.U_a \quad (8)$$

$$I_b^* = I_m.U_b \quad (9)$$

$$I_c^* = I_m.U_c. \quad (10)$$

The neutral current, present if any, due to the loads connected to the neutral conductor should be compensated by forth leg of grid-interfacing inverter and thus should not be drawn from the grid. In other words, the reference current for the grid neutral current is considered as zero and can be expressed as

$$I_n^* = 0. \quad (11)$$

The reference grid currents (I_a^*, I_b^*, I_c^*, and I_n^*) are compared with actual grid currents (I_a, I_b, I_c and I_n) to compute the current errors as

$$\mathbf{I_{aerr} = I_a^* - I_a} \quad (12)$$
$$\mathbf{I_{berr} = I_b^* - I_b} \quad (13)$$
$$\mathbf{I_{cerr} = I_c^* - I_c} \quad (14)$$
$$\mathbf{I_{nerr} = I_n^* - I_n.} \quad (15)$$

These current errors are given to hysteresis current controller. The hysteresis controller then generates the switching pulses (P_1 *to* P_8) for the gate drives of grid-interfacing inverter. The average model of 4-leg inverter can be obtained by the following state space equations

$$\mathbf{dI_{Inva}/dt = (V_{Inva} - V_a) / L_{sh}} \quad (16)$$
$$\mathbf{dI_{Invb}/dt = (V_{Invb} - V_b) / L_{sh}} \quad (17)$$
$$\mathbf{dI_{Invc}/dt = (V_{Invc} - V_c) / L_{sh}} \quad (18)$$
$$\mathbf{dI_{Invn}/dt = (V_{Invn} - V_n) / L_{sh}} \quad (19)$$
$$\mathbf{dV_{dc}/dt = (I_{Invad}+I_{Invbd}+I_{Invcd}+I_{Invnd})/C_{dc}} \quad (20)$$

Where V_{Inva}, V_{Invb}, V_{Invc}, and V_{Invn} are the three-phase ac switching voltages generated on the output terminal of inverter. These inverter output voltages can be modeled in terms of instantaneous dc bus voltage and switching pulses of the inverter as

$$\mathbf{V_{Inva} = (P_1 - P_4)V_{dc}/2} \quad (21)$$
$$\mathbf{V_{Invb} = (P_3 - P_6)V_{dc}/2} \quad (22)$$
$$\mathbf{V_{Invc} = (P_5 - P_2)V_{dc}/2} \quad (23)$$
$$\mathbf{V_{Invn} = (P_7 - P_8)V_{dc}/2} \quad (24)$$

Similarly the charging currents I_{Invad}, I_{Invbd}, I_{Invcd} and I_{Invnd} on dc bus due to the each leg of inverter can be expressed as

$$\mathbf{I_{Invad} = I_{Inva} (P_1 - P_4)} \quad (25)$$
$$\mathbf{I_{Invbd} = I_{Invb} (P_3 - P_6)} \quad (26)$$
$$\mathbf{I_{Invcd} = I_{Invc} (P_5 - P_2)} \quad (27)$$
$$\mathbf{I_{Invnd} = I_{Invn} (P_7 - P_8)} \quad (25)$$

C. *Switching Control Of IGBTs*

The switching pattern of each IGBT inside inverter can be formulated on the basis of error between actual and reference current of inverter, which can be explained as:

If $\mathbf{I_{Inva} < (I_{Inva}^* - h_b)}$, then upper switch S_1 will be OFF (P_1=0) and lower switch S_4 will be ON (P_4=1) in the phase "a" leg of inverter.

If $\mathbf{I_{Inva} > (I_{Inva}^* - h_b)}$, then upper switch S_1 will be OFF (P_1=0) and lower switch S_4 will be ON (P_4=1) in the phase "a" leg of inverter.

where h_b is the width of hysteresis band. On the same principle, the switching pulses for the other remaining three legs can be derived.

IV. SIMULATION RESULTS

In order to verify the proposed control approach to achieve multi-objectives for grid interfaced DG systems connected to a 3-phase 4-wire network, an extensive simulation study is carried out using MATLAB/Simulink. A 4-leg current controlled voltage source inverter is actively controlled to achieve balanced sinusoidal grid currents at unity power factor (UPF) despite of highly unbalanced nonlinear load at PCC under varying renewable generating conditions. A RES with variable output power is connected on the dc-link of grid-interfacing inverter. An unbalanced 3-phase 4-wire nonlinear load, whose unbalance, harmonics, and reactive power need to be compensated, is connected on PCC. The system parameter is given in Table I shown.

TABLE I
SYSTEM PARAMETER

3-phase Supply (r.m.s.)	:	V_g=30 *V*, 60 *Hz*
3-phase Non-linear Load	:	R=26.66Ω, L=10 *mH*
1-phase Linear Load (A-N)	:	R=36.66Ω, L=10 *mH*
1-phase Non-Linear Load (C-N)	:	R=26.66Ω, L=10 *mH*
DC-Link Capacitance & Voltage:		C_{dc}=3000 *μF*, V_{dc}=90 *V*
Coupling Inductance	:	L_{sh}=2.0 *mH*

Initially, the grid-interfacing inverter is not connected to the network (i.e., the load power demand is totally supplied by the grid alone). Therefore, before time t=0.72s, the grid current profile in Fig. 7(b) is identical to the load current profile of Fig. 7(c). At t=0.72s, the grid-interfacing inverter is connected to the network. At this instant the inverter starts injecting the current in such a way that the profile of grid current starts changing from unbalanced non linear to balanced sinusoidal current as shown in Fig. 7(b). Fig. 14. shows the simulation results for load and inverter. It can be noticed that as the inverter also supplies the load neutral current demand, the grid neutral current (In) becomes zero after t=0.72 s. The load neutral current due to single phase loads is effectively compensated by the fourth leg of the inverter such that the current in the grid side neutral conductor is reduced to zero.

At t=0.72 s, the inverter starts injecting active power generated from RES (P_{res}=P_{inv}). Since the generated power is more than the load power demand the additional power is fed back to the grid. The negative sign of P_{grid}, after time 0.72 s suggests that the grid is now receiving power from RES. Moreover, the grid-interfacing inverter also supplies the load reactive power demand locally. Thus, once the inverter is in operation the grid

only supplies/receives fundamental active power which is shown in Fig. 9.

At t=0.82 s, the active power from RES is increased to evaluate the performance of system under variable power generation from RES. This results in increased magnitude of inverter current. As the load power demand is considered as constant, this additional power generated from RES flows towards grid, which can be noticed from the increased magnitude of grid current as indicated by its profile. At t=0.92s, the power available from RES is reduced. The corresponding change in the inverter and grid currents can be seen from Fig. 7. The active and reactive power flows between the inverter, load and grid during increase and decrease of energy generation from RES can be noticed from Fig. 8. The dc-link voltage across the grid- interfacing inverter (Fig. 8(d)) during different operating condition is maintained at constant level in order to facilitate the active and reactive power flow. Thus from the simulation results, it is evident that the grid-interfacing inverter can be effectively used to compensate the load reactive power, current unbalance and current harmonics in addition to active power injection from RES. This enables the grid to supply/ receive sinusoidal and balanced power at UPF.

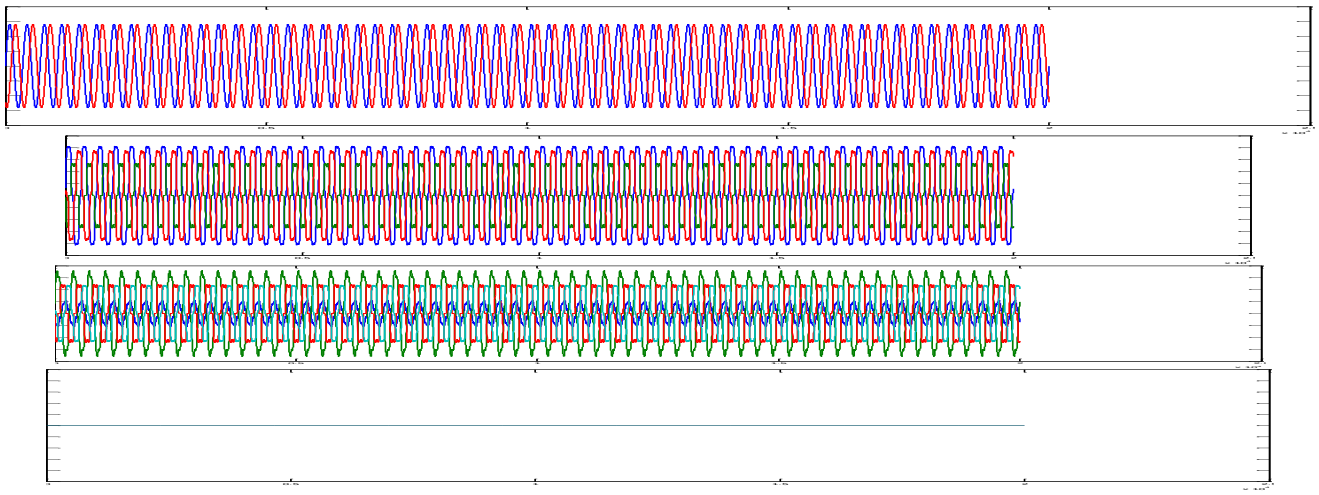

Fig. 7. Simulation results: (a) Grid voltages, (b) Grid currents, (c) Unbalanced load currents, (d) Inverter currents under absence of inverter.

Fig. 8. Simulation results: (a) PQ- Grid, (b) PQ- Load, (c) PQ- Inverter, (d) dc- link voltage under the absence of inverter.

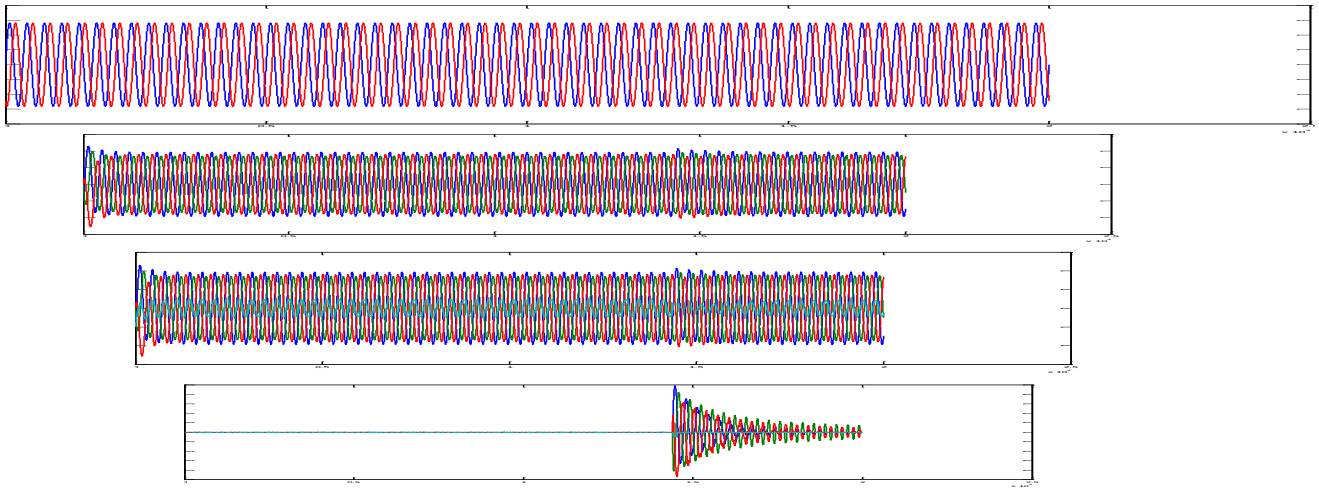

Fig. 9. Simulation results for the active power filtering mode ($P_{res}=0$) (a) Grid voltages, (b) Grid currents, (c) Load currents, (d) Inverter currents.

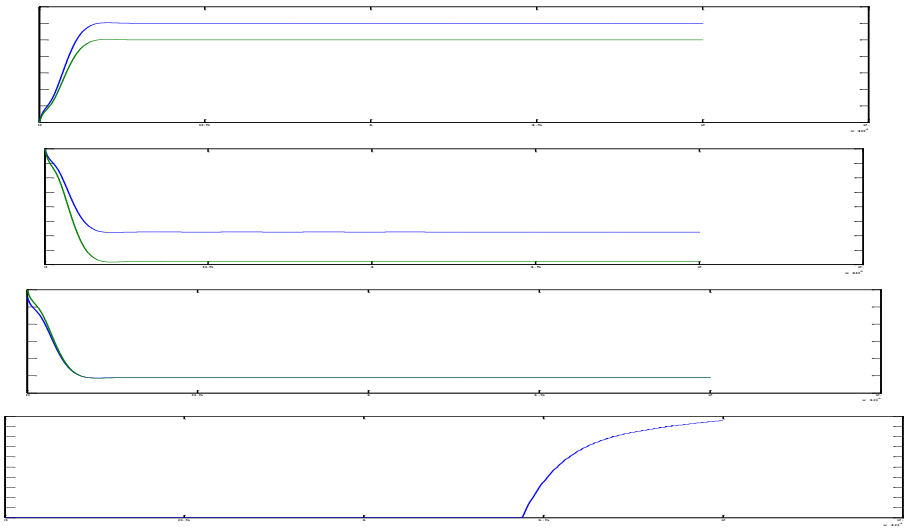

Fig. 10. Simulation results: (a) PQ- Grid, (b) PQ- Load, (c) PQ- Inverter (d) dc- link voltage when there is no power generation from RES

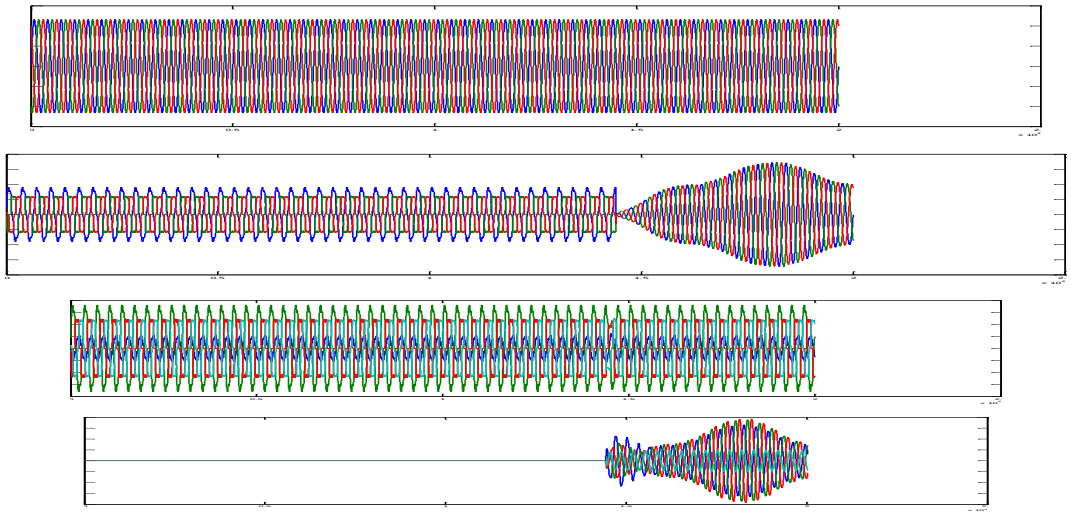

Fig. 11. Simulation results for the active power filtering and renewable power injection mode: (a) Grid voltages, (b) Grid currents, (c) load currents, (d) Inverter currents.

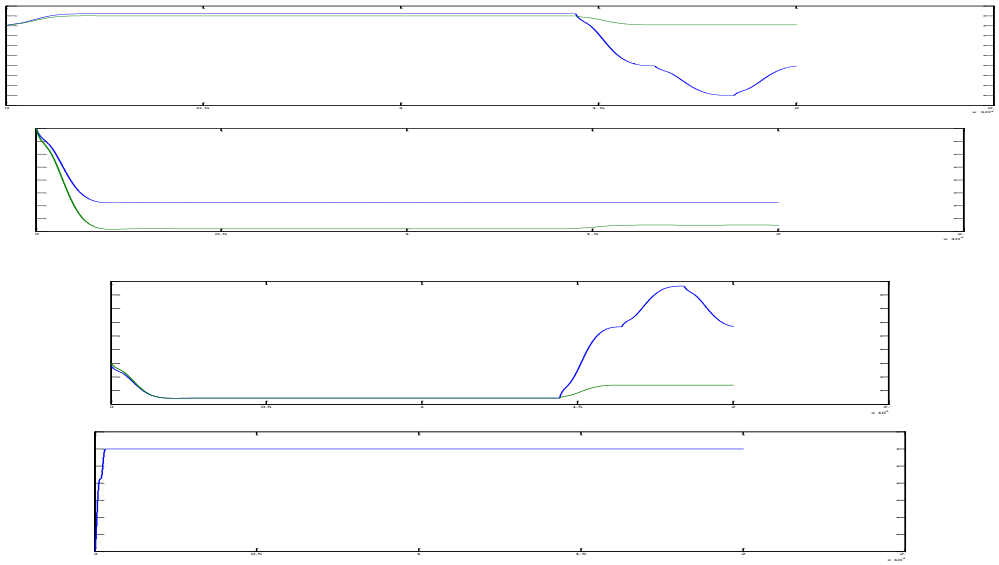

Fig. 12. Simulation results for the active power filtering and renewable power injection mode: (a) PQ- Grid, (b) PQ- Load, (c) PQ- Inverter, (d) dc- link voltage.

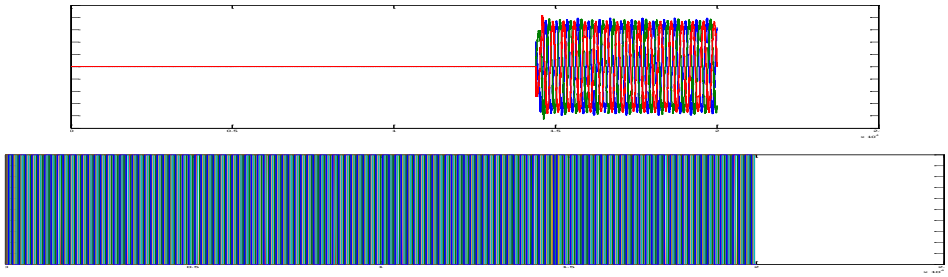

Fig. 13. Simulation results: (a) Inverter voltage, (b) Switching pulses for inverter.

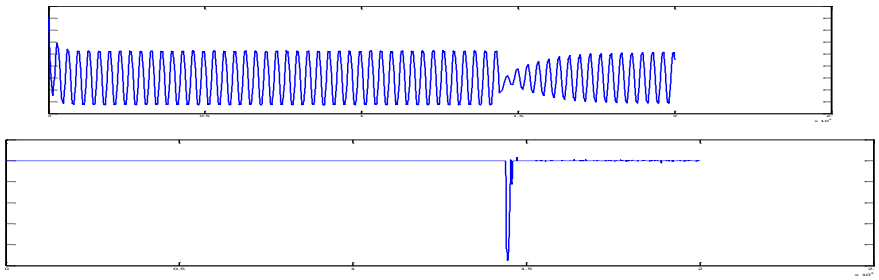

Fig. 14. Simulation results: (a) Load neutral current , (b) Inverter neutral currents.

V. CONCLUSION

This paper has presented a novel control of an existing grid interfacing inverter to improve the quality of power at PCC for a 3-phase 4-wireDGsystem. It has been shown that the grid-interfacing inverter can be effectively utilized for power conditioning without affecting its normal operation of real power transfer. The grid-interfacing inverter with the proposed approach can be utilized to:
i) inject real power generated from RES to the grid, and/or,
ii) operate as a shunt Active Power Filter (APF).
This approach thus eliminates the need for additional power conditioning equipment to improve the quality of power at PCC. Extensive MATLAB/Simulink simulation approach and have shown that the grid-interfacing inverter can be utilized as a multi-function device.
It is further demonstrated that the PQ enhancement can be
achieved under three different scenarios: 1)P_{res}=0 , 2)P_{res}< P_{Load} , and 3) P_{res} > P_{Load}. The current unbalance, current harmonics and load reactive power, due to unbalanced and non-linear load connected to the PCC, are compensated effectively such that the grid side currents are always maintained as balanced and sinusoidal at unity power factor. Moreover, the load neutral current is prevented from flowing into the grid side by compensating it locally from the fourth leg of inverter. When the power generated from RES is more than the total load power demand, the grid-interfacing inverter with the proposed control approach not only fulfills the total load active and reactive power demand (with harmonic compensation) but also delivers the excess generated sinusoidal active power to the grid at unity power factor.

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Various Techniques Used For Prioritization of Test Cases

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***Abstract*-** The Software testing phase of the development life cycle model of software plays a very important role in deciding the quality and functionality of the software. The Testing of the software is done to detect the fault in its functionality and on the basis of its performance further quality of software is improved. In the software testing phase there is a task involved which is prioritization of Test cases. In this paper we have discussed about test case prioritization, what is the need of test cases prioritization? And the various techniques proposed by researchers for performing the test case prioritization.

***Index Terms*-** Test Case, Test Suite, Test Case prioritization, fault, APFD

I. INTRODUCTION

In general, a Software Development Life Cycle consists of main four Requirement gathering, design and analysis, Development of prototype and then testing and maintenance.
As the name reveals in the first phase requirement from the point of view of the users as well as other stakeholder are collected, in the second phase designing is done, in the third phase implementation is done and the fourth phase is Testing and Maintenance, the testing include the execution of the program or an application with an intent of finding software errors and faults in the application executed. The testing is also known as the process of validating and verifying that software meets the business and technical requirements that guided its design and developments [3], so that it works according to the need of the stakeholders.
Now, on further discussion there is various type of testing that software tester prefer to use according to their need. These can be Mutation Testing, Regression Testing, white Box Testing, black box testing mainly.
Depending upon the type of the testing the tester designs the test Cases and the collection or set of many test cases is known as Test Suite. So during the testing phase to perform the testing the tester decides the test cases, then executes the software with those test cases and then check and verifies the results produced by those executions. After the verification the faults are detected in the application and tell the developer about the improvements required means validation is followed by the verification of the application. The testing id performed to ensure the stakeholders about the quality and functionality of the applications.
The regression testing one of the testing techniques is the testing in which testing is performed on the modified application using the same previously defined sets of Test cases. When an application is developed and it is tested for the first time a set of test cases means test suite is designed to verify and validate its functionality. The tester keeps this test suite with them for further use. When a modification is done in the application then these previously designed test suites are used by testers to ensure that no new errors have been introduced in the previously tested code [4].
But to execute all the test cases to check a small modification is not worth full. It is impractical and inefficient to re execute every test for every program function if once modification occurs. Further it becomes very expensive technique also by executing the all test for a small change. Therefore to reduce the cost of the regression technique and to make it more effective the concept of test case prioritization was introduced by the researchers.
In the test case prioritization the test cases are prioritized and scheduled in order that attempts to maximize some objective function. To decide the priority of the test cases the various factors depending upon the need are decided then the priority is assigned to the test cases. Test case prioritization provides a way to schedule and run test cases, which have the highest priority in order to provide earlier detect faults. Furthermore,
In [3] it is mentioned that Gregg Rothermel has proven that prioritization and scheduling test cases are one of the most critical task during the software testing process as he has given an example of industrial collaborators reports, which shows that there are approx 20,000 lines of code, running the entire test cases require seven weeks. In this situation prioritization of test cases plays a vital role to save the time.
In addition to this [3] have given three reasons that are why we need to do the prioritization of the test cases. These reasons are as below:

The regression testing phase is time as well as cost consuming
Lack of time and resources to run all the test cases again
Need to decide which test cases to run first
Thus in the paper we have discussed the various proposed techniques for prioritization of the test cases.

Further sections are organized as: description of classes on the basis of which various prioritization techniques are classified, description of Prioritization technique based on APFD, Prioritization technique based on Fault Severity, Prioritization in Regression testing in section II, III, IV, and V respectively.

Finally the future work and a conclusion of the discussion are provided in last section.

II. FACTORS FOR CLASSIFICATION OF THE PRIORITIZATION TECHNIQUES

It has been previously said that the techniques for the prioritization of the test cases depends upon various factors. In

this section we have discussed the various factors that classify the prioritization techniques in the different classes.

1) Customer requirements –

In the customer requirements based prioritization techniques test cases are prioritized on the factors decided on keeping in mind the requirements of customers documented during the phase of requirements gathering.
Some of the factors proposed to rank the test cases for this approach are customer assigned priority (CP), requirement complexity (RC) and requirements volatility (RV). These factors are assigned a value and higher factor values indicate a need for prioritization of test case related to that requirement.

2) Coverage Based-

In the prioritization techniques based on coverage the prioritization of the test cases are on the quantity of the source code of a program that has been exercised during testing [3].
In the context of testing the word coverage means the part of code that has been covered during the process of the testing or it can be requirement coverage, total requirement coverage, additional requirement coverage; therefore in this approach the test cases having the capability of testing the major part of code are prioritized first and so on.

3) Cost Effective-

In this approach the test cases are prioritized on the basis of the cost factor. The cost can be the cost of requirement gathering, cost of regression testing, cost of execution and validating test cases, cost of analyses to select and support a test case, cost of prioritization of test cases. Thus, the test cases requiring the less cost will get the higher priority.

4) History based-

In this approach the test cases are prioritized based upon the history of the test case itself it means priority of test case depends upon its previous performance. The execution history of the test case increases or decreases the likelihood that it will be used in the current testing session [3].

For the detailed study of these four approaches discussed you can refer to [1].

III. PRIORITIZATION BASED ON APFD

In this section we have discussed a test case prioritization technique which is based on the rate at which fault is detected in the code under test. In the [1], they have proposed a technique in which two criteria are used to decide a factor on the basis of which the priorities to the test cases are assigned.

The first criterion is the number of the code lines or statement covered by a test case. The first is symbolized by St

Statement coverage (St) = (No. of statements covered /total number of statements) * 100

The second criterion is number of function calls in the covered statement. This is symbolized by Fc.

No. of Function calls (Fc) = Local functions + nested functions + private functions + overloaded methods

Both the criteria are counted in the numerical value.

The factor used to prioritize the test cases is the product of these two numerical values and this factor is symbolized by P.

Product (P) = Statement coverage (St) * Number of the Function Calls (Fc)

Thus the value of P for each test case of a test suite is calculated using this formula and the test case having higher value is given the higher priority.

In [1], they have used a metric known as APFD (Average Percentage of Fault detected) to compare the fault detection rate of the prioritized and non prioritized test cases. The APFD for both the test suites is calculated and then compared. The formula used to get the value of APFD is given below

$$APFD = 1- \{(TF1 + TF2 + TF3\ldots\ldots TFm) / mn \} + (1/2n)$$

Where,

n is the number of test cases in a test suite
m is the number of faults
TFi is the position of first test in T that exposes fault i.

In [1] they have proved that the value obtained for the test suite having prioritized test cases has the higher value for the APFD. For further detailed study of this approach you can refer to [1].

IV. PRIORITIZATION USING FAULT SEVERITY

In this section we are going to discuss a technique which is based on prioritization of technique in which priority to the test cases are assigned depending upon the priority of the requirement to be tested. The requirement to be tested first is assigned the higher weight and the test cases covering that requirement are given higher priority of execution. In this approaches the requirements considered are based on fault severity that is the number of times the fault can occur in the code that code is required to be tested first thus given the higher weight.

The four factors are proposed by [2], to decide the weight of the requirement. These four factors are described in brief below

1) Business value Measure-

This is the factor in which the requirements are assigned rank according to their importance. Most critical requirement is

assigned higher number (10) and least important requirement is assigned the lowest number (1).

2) Project Change Volatility-

This factor depends upon the times consumer is modifying the project requirements during the software development cycle. The biggest causes of the project failure happen to be the lack of user inputs and the changing and incomplete requirements [4].

3) Development Complexity-

Development efforts, technology used for development, environmental constraints and the time consumed or required decides the complexity of the development phase.

4) Fault Proneness of Requirements-

This is the very direct factor for assigning weight to requirement. This factor considers those requirements which are error prone according to the historical data such as requirement failure reported by the customer.

Thus on the basis of this weight is assigned to each requirement and depending upon this the weighted prioritization factor that measures the importance of testing a requirement earlier is calculated and the test cases are assigned priority. This is the first step of the proposed technique.

The second step is to assign severity measure to the each fault. The range of severity measure varies as below:

Complex (Severity 1): SM value of 9-10
Moderate (Severity 2): SM of 6
Low (Severity 3) :SM of 4
Very Low (Severity 4): SM of 2

This is done to calculate the total severity of the Faults Detected (TSFD). This is the summation of the measures of the all faults identified.
This is how the test cases are prioritized first requirements are prioritized then test cases against each requirements is mapped , then executed according to the priority assigned and the results are analyzed based on fault severity.

V. PRIORITIZATION IN CASE OF REGRESSION TESTING

In this section prioritization of test cases in case of regression testing will be discussed. In [5], authors have presented nine techniques which could be used for this purpose. These techniques are discussed in brief as follows:

1) No prioritization

In this case no techniques are implemented and is been used as a untreated test suit and it serves as a control.

2) Random prioritization

This is applied to have an additional control in studies where the test cases are ordered randomly in the test suite.

3) Optimal prioritization

In this technique known faults are been used so that its results can be used to measure the effects of other prioritization techniques which are to be used

4) Total statement coverage prioritization

This technique instrument the program with any test cases and finds out that which statements were covered by the test cases; then these test cases can be prioritized on the bases of number of statements they covered. If more than one tests case covers equal number of statements then we have use some additional rules or we can order them randomly.

5) Additional statement coverage prioritization

This method covers the shortcomings of total statement coverage technique and iteratively selects a test case that gives the highest statement coverage and then adjusts the coverage information on rest of the test cases to find out their statements not yet covered. This whole process is repeated till at least one test case covers all the statements.

6) Total branch coverage prioritization

This technique is same as statement coverage prioritization but it just uses test coverage measured in form of program branches as there was the case of statements in other technique.

7) Additional branch coverage prioritization

This technique is same as additional statement coverage prioritization but the only difference is that it uses test coverage measured in term of program branches and not in statements.

8) Total fault-exposing potential prioritization

Other method like statement and branch coverage takes in context that whether a statement or branch is been reached by some test cases or not and do not takes in context the case that some faults are more easily seen as compared to others. As some test cases can expose faults more easily as compared to others, so it is called as fault-exposing potential of a test case.

9) Additional fault-exposing potential prioritization

As additions were made in total coverage and branch coverage prioritization, extensions were made in total fault-exposing potential prioritization and as a result this technique is created where we extend total FEP to create additional FEP prioritizations.

VI. CONCLUSION AND FUTURE WORK

In this paper we have briefly discussed and reviewed the various techniques for the test cases prioritization and the various factors responsible for classification of the techniques. All the algorithms have their own field of use.

Further research will be focused on studying the other prioritization techniques and on implementing the proposed algorithms in order to get the good results in testing phase of the application.

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Chemopreventive Activity of Green Tea Polyphenol in Laryngeal Cancer Cells

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Abstract- The present study was to investigate the possible chemopreventive activity of green tea polyphenol, (-)-Epigallocatechin-3-gallate (EGCG) on laryngeal cancer cells. Cell viability was evaluated using MTT assay. Activity of superoxide dismutase, cytotoxicity was assessed using lactate dehydrogenase and clonogenic assay was done using crystal violet stain. Apoptotic cell death was confirmed by DNA fragmentation and cell cycle arrest was analyzed by flow cytometry using propedium iodide. The obtained results showed that the cell viability of Hep2 cells was very much reduced in EGCG treated cells. Significant increase in SOD activity ($p<0.001$) and a significant decrease in LDH activity ($p<0.001$) was noticed in EGCG treated group. Clonogenic assay and continuous shear in DNA fragmentation was observed in EGCG treated group.

Index Terms- Apoptosis; (-)-Epigallocatechin-3-gallate; DNA fragmentation; Hep2 cells; Antioxidants

I. INTRODUCTION

Catechins found in green tea comprise of: epicatechin (EC), epigallocatechin (EGC), epicatechin-3-gallate (ECG) and (-) - epigallocatechin-3- gallate (EGCG)[1]. EC appears to increase the incorporation of EGCG and ECG into lipid bilayers, emphasizing the importance of synergistic effects between the various green tea components[2]. Of these 30% polyphenol content and 58.5% is EGCG. A potent antioxidant enzyme, superoxide dismutase in suppressing cell growth in a variety of cancer cell lines[3]. Accordingly, chemical and enzymatic antioxidants have been shown to suppress tumor cell growth[4,5]. EGCG is known to be the most active catechin, although combinations of catechins proved its antioxidant[6], anti – cancer[1], anti – inflammatory[7], anti-HIV[8] and anti – diabetic[9].

Laryngeal carcinoma accounts for 26% of all the head and neck cancers[10] and 90% of laryngeal cancer are of squamous cell type while the remaining 10% is of the verrucous type[11]. In India, incidence of laryngeal cancer is 70%. About 12,500 new cancer cases of the larynx occur each year in which 78% are males and 22 % are females[10]. Multimodality treatment for laryngeal carcinoma includes surgery, chemotherapy and external beam radiation therapy[12] and high-energy x-rays are also used to kill cancer cells[13]. 5-Fluorouracil (5-FU), a pyrimidine antagonist is a chemotherapeutic drug which is used in the treatment of a wide range of cancers[14]. Detection of the antioxidant status may be useful to determine the tumor resistance to therapy, and to choose the correct treatment regimen.

Hep2 cell line was chosen as an *in vitro* model for laryngeal carcinoma for the present study. The chemotherapeutic effect of EGCG on this cell line was studied on the basis of its effectiveness in other types of cancers. 5-FU is a synthetic chemotherapeutic drug used for treatment of various cancers including laryngeal carcinoma.

II. MATERIALS AND METHODS

Experimental Design

The present experimental study includes four groups; group1-Hep2 cell line (cell control); group2 -DMSO control; group3-Hep2 cell line + EGCG (27.4µg); group4-Hep2 cell line + 5-FU (0.5µM).

Preparation of EGCG

58.4g of EGCG was present in 100g of total polyphenol content of green tea, obtained after solvent extraction and high performance liquid chromatography purification. So 125mg of polyphenol extract was weighed containing 73mg of EGCG and dissolved in DMEM medium and filter sterilized through membrane filter of 0.2µm and final concentration was 3.65µg/µL and stored at 4°C.

Preparation of 5 - FU

0.5µM of 5-FU was prepared in 0.1% DMSO in DMEM media and this drug was filter sterilized through 0.2µm filter and stored at 4°C.

Cell culture

Hep2 cells were obtained from National Centre for Cell Science (NCCS), Pune, and cells were maintained in Dulbeco's Modified Essential Medium supplemented with 10% fetal bovine serum, 2mM L-Glutamine (Gibco, India), 100IU / ml penicillin, 100µg / ml streptomycin and kanamycin, 20µg/ml amphotericin B from Himedia, India was prepared and stored at 4°C. The cells were incubated at 37°C in a humidified atmospheric condition with 5% CO_2 in a CO_2 chamber.

Cell Viability assay

Cell viability was assessed using MTT [3-24, 5-imethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide] by the

method reported by Wilson [15]. Briefly, Hep2 cells were seeded in 96–well plates at a density of 1 x 10^4 cells per well. After 48h, cells were treated with IC_{50} of the drugs and further incubated with 24h in a humidified CO_2 incubator provided 5% CO_2. MTT (0.5mg/mL) was added to each well in the concentration of 0.5mg/mL and cells were incubated at 37°C for overnight. Formosan crystals formed were dissolved in DMSO, and plates were read on the microplate reader at a wavelength of 595nm.

Cell preparation for antioxidant assay

A total of 4x10^4 cells / well were seeded in a 24 well plate and incubated at 37°C in a 5% humidified CO_2 chamber for 48 hours. After incubation, cells were treated with IC_{50} concentration of EGCG and 5-FU. Cells with 0.1% DMSO served as a solvent control and cells without any addition was considered as test control. The cells were incubated for an additional 24 hours. After incubation, the media was collected in a separate tube and this was used for the cytotoxicity assay. Cells were washed with phosphate buffered saline, trypsinised and collected in a separate tube. These cells were sonicated under cooling with ice in 10mM potassium phosphate (pH7.4) containing 30Mm potassium chloride. After extraction for 30 minutes, the homogenates were centrifuged (20,000xg, 15 minutes). The cell supernatant and cell suspension were stored at -80°C till the analysis.

Assay of Superoxide Dismutase

Superoxide dismutase (SOD) was determined in terms of its ability to catalyze the disproportionation of O_2^- in alkaline aqueous solution. The disproportionation was directly studied in a spectrophotometer by the method of Misra and Fridovich[16]. Briefly, different test tubes were labeled for supernatant and cell suspension respectively. To each tube, 1.25ml of carbonate buffer (0.05M, pH-10.2), 250µl of 1mM EDTA, 25µl of supernatant were added to tubes. Added 100µl of 0.1% epinephrine to all the tubes while reading. Blank was prepared without enzymes.

Assay of Lactate Dehydrogenase (LDH)

The cytotoxicity was assessed by assaying LDH by the method of Nieland[17]. Briefly, to a set of test tubes, 200µl of the buffered substrate consists of 2.3mM of lithium lactate in 0.1M of glycine buffer and 0.1N sodium hydroxide solution (NaOH) and 20µl of sample, the tubes were incubated at 37°C for 15 minutes. Added 40µl of 20mM Nicotinamide Adenine Dinucleotide and incubated for another 15minutes at 37°C. The reaction was arrested by adding 200µl of 0.2% DNPH reagent and incubated the tubes for another 15 minutes at 37°C. 20µl of sample added to control tubes after arresting the reaction with 200µl of 0.2% DNPH. Added 1.4ml of 0.4N NaOH and color developed was read at 420nm in a UV-Spectrophotometer.

Clonogenic Assay

A slight modification in the protocol of Kishore *et al* [18]. Briefly, 1x10^3 cells/well were grown on the 6 well plate for 7 days with and without treatment of EGCG and 5-FU. After the treatment period cells were washed with 0.1M phosphate buffered saline and fixed with ice-cold absolute methanol for 2 minutes. Then the cells were stained using crystal violet (0.5% in 25% methanol) for ten minutes. Excessive stains were removed by washing and colonies were counted under microscope.

Detection of DNA Fragmentation

Inter-nucleosomal cleavage of DNA was analyzed as given below. Briefly, cells were treated with EGCG (27.4µg) and 5-FU (0.5µM). The plate was incubated with required time points. Cells were washed twice with ice-cold PBS and resuspended in lysis buffer containing 10mM Tris-HCl (pH 8.0), 20mM EDTA and 0.5% Triton X-100 and incubated for 30minute in ice. After centrifugation at 10000 rpm for 10minutes at 4°C, DNA was extracted with phenol chloroform, precipitated with 0.1 volume 3M sodium acetate and 2.5volume ethanol and stored at -20°C for overnight. DNA was pelleted by centrifugation at 10000 rpm for 5minutes at 4°C, rinsed with 70% ethanol and then resuspended in TE buffer (10mM Tris-HCl, pH 7.4, and 1mM EDTA, pH 8.0) containing, 20µg/mL proteinase K and 30µg/mL RNase and incubated for 6 hours at 37°C. DNA was run on a 2% agarose gel with 1.0µg/mL ethidium bromide staining. After electrophoresis, DNA was visualized under UV inspection chamber and documented.

III. Statistical Analysis

Statistical analysis of the data was performed using student's "t" test and analysis of variance (ANOVA). The level of significance was studied comparing with control group. All values are expressed as mean ± SD. $p \leq 0.05$ is considered as statistically significant.

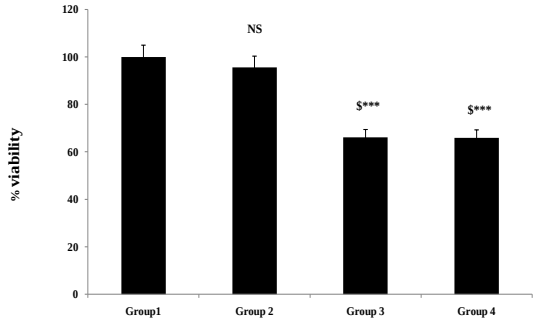
IV. Result

Considering Group 1 as 100% cell viability, cell viability % of other groups are calculated using formula:

$$\text{Cell viability \%} = \frac{\text{OD of test}}{\text{OD of control}} \times 100$$

The cell count was significantly decreased in group3 and 4 ($p<0.001$) when compared to group1. No significant reduction was noticed in group2 when compared to group1 (Fig.1).

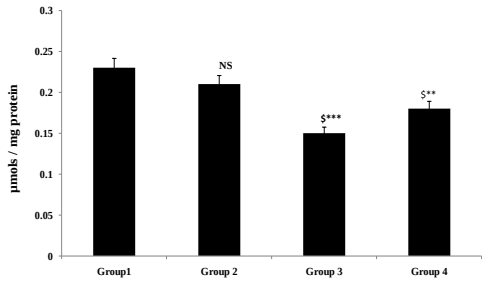
Fig. 1: MTT Assay showing Percentage Viability of Hep2 cells



Statistically significant values of group 2 –group 4 were compared with group 1. NS –Non Significant , ***p < 0.001, $<0.0001 (ANOVA). Group 1 - Hep 2 cell line (control), Group 2 DMSO control, Group 3 - Hep 2 cell line + EGCG, Group 4 – Hep 2 cell line + 5FU

The increased activity of SOD ($p<0.001$) was noticed in group3 when compared to group1. No significant changes were noticed in groups2 and 4 compared to group1 (Fig.2).

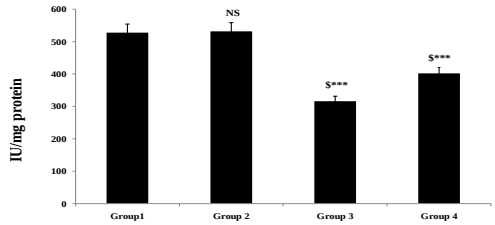
Fig. 2: Activity of Superoxide dismutase in Hep2 cells treated with EGCG and 5-FU



Statistically significant values of group 2 –group 4 were compared with group 1. NS –Non Significant , ***p < 0.001, $<0.0001 (ANOVA). Group 1 - Hep 2 cell line (control), Group 2 DMSO control, Group 3 - Hep 2 cell line + EGCG, Group 4 – Hep 2 cell line + 5FU

The statistically significant decrease ($p< 0.001$) in the activity of LDH in group3 was observed in group1. Increased activity was noticed in group4 ($p< 0.001$) compared to group1. No significant changes were observed in group2 as compared to group 1 (Fig.3).

Fig. 3: Lactate Dehydrogenase Release in Hep2 cells treated with EGCG and 5-FU



Statistically significant values of group 2 –group 4 were compared with group 1. NS –Non significant, ***p < 0.001, $<0.0001(ANOVA). Group 1 - Hep 2 cell line (control), Group 2 – DMSO control, Group 3 - Hep 2 cell line + EGCG, Group 4 – Hep 2 cell line + 5FU

The clonogenic assay showed the effectiveness of the treatment with EGCG than 5-FU which was evident in group3 compared with group1 (Table 1; Fig.4).

Fig. 4: Clonogenic Assay of EGCG on Hep2 cells

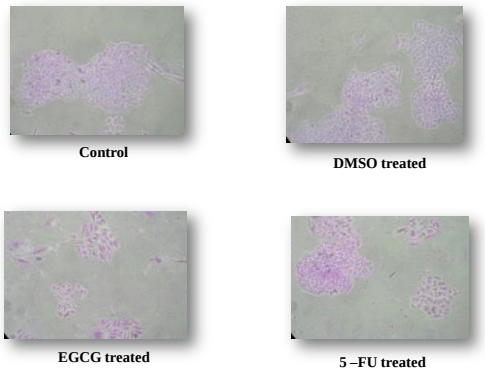


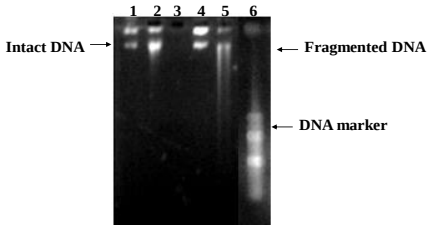
Table 1: Clonogenic assay of EGCE on Hep2 cell line
(No. indicates are colony of cells)

Groups	Description	7th Day (%)	14th Day %)	'p' Value
Group1	Hep2 cell line	38	82	-
Group2	Hep2 cell line+DMSO	35$	79#	NS
Group3	Hep2 cell line+EGCG (27.4µg)	12$	22#	***
Group4	HeP2 cell line+5-FU (0.5µM)	16$	28#	***

#, $Values of groups2, 3, & 4 are compared with group1 of respective day of incubation. NS- Non-significant; ***p<0.001

Group 3 showed a continuous shear of fragmented DNA indicative of apoptosis. Groups1, 2 and 4 did not show any fragmentation in DNA (Fig.5).

Fig. 5: DNA Fragmentation Analysis on Hep2 cells



Lane 1 - Hep 2 cell line (control), Lane 2 - DMSO control, Lane 3 – Empty well, Lane 4 - Hep 2 cell line + 5-FU, Lane 5 – Hep 2 cell line + EGCG, Lane 6 – DNA marker

V. DISCUSSION

MTT assay is based on the ability of a mitochondrial dehydrogenase enzyme from viable cells to cleave the tetrazolium rings of the pale yellow MTT and form dark blue formazan crystals which is largely impermeable to cell membranes, thus resulting in its accumulation within healthy cells. The number of surviving cells is directly proportional to the level of the formazan product created. This assay also shows significant decrease in cell viability percentage may be due to the anti-cancer activity of EGCG and 5-FU[19,20].

Superoxide dismutase (SOD) is an intracellular scavenging enzyme; this scavenges the superoxide, hydroxyl, and other oxygenated free radicals[21]. EGCG has 25 and 100 times more potent antioxidant potential than that of vitamin C and E respectively[22]. Regulation of superoxide dismutase and catalase activity by EGCG in the brain was noticed in Parkinson's disease[23].

Cell death or cytotoxicity is classically evaluated by the quantification of membrane damage. The LDH cytotoxicity assay provides a fast and simple method for quantitating cytotoxicity based on the measurement LDH release from damaged cells. LDH is a stable cytoplasmic enzyme present in all cells and rapidly released into the cell culture supernatant upon damage of the membrane. The 5-FU treated group showed more release of LDH when compared to EGCG treated group. Low LDH release

was noticed in group 3 when compared to control, this might be due to the inhibition of cell cytotoxicity by EGCG. EGCG may kill cancer cells through apoptotic pathway rather necrotic cell death.

Apoptosis is an innate mechanism of eukaryotic cell suicide, which plays a major role in many physiological and pathological processes. The hallmark of apoptosis is that the endonuclease mediated cleavage of DNA yielding 180-200bp fragments. This phenomenon involves the activity of a Ca^{2+}-Mg^{2+} dependent endonuclease to break the double stranded DNA at inter nucleosomal sites[24]. The group 2 showed a continuous shear of fragmented DNA indicating apoptosis with the effect of EGCG. EGCG modulates carcinogenic metabolism[25,26]. Cell proliferation and cell-cycle arrest was observed in laryngeal cancer cells[27-29]. EGCG mainly targets specific cell-signaling pathways responsible for regulating cellular proliferation or apoptosis. It induces apoptosis by causing G0/G1 phase cell cycle arrest in cancerous cells and not in normal cells[1]. EGCG treatment induces mitochondrial disruption and thus causes release of cytochrome c, induction of apaf-1, cleavage of caspase 3 and poly (ADP ribose) polymerase[30]. It is suggested that EGCG induces stress signals by damaging mitochondria and ROS-mediated JNK activation in cancer cells[31].

ACKNOWLEDGMENT

The Authors gratefully acknowledge the Management and Dean of Faculties of Sri Ramachandra University, Chennai for the support of the partial work of this article.

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Impact of Community Managed Nutrition cum Day Care Centers on IMR, MMR and Malnutrition: an empirical case study in Srikakulam District, India

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Abstract: India gives utmost importance to alleviate malnourishment, health problems in order to reach low Infant Mortality Rate (IMR) & Maternal Mortality Rate (MMR) as indicated in Millennium Development Goals (MDGs) by 2015. Society for Elimination of Rural Poverty (SERP), Andhra Pradesh with the support of World Bank has brought a unique model namely Community Managed Nutrition cum Day Care Centres (NDCCs) into practice to provide decentralized cooked supplementary food to pregnant women, lactating mothers and children below 3 years. A study has been conducted recently on functioning and impact of NDCCs in Srikakulam District to assess its impact on IMR, MMR and malnutrition. This study analyzes the quantitative facts and also highlights the result of the Community Managed NDCCs in achieving the health related Millennium Development Goals. This study also gives insights to the policy arena to achieve the health MDGs in Andhra Pradesh.

Index Terms: Nutrition cum Day Care Centers, Community Management, IMR & MMR, Millennium Development Goals

I. INTRODUCTION

In many developing countries majority of women have lower status to men- occupying lowest paid jobs, insecure positions requiring the least skill. They are provided less educational opportunities compared to men which results in lower female literacy rates. For instance globally it is estimated that 32 % of women are literate, vs. 52% for men (UNESCO,1987).

Plenty of evidences documented that girls receive less nutrition both quantitatively and qualitatively due to society's preference for boys. A review of this subject concludes that "sex discrimination in nutrition and health care appears to increase girls' vulnerability to infectious diseases" (Waldron, 1987).

The recent Global Hunger Index 2012 (GHI) has been released by International Food Policy Research Institute puts India under the alarming zone with 23 % hunger level which is calculated on the basis of three important variables: under-nourishment, underweight of children and child mortality (under five). Other surveys show that under-nutrition in India has 48% of malnourished children and the country stands above the

neighboring Asian countries of Bangladesh and Nepal in terms of higher percentage of malnutrition. Andhra Pradesh state accounts for 25%-34% of children with problem of underweight.

"Next to young children, pregnant and lactating women are nutritionally the most vulnerable group, especially in the developing regions of the world, and yet comparatively little is known of their special nutritional needs." (WHO, 1965). The decade of 1976-85 was selected the United Nations Decade for Women. Following this, many countries including India were encouraged to give utmost consideration to women's holistic development.

Government of India has adopted National Development Targets which are in line with – and at times more ambitious than – the Millennium Development Goals (MDGs). The MDGs laid down by the United Nations aim for a reduction in maternal deaths by 75% to 109 (MMR) between 1990 and 2015 in India which requires a reduction rate of 5.5% per year to achieve the goal. At the current rate of decline in major health indicators, there is a fair chance that the MDGs would be missed as the MMR (per lakh live births) is 134 as against the national average of 212 and target of less than 100 by 2015; and the IMR (per 1000 live births) is 46 as against the national average of 50, far behind the target of 23 as per the MDGs. Similarly, over 42 per cent children are malnourished and 59 per cent pregnant women are anaemic in the State.

The Andhra Pradesh government has initiated integration of programmes of key departments to improve health, nutrition, water and sanitation services offered to women and children. It has also initiated convergence strategy called "maarpu" between the health department and Integrated Child Development Scheme (ICDS). It has identified some of the important health indicators

for reduction of MMR, IMR and malnutrition viz., age at marriage, early registration of pregnancy and births, anemia among pregnant women, institutional delivery, early initiation of breast feeding, complementary feeding, awareness against sex selection abortion, pre-natal & post-natal care and care of adolescent girls.

NDCCs and its strategy

The primary objective of NDCC is to combat the malnutrition and to achieve health related Millennium Development Goals (MDGs) by 2015. SERP is an autonomous organization registered under the Societies Registration Act, 1860 and to act on behalf of Andhra Pradesh for implementation of various developmental activities. Under the Health & Nutrition strategy, the NDCC program is being implemented since 2007 with 4227 Nutrition cum day care centers in 2969 pilot mandals. Further, extensive health & nutrition strategies are being adopted for capacity building of stake holders at mandal and district levels.

II REVIEW OF LITERATURE

An attempt is made to analyses the work done by National Family Health Survey 3 during the past in the related field. According to the NFHS-3, 2005-06, India has lowest child immunization rate in South Asia. But in terms of getting BCG vaccine- in India it is twice than Nepal and five times higher than Bangladesh and 30 times higher than Sri Lanka. It has been said that the chances of immunization for Scheduled tribe children is just 26%. The survey highlighted that just 23.1% mothers received iron and folic acid for at least 90 days in the last pregnancy and also stated that 56.2% of Indian women have Anemia. Finally the survey coupled all the reasons and stressed that 33% Indian women conceive when they are not fit to undertake a pregnancy. In 'The state of the World's Children 2006' UNICEF has stated malnutrition contributes to over 50% of child deaths. 30% of infants born with low birth weight (LBW) across the world were from India (1998-2004).

A study conducted by Ambpali Hastkargha Evom Hastshilp Vikas Swavlambi Sahkari Samiti Ltd. describes that the awareness regarding maternal and pre-natal, post-natal health care, baby feed at the village level is less and recommended for conducting awareness camps that would be associated with other departments and NGOs so that the resource could be utilized effectively. A study by M.Prakasamm (2009) pointed out that the Government of India has not yet focused on maternal health-considered as secondary prioritized issue and that has very narrow level of promoting institutional deliveries.

The Annual report on health by the Ministry of Health and Family (2010) estimated that over 40% of children and 36% of adult women are classified as undernourished. The Ministry has specified the reasons for such high levels of malnutrition and anaemia. And the multifaceted reasons would be poverty, gender inequity, specific dietary patterns and recurrent illness and all these acting in conjunction. It has been stressed very much that the gender discrimination contributes to malnutrition levels by early age of marriage which leads to reduced access to nutrition during critical periods like pregnancy and lactation.

III OBJECTIVES OF THE STUDY

a. To know the outcome the NDCCs
b. To know the levels of community participation in running the NDCCs
c. To compare NDCCs with other program in order to understand the effectiveness of the NDCC on IMR, MMR and Malnutrition
d. To suggest effective ways and means for health related policies

IV RESEARCH METHODOLOGY

This descriptive study was conducted based on two types of data, namely- primary and secondary. The main source of primary data is obtained through pre-structured interview schedule. The secondary data is obtained from Society for Elimination of Rural Poverty (SERP), other Government departments and institutes. The researcher has also collected secondary data from various publications, reports and reputed journals.

Primary Sources

An in-depth study of 20 NDCCs in Srikakulam District was conducted through pre-structured interview, schedule and Focus Group Discussion (FGD) with beneficiaries to gain specific insights into the functioning of the NDCC with special focus on IMR and MMR. For facility assessment, a pre-determined questionnaire was prepared for FGD.

Secondary Sources

The data between 2008-12 from SERP, Andhra Pradesh were collected to assess the outcome of the NDCCs and also to compare status of IMR and MMR in NDCCs with that of Southern states of India.

V. SAMPLING

Geographically Srikakulam District is selected as study area in which 200 NDCCs are functioning. As a sample size, 20 NDCCs have been selected through drawing system which is part of simple random sample method to conduct an in-depth study.

VI. STATISTICAL TECHNIQUE

The Statistical Package for Social Science (SPSS) has been used to organize the data that is being collected through primary and secondary sources and also to analyze and interpret quantitative data

VII MAIN FINDINGS

Findings related to safe deliveries and babies born with more than 2.5 kg in Nutritional cum Day Care Centers (NDCCs).

Table I : Delivery Status of NDCCs in Andhra Pradesh – 2008-12

Period	No.of Deliveries	Safe deliveries	Babies born with more than 2.5 kg
2008-09	8570	8301	7158
2009-10	8917	8156	6642
2010-11	10658	6623	5491
2011-12	18296	14173	11724
2012-13	28636	25278	19279

Source: Misreport, SERP: http://www.serp.ap.gov.in/HN/

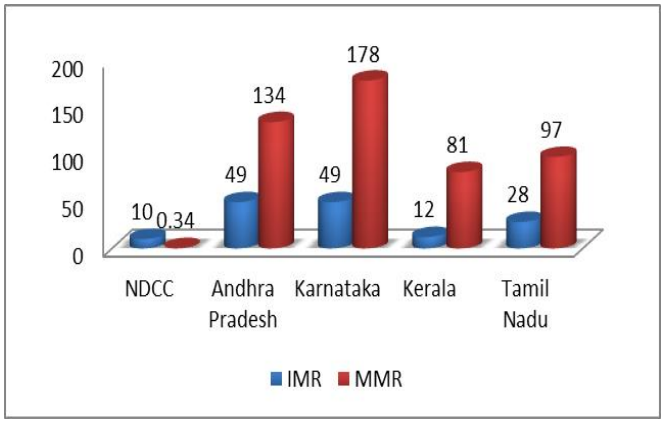
It is very essential to understand from table I that the number of deliveries has been increased from 8570 to 28636 since 2008. The highest percentage of safe deliveries (96.8 %) has been recorded in 2008-09 and the lowest percentage of safe deliveries (62.14 %) has shown in 2010-11. The safe deliveries increased from 2008 due to increased number of NDCCs. Again the percentage of babies born with more than 2.5kgs weight was highest (83.5 %) in 2008-09 and that was lowest in 2010-11. Taking 2012-13 statistics alone, out of 28636 deliveries, there are 19279 (67.3%) babies born with more than 2.5kg which indicates that NDCC encounters malnutrition very effectively.

Table II: Delivery Status of NDCC in Srikakulam District – 2008-2012

Period	No.of Deliveries	Safe deliveries	Babies born with more than 2.5 kg
2008-09	2112	2102	1893
2009-10	2105	1903	1585
2010-11	1057	756	701

Source: MIS Report, SERP: http://www.serp.ap.gov.in/HN/

As the year 2008-09 is compared to the year 2012-13, it is observed that number of deliveries from the beneficiaries of NDCC in Srikakulam District has been decreased , gradually the safe deliveries and babies who born with more than 2.5kg have also decreased.



Source: Innovations in Development (2012), Ministry of Finance Department of Economic Affairs and the World Bank in India, issue 6

The above figure describes the facts of IMR and MMR in Southern states in comparison with that of NDCCs in Andhra Pradesh. It demonstrates that the IMR rate in NDCC between 2007-11 was just 10 where as in Andhra Pradesh state it is 49 out of 1,000 live births. The IMR status in NDCC is always low when compared to that of other Southern states in India. In fact, the study looks into the deeper consideration of area of coverage and number of centers run by the particular programs. Through Health and Nutritional Component, there were 4,200 NDCCs functioning under SERP in 22 districts in the state of Andhra Pradesh and through Integrated Child Development Scheme (ICDS) there were 73,944 Anganwadi Centers (AWCs) functioning in 23 district in 2010. Logically, 4,200 NDCCs may not be compared with 73,944 AWCs. But it can be taken as a pilot or an experiment to study the impact of community managed nutrition cum day care centers on IMR and MMR.

The NDCC model is a community driven concept in which Self-Help Groups (SHGs) participate at every phase of running the centers. Village Organizations which were formed by women SHGs are given responsibility to manage

the NDCCs and here the SHG member and beneficiaries monitor the quality of food and other matters of running the centers where as in ICDS scheme community participation is limited. In AWCs, we may ensure distribution of food but we are not sure that the distributed food is being consumed by pregnant women. Hence, it is very painful to conclude on the status of IMR and MMR

Table III Weight gained in pregnant women and newly born babies in NDCCs in Srikakulam District

Pregnant women weight gained from 35kgs in NDCCs	**Frequency**	**Percent**
35-40 kg	3	15
40-45 kg	1	5
45-50 kg	9	45
above 50 kg	7	35
Weight of the newly born baby in NDCCs	**Frequency**	**Percent**
Below 2,5 kg	1	5
2.5 kg	6	30
3 kg	11	55
3.5kg	2	10

The above indicators show that NDCCs are potential to improve the nutritional status of pregnant women and children below 3 years and it is contributing well during the crucial period. During pregnancy, women are being provided nutritional food for three times in a day in NDCCs and also given awareness on reproductive health. The Health activist (HA) of NDCCs advises pregnant women to avail health facilities such as immunization, Health checkup, medicines, nutritious diet. Pregnant women are provided with a Mother and Child Protection Card (MCP card) in which one can find the due-date of delivery, weight of the pregnant women, address of nearest primary health center, emergency contact numbers such as that of hospital, ambulance.

The Health Assistant will take enrolled pregnant women to the hospital for delivery as she knows the complete history of pregnant women including delivery date. After delivery, again the lactating mother and child get balanced diet for 3 years. The weight of mother and child are being checked and is recorded in the NDCCs.

From table III it is very clear that weight of the pregnant women has tremendously increased due to complete care and service provided through NDCCs. Significantly, 45 percent of pregnant women gained weight from 35kg to 45 kg and more than 50kg weight have been gained by 35 percent of the pregnant women in NDCCs. Similarly 30 percent of the babies' weight at birth was 2.5 kg and 55 percent weigh 3kgs. Significantly, 10 percent of new born babies have 3.5 kg of weight. It has been observed that above 90 percent of the children gained sufficient weight in NDCCs

VIII Community Participation in NDCCs

The NDCCs are based on community felt-need, interest of the communities generates through Conscientization process, community-owned, and community supervised. NDCCs have been started on the Strong social groups of women's Self Help Groups (SHG), their village Organizations and mandal samakyas that have been established across the state over the past 16 years. This program has been felt as one of the most important nutritional programe that could be managed by community itself and here the local women act as leaders, mentors, and trainers. Hence, the NDCCs have been successfully running and helping to combat the malnutrition as well.

IX Policy Analysis and Suggestions

Analysis of the root causes for malnutrition in rural India shows the lack of awareness on nutrition and type of food that need to be consumed during the crucial period (9 months pregnancy and children up to 3 years). The study has explored factors affecting the status of the malnutrition in Andhra Pradesh, India. Poverty, conservatism, negligence in securing nutritional food during pregnancy that leads to malnutrition among rural women and children below 3 years. It is a time for policy maker to come with policy that where it is possible to provide quality nutritional food as well as education on reproductive health so that pregnant women will sensitize themselves about diet and nutritional pattern during their pregnancy.

It is quite hard for government alone to provide nutritional diet to all 16 percent of malnourished people in the world. Hence, it is necessary to bring decentralized health policy frame work through which community participation can be part of entire programmes so that desired objectives can be achieved easily.

Interventions by government need to be evaluated in terms of their cost –effectiveness and delivery mechanism on particular program (ex: ICDS, IAH, NDCC).

In order to curb the malnutrition in India, it is necessary to bring a national food and nutrition security policy with public-private partnership.

As of now, the food security bill has not been passed in Indian Parliament through which the government aims to provide subsidized food grain to over 62 per cent of the country's population

X Conclusion

Through this study, it has been observed of community partnership in maintenance and delivery of the nutritional food. SHGs participate merely at each of the phases of implementation and have seen the results in terms of minimizing the IMR, MMR and Malnutrition in Andhra Pradesh where the NDCCs function.

ACKNOWLEDGMENT

I am indebted to Shri R. Subramaniam, Principal Secretary (RD), Govt. of Andhra Pradesh, Shri.B.Rajashekar, CEO, SERP, Andhra Pradesh, Shri.Jagannadh Rao.D, Director, NRLM Unit, and SERP for their guidance and support to Mr. Katamgari Balaiah during research work.

I am obliged to record my thanks to DRDA, ITDA and other line departments Srikakulam District for their support during this study.

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Providing Data Protection as a Service in Cloud Computing

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Abstract- Data protection in cloud has become an unavoidable and tremendously increasing technology. Many multinational organizations are interested in cloud computing and its wonderful features but they are worried about the security, privacy and availability of data as it rest in the cloud. As more and more sensitive information are centralized in cloud the data protection, security and privacy issues must be tightly considered. In this paper we propose a new cloud computing service called *Data Protection as a Service*. User authentication, data protection, security are the key areas we consider. User authentication is provided using alphanumeric password and graphical password, security is provided using encryption of the file using key. Key management is an important concept used for the protection of data. Overall transactions are viewed by an auditor. Here multilevel data protection is guaranteed for the cloud users.

Index Terms- Cloud data protection, graphical password, key, encryption, and auditor.

I. INTRODUCTION

As cloud computing has become important and easy to implement, many multinational organizations and leading companies are coming forward for adopting the cloud features for the better management and increasing efficiency of their organization. Cloud computing provides on-demand high quality data storage service. But there is one factor that everybody is afraid about cloud computing is the security problems. Since all the data are stored in the cloud environment data owners are afraid about the security. Whether hackers will attack the data? This question makes a good scene. For that sensitive data usually should be encrypted prior to outsourcing for data privacy and avoiding unauthorized accesses. However, data encryption makes effective data utilization a very risky task given that there could be a huge volume of outsourced data files.

In Cloud Computing, data owners share their outsourced data with a large number of cloud users. Each user might be interested in retrieving only a specific data file in a given session. Also it must be *guaranteed* that only authorized users must have the permission to view the data file. User authentication can be performed by using many scientific ways. Alphanumeric passwords and graphical passwords are both guaranteed service. In many of the trusted website like Gmail, Google all supports alphanumeric passwords. They also provide multiple protection techniques like verification using mobile number, captcha etc. Multilevel verification ensures the authorized access. The concept of key come from the branch of science called cryptography. There are basically two types of keys they are public key and private key. A public key is known to everyone and a private or secret key known only to the recipient of the message. An authorized user has the key for encryption and decryption of the specific data file. Keyword based search is one of the popular ways to selectively identify and retrieve data files instead of retrieving all the files. Keywords are parts of file name or phrases used in the file which will help us to find the exact data file at the time of retrieval if you don't remember the exact keyword. There are many keyword searching methods.

An auditor is one who keeps track of all the histories of users. In our paper we use software that will keep the histories of all the users and all the data file transactions etc... Thus data protection is highly verified in our system, so the cloud users can outsource the data very securely.

II. RELATED WORK

2.1 Fuzzy Keyword Search over Encrypted Data in Cloud Computing. For the protection of data privacy, sensitive data usually have to be encrypted before outsourcing. This technique formalizes and solves the problem of effective fuzzy keyword search over encrypted cloud data while maintaining keyword privacy. Fuzzy keyword search greatly enhances system usability by returning the matching files when users' searching inputs exactly match the predefined keywords or the closest possible matching files based on keyword similarity semantics, when exact match fails. In our solution, we exploit edit distance to quantify keywords similarity and develop an advanced technique on constructing fuzzy keyword sets, which greatly reduces the storage and representation overheads**.**

2.2 Cloud Data Protection for Masses. This paper proposes a new cloud computing paradigm, data protection as a service. DPaaS is a suite of security primitives offered by a cloud platform, which enforces data security and privacy and offers evidence of privacy to data owners, even in the presence of potentially compromised or malicious applications. Data protection is provided by using three primitives they are access control, key management and logging. Also there is an auditor who audits all the transactions occurred in the system. Auditor finally provides an audit report based on all conversations.

2.3Graphical User Authentication: A Time Interval Based Approach. A number of authentication techniques have been proposed in the recent times that are based upon graphical methods. Text based passwords are most commonly used for authentication; however, they are highly vulnerable to several kinds of attacks. Graphical techniques are coming up as an

attractive alternative to the conventional methods of authentication. In this paper we have proposed a graphical method of authentication that employs graphical coordinates along with a novel introduction of time interval between successive clicks. The user needs to recall the coordinates and the time interval of the successive clicks. This leads to the incorporation of the advantages of the recent graphical methods along with the added security achieved through the use of time interval. The proposed scheme has a much higher password space than the other contemporary graphical authentication schemes. The scheme is robust, secure and very convenient to use.

III. RESERCH ELABORATIONS

Security of data

For the security in storage most system uses data protection mechanisms. They include graphical password, alphanumeric password and many other similar ways that will help us to increase the security of data.

Authorization

Only authorized user has the permission to read and edit the file that is stored in the cloud. Authorized users are those users who have cloud authorization and also should have the right to retrieve the data file. All the users who have the cloud access are not allowed to access the data file, but all users who can access a particular data file stored in the cloud are cloud authorized users.

Reliability

Reliability is also as important as security. Reliability in storage corresponds to the accuracy and consistency of data.

There are different cloud storage systems. Some are focused on storing e-mail messages or digital pictures etc. In this paper we propose a system which is able to be secure storage of files by using alphanumeric passwords, graphical passwords, key management and auditing. Thus in our proposed system we provide data security as a service for the data stored in the cloud by undergoing various strategies.

IV. THEORIES AND APPROACHES

4.1. Alphanumeric Password Authentication

In our system there is an administrator who has the overall control . Both the administrator and staffs have alphanumeric password authentication. Only the users who passed the text can only enter into the next level of authentication. This administrator has the rights to create the users. Administrator has cloud authorization. Users created by the administrator have only the cloud access.

4.2. Graphical Password Authentication

Both the administrator and the users should undergo the graphical password text. In view of the shortcomings of the traditional approach to authentication, i.e. alphanumeric passwords, Graphical techniques are gaining importance. A graphical password is an authentication system in which the user has to work with images, either selecting them or creating them. The graphical password form is shown in Figure 4.2. E.g. the user may select some points from the image which is stored as the graphical password in the database. If someone needs to store the file or retrieve the file stored in the system he should enter the correct graphical password for access to the file. The graphical-password approach is also sometimes called graphical user authentication (GUA). A graphical password is easier to remember than a complex text-based password for most people.

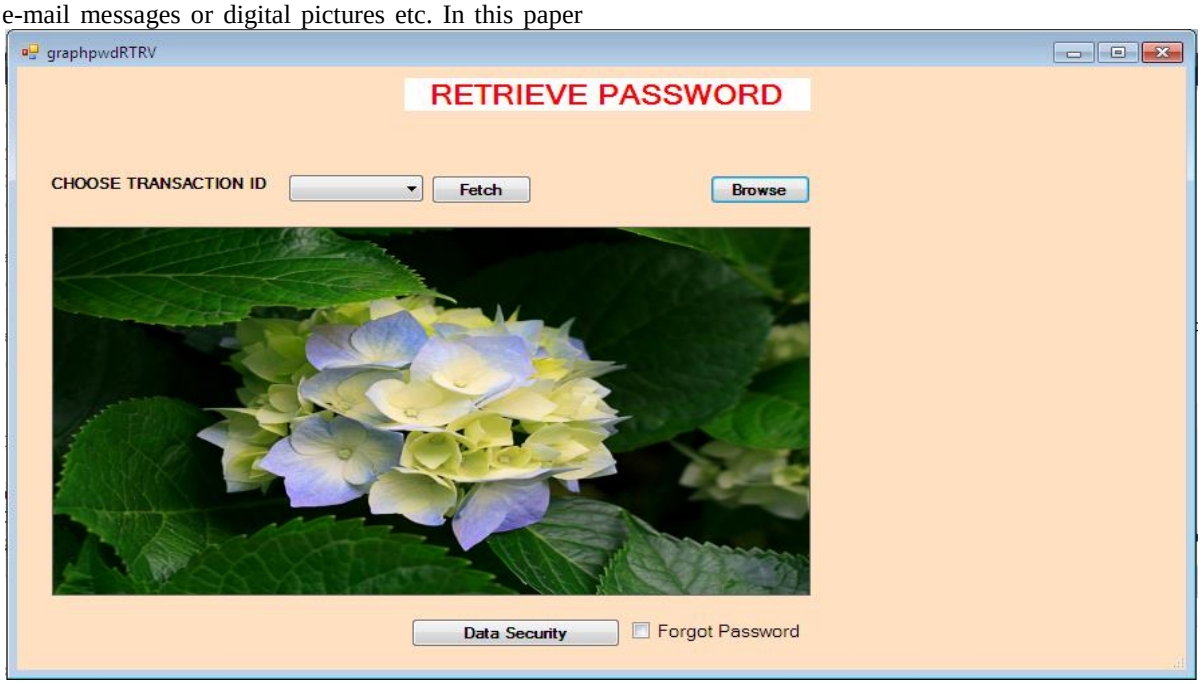

Figure 4.2: Graphical Password

4.2. Key Management

The concept of key come from the branch of science called cryptography. There are basically two types of keys.

1. Public key
2. Private key

A public key known to everyone and a private or secret key known only to the recipient of the message. When John wants to send a secure message to Jane, he uses Jane's public key to encrypt the message. Jane then uses her private key to decrypt it. In our system we encrypt the file using a key and stored in the cloud. The user should enter the key to decrypt the file. The key management form is shown in Figure 4.3.So multiple protection mechanisms are used here for protecting the files in the cloud.

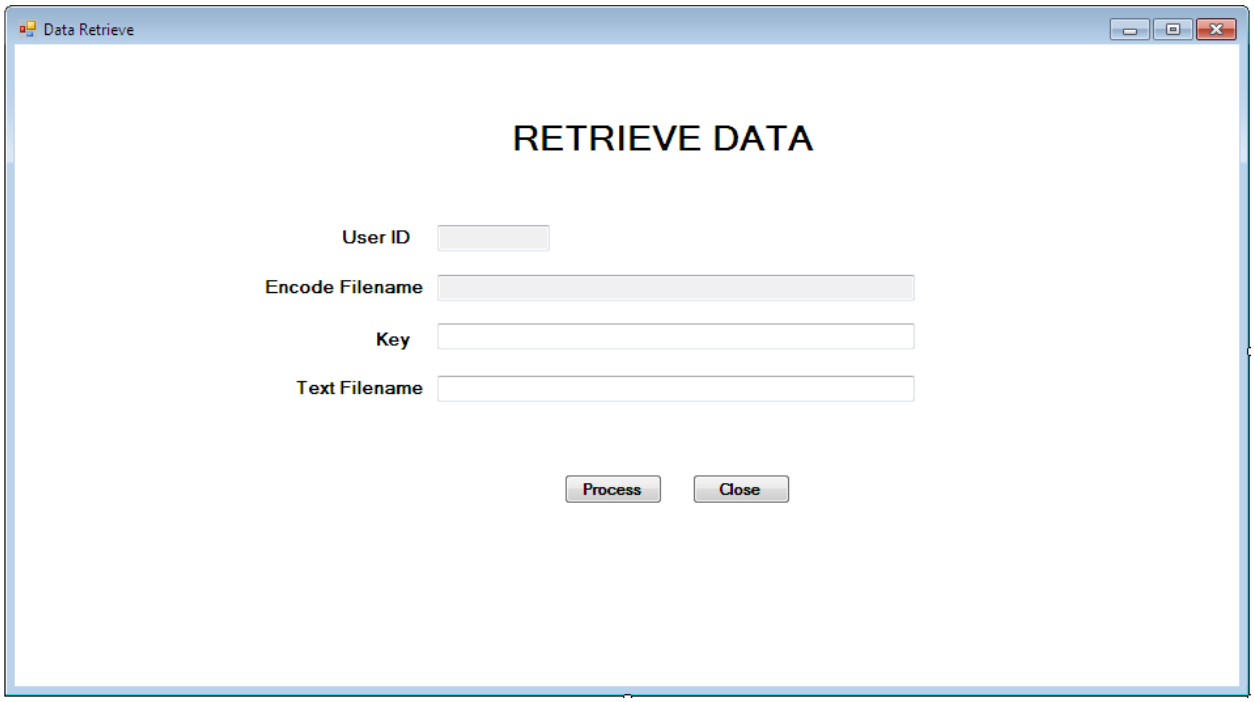

Figure 4.4: Key Management

4.3. Auditor

The auditor is one who audits the overall performance of the system. He can track the transactions and logins of users with correct time and date. Here auditor is software that is capable of tracking the transactions. Cloud storage offers movement of data into cloud .It has great convenience to the user because users can store their data in the cloud safely without the knowledge about the storage space . There are several trends in cloud computing because of its wide variety of possibilities in the new era. Security in cloud computing have greater importance because users wants their data to be secure .The attacks towards the data which is stored into the cloud is increasing. There are different security services implemented toward data storage. Researches for the security threats in cloud have great opportunities.

All the existing systems have many drawbacks and also they do not fulfill the motive. So here we introduce a new data protection mechanism which incorporates many technical concepts of computer science engineering. Cryptography is the practice and study of techniques for secure communication in the presence of third parties. More generally, it is about constructing and analyzing protocols that overcome the influence of adversaries and which are related to various aspects in information security such as data confidentiality, data integrity, authentication, and non-repudiation. Modern cryptography intersects the disciplines of mathematics, computer science, and electrical engineering. Applications of cryptography include ATM cards, computer passwords, and electronic commerce. Cryptography include s the concepts of keys, public key and private key, so we are familiar with the concept of keys. An authorized user must know the key used for locking and unlocking the data. Here in our system the administrator has the ultimate power. He creates the users in the cloud. Each user must login using 2 ways. The workflow of the model is shown in Figure 4.4.1 and in Figure 4.4.2.Once is by using character password after passing that he should login using graphical password.

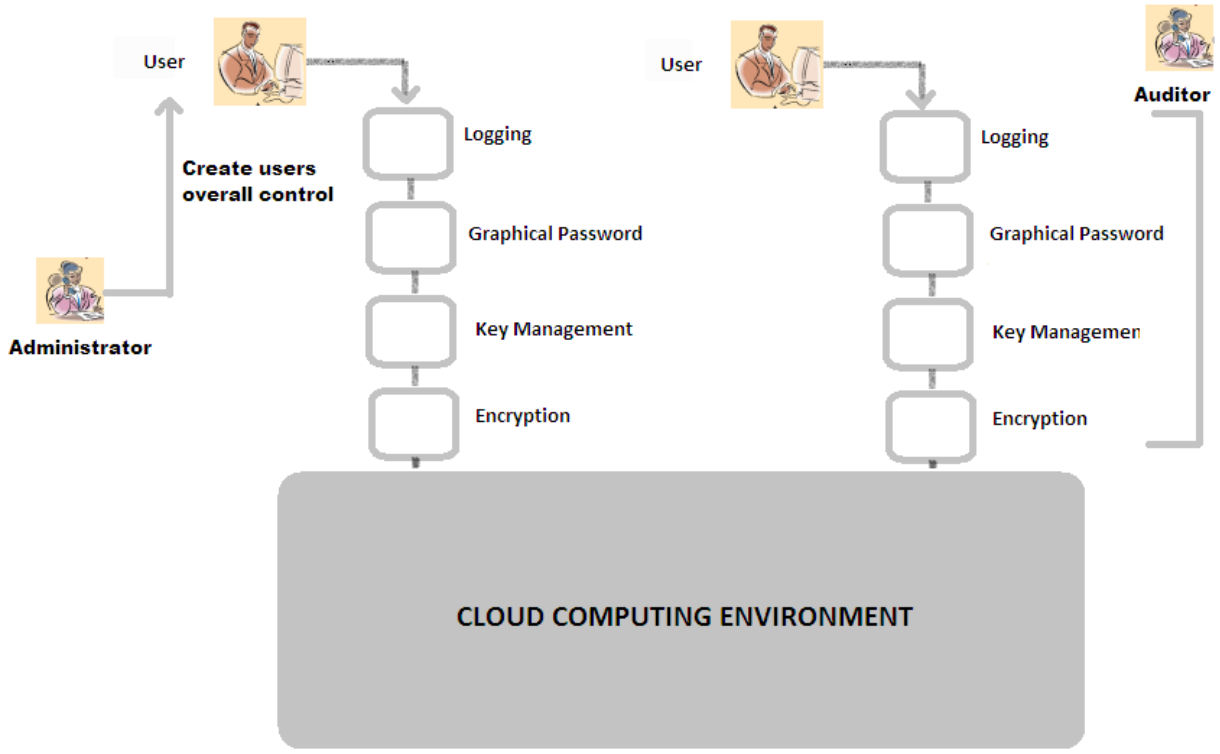

Figure 4.4.1: Workflow of the model

After they login they can communicate each other and sent files between them. The receiver must know about the key used by the sender otherwise he cannot decrypt the file. There is an auditor who is tracking all the transactions and all the conversations between the users. The auditor is basically software that can track all the transactions. So multilevel data security is provided in our model.

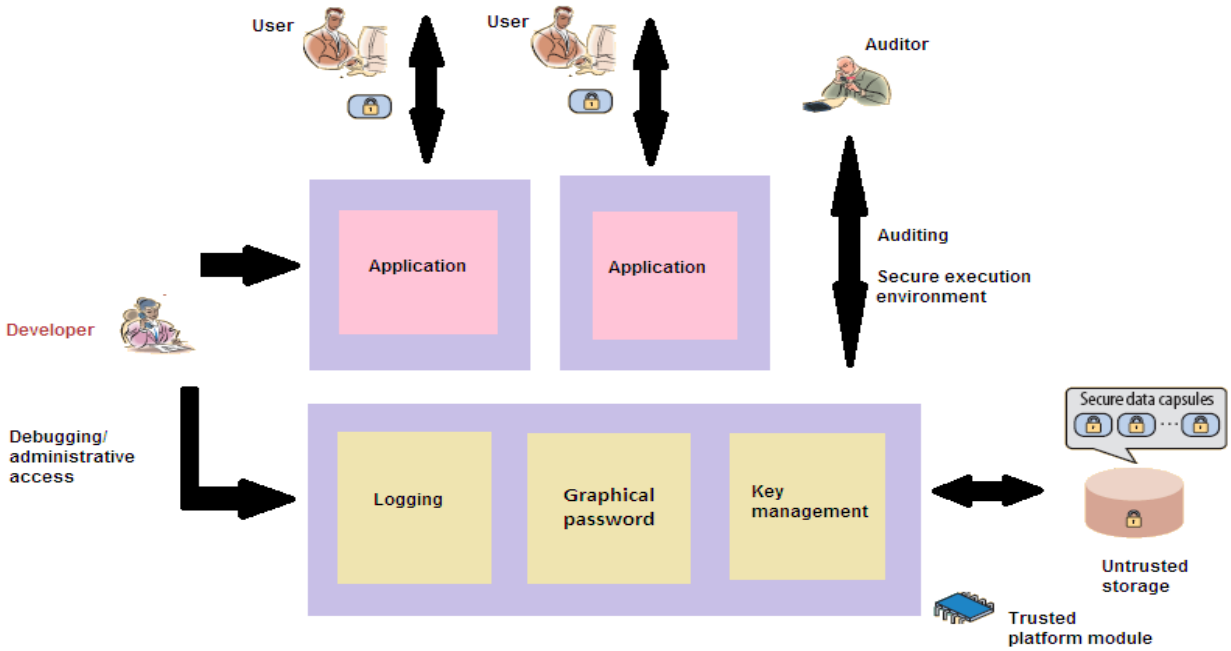

Figure 4.4.2: Data Protection as a service in Cloud Computing

V. CONCLUSION AND FUTUREWORK

As private data moves online, the need to secure it properly becomes increasingly urgent. The good news is that the same forces concentrating data in enormous datacenters will also aid in using collective security expertise more effectively. Adding protections to a single cloud platform can immediately benefit hundreds of million users

In future, this work can be extended to develop a more formal model for data protection as a service in cloud computing. We can use this model for many other communications like client server communication etc..

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The Rabin Cryptosystem & analysis in measure of Chinese Reminder Theorem

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***Abstract*-** Cryptography is the practise and study of techniques for secure communication in the presence of third parties. The necessity and the fact that exchanged messages are exposed to other people during the transmission promoted the creation of encryption systems, enabling just the recipients to interpret the exchanged information.

In this paper, a particular cryptosystem called Rabin Cryptosystem is presented and analysed with the help of Chinese Reminder Theorem. Also, redundancy schemes for decryptions technique is mentioned and some basic mathematical concepts is explained and finally compared with RSA cryptosystem in terms of security and efficiency.

***Index Terms*-** Rabin cryptosystem, Chinese Reminder Theorem, Jacobi symbol, Rabin signature scheme

I. Introduction

The Rabin cryptosystem is an asymmetric cryptographic technique, whose security, like that of RSA, is related to the difficulty of factorization. However the Rabin cryptosystem has the advantage that the problem on which it relies has been proved to be as hard as integer factorization, which is not currently known to be true of the RSA problem. It has the disadvantage that each output of the Rabin function can be generated by any of four possible inputs; if each output is a cipher text, extra complexity is required on decryption to identify which of the four possible inputs was the true plaintext.

The process was published in January 1979 by Michael O. Rabin. The Rabin cryptosystem was the first asymmetric cryptosystem where recovering the entire plaintext from the cipher text could be proven to be as hard as factoring.

II. Chinese Remainder theorem

Theorem: Suppose that m_1, m_2.., m_r are pairwise relatively prime positive integers, and let a_1, a_2... a_r be integers. Then the system of congruence's, $x \equiv a_i \pmod{m_i}$ for $1 \le i \le r$, has a unique solution modulo $M = m_1 \times m_2 \times ... \times m_r$, which is given by: $x \equiv a_1M_1y_1 + a_2M_2y_2 + ... + a_rM_ry_r \pmod{M}$, where $M_i = M/m_i$ and $y_i \equiv (M_i)^{-1} \pmod{m_i}$ for $1 \le i \le r$.

***Pf*:** Notice that gcd (M_i, mi) = 1 for $1 \le i \le r$. Therefore, the y_i all exist (determined easily from the extended Euclidean Algorithm). Now, notice that since $Miyi \equiv 1 \pmod{m_i}$, we have $a_iM_iy_i \equiv a_i \pmod{m_i}$ for $1 \le i \le r$.

On the other hand, $a_iM_iy_i \equiv 0 \pmod{m_j}$ if $j \ne i$ (since $m_j \mid M_i$ in this case). Thus, we see that $x \equiv a_i \pmod{m_i}$ for $1 \le i \le r$.

If x0 and x1 were solutions, then we would have $x0 - x1 \equiv 0 \pmod{m_i}$ for all i, so $x0 - x1 \equiv 0 \pmod{M}$, i.e., they are the same modulo M.

III. Encryption

As with all asymmetric cryptosystems, the Rabin system uses both a public and a private key. The public key is necessary for later encryption and can be published, while the private key must be possessed only by the recipient of the message.

The precise key-generation process follows:

- Choose two large distinct primes *p* and *q*. One may choose $p \equiv q \equiv 3 \pmod{4}$ to simplify the computation of square roots modulo *p* and *q* (see below). But the scheme works with any primes.
- Let $n = p \cdot q$. Then *n* is the public key. The primes *p* and *q* are the private key.

To encrypt a message only the public key *n* is needed. To decrypt a cipher text the factors *p* and *q* of *n* are necessary.

For the encryption, only the public key *n* is used, thus producing a cipher text out of the plaintext. The process follows:

Let $P = \{0, \dots, n-1\}$ be the plaintext space (consisting of numbers) and $m \in P$ be the plain text. Now the cipher text c is determined by

$$c = m^2 \bmod n$$

That is, *c* is the quadratic remainder of the square of the plaintext, modulo the key-number *n*.

IV. Decryption

To decode the cipher text, the private keys are necessary. The process follows:

If *c* and *r* are known, the plaintext is then $m \in \{0, \dots, n-1\}$ with $m^2 \equiv c \pmod{r}$. For a composite *r* (that is, like the Rabin algorithm's $n = p \cdot q$) there is no efficient method known for the finding of *m*. If, however r is prime (as are *p* and *q* in the Rabin algorithm), the Chinese remainder theorem can be applied to solve for *m*.

Thus the square roots

$$m_p = \sqrt{c} \bmod p$$

And

$$m_q = \sqrt{c} \bmod q$$

Must be calculated

Now, by invocation of the Chinese remainder theorem, the four square roots $+r, -r, +s$ and $-s$ of $c + nZ \in Z/nZ$ are calculated (Z/nZ here stands for the ring of congruence classes modulo *n*). The four square roots are in the set $\{0, \dots, n-1\}$

$$r = \left(y_p \cdot p \cdot m_p + y_q \cdot q \cdot m_p\right) \bmod n$$
$$-r = n - r$$
$$s = \left(y_p \cdot p \cdot m_q - y_q \cdot q \cdot m_p\right) \bmod n$$
$$-s = n - s$$

One of these square roots $\bmod n$ is the original plaintext *m*. In our
Rabin pointed out in his paper, that if someone is able to compute both, r and s, then he is also able to find the factorization of n because:
Either $gcd(|r-s, n|) = p$ or $gcd(|r-s, n|) = q$,

Where gcd means Greatest common divisor.

Since the Greatest common divisor can be calculated efficiently you are able to find the factorization of n efficiently if you know r and s.

The decryption requires to compute square roots of the cipher text *c* modulo the primes *p* and *q*. Choosing $p \equiv q \equiv 3 \pmod 4$ allows to compute square roots by

$$m_p = c^{\left(\frac{p+1}{4}\right)} \bmod p$$

And

$$m_q = c^{\left(\frac{q+1}{4}\right)} \bmod q$$

We can show that this method works for *p* as follows. First $p \equiv 3 \pmod 4$ implies that (*p*+1)/4 is an integer. The assumption is trivial for *c*≡0 (mod *p*). Thus we may assume that *p* does not divide *c*. Then

$$m_p^2 \equiv c^{\left(\frac{p+1}{2}\right)} \equiv c \cdot c^{\left(\frac{p-1}{2}\right)} \equiv c \cdot \left(\frac{c}{p}\right) \pmod p$$

Where $\left(\frac{c}{p}\right)$ is a Legendre symbol. From $c = m^2 \pmod{pq}$ follows that $c = m^2 \pmod p$. Thus *c* is a quadratic residue modulo *p*. Hence $\left(\frac{c}{p}\right) = 1$ and therefore $m_p^2 \equiv c \pmod p$

The relation $p \equiv 3 \pmod 4$ is not a requirement because square roots modulo other primes can be computed too.

Example: Let $n = 77 = pq = 11 \cdot 7$ and $m = 32$.

First, the message m must be encoded using the encryption function:

$e_k(32) = 32^2 \bmod 77 = 23 = c$

The encoded message $c = 23$ is sent. The receiver must decrypt the message, so has to find the square roots of 23 modulo 7 and modulo 11. The decryption algorithm is applied:

$$m_p = c^{\left(\frac{p+1}{4}\right)} \bmod p \equiv 23^{\left(\frac{7+1}{4}\right)} \bmod 7 = 4$$
$$m_q = c^{\left(\frac{q+1}{4}\right)} \bmod q \equiv 23^{\left(\frac{11+1}{4}\right)} \bmod 11 = 1$$

And the system of congruence's $x \equiv a_i b_i \frac{M}{m_i}$ is:

$$+m_p \bmod p = 4 \bmod 7$$
$$-m_p \bmod p = 3 \bmod 7$$
$$+m_q \bmod q = 1 \bmod 11$$
$$-m_q \bmod q = 10 \bmod 11$$

Finally we can apply the Chinese remainder theorem to compute the four square roots:

First we compute b_1 and b_2 such:

$$\frac{N}{7} \cdot b_1 \equiv 1 \bmod 7 \rightarrow b_1 = 2$$
$$\frac{N}{11} \cdot b_2 \equiv 1 \bmod 11 \rightarrow b_2 = 8$$

Now, we can compute the solutions:

1) $x = 4 \bmod 7$ and $x = 1 \bmod 11$:

$$x = a_1 \times b_1 \times \frac{M}{p} + a_2 \times b_2 \times \frac{M}{q} = 4 \times 2 \times 11 + 1 \times 8 \times 7$$
$$x \equiv 144 \equiv 67 \bmod 77 \rightarrow x = 67$$

2) $x = 3 \bmod 7$ and $x = 1 \bmod 11$:

$$x = a_1 \times b_1 \times \frac{M}{p} + a_2 \times b_2 \times \frac{M}{q} = 3 \times 2 \times 11 + 1 \times 8 \times 7$$
$$x \equiv 122 \equiv 45 \bmod 77 \rightarrow x = 45$$

3) Now, we can take the advantage of symmetry to get the other two result:

$$7767 = 10 \rightarrow x = 10$$
$$7745 = 32 \rightarrow x = 32$$

Finally, the original message must be **10**, **32, 45** or **67**.

V. Redundancy Schemes for Unique Decryption

To ensure that decryption returns the correct message it is necessary to have some redundancy in the message, or else to send some extra bits. We now describe three solutions to this problem.

• **Redundancy in the message for Rabin**: For example, insist that the least significant *l* bits (where $l > 2$ is some known parameter) of the binary string m are all ones. If *l* is big enough then it is unlikely that two different choices of square root would have the right pattern in the *l* bits.

A message m is encoded as $x = 2^l m + (2^l - 1)$, and so the message space is $M_\kappa = \{m: 1 \le m < N/2^l, \gcd(N, 2^l m + (2^l - 1)) = 1\}$ (alternatively, $M_\kappa = \{0,1\}^{\kappa - l - 2}$). The cipher text is $c = x^2 \pmod N$. Decryption involves computing the four square roots of c. If none, or more than one, of the roots has all *l* least significant bits equal to one and so corresponds to an element of M_κ then decryption fails (return $\perp$). Otherwise output the message $m = \lfloor x/2^l \rfloor$.

• **Extra bits for Rabin**: Send two extra bits of information to specify the square root. For example, one could send the value $b_1 = \left(\frac{m}{N}\right)$ of the Jacobi symbol (the set $\{-1,1\}$ can be encoded as a bit under the map $x \rightarrow 7\ (x+1)/2$), together with the least significant bit b_2 of the message. The cipher text space is now $C_\kappa = (Z/NZ)^* \times \{0,1\}^2$ and, for simplicity of exposition, we take $M_\kappa = (Z/NZ)^*$.

These two bits allow unique decryption, since $\left(\frac{-1}{N}\right) = 1$, m and $N - m$ have the same Jacobi symbol, and if m is odd then $N - m$ is even.

Indeed, when using the Chinese remainder theorem to compute square roots then one computes m_p and m_q such that $\left(\frac{m_p}{p}\right) = \left(\frac{m_q}{q}\right) = 1$. Then decryption using the bits b_1, b_2 is: if $b_1 = 1$ then the decryption is $\pm CRT\ (m_p, m_q)$ and if $b_1 = -1$ then solution is $\pm CRT(-m_p, m_q)$.

This scheme is close to optimal in terms of cipher text expansion and decryption never fails. The drawbacks are that the cipher text contains some information about the message, and encryption involves computing the Jacobi symbol, which typically requires far more computational resources than the single squaring modulo *N*.

• **Williams**: Let $N = pq$ where $p,q \equiv 3 \pmod 4$. If $p \not\equiv \pm q \pmod 8$ then $(\frac{2}{N}) = -1$. Hence, for every $1 \le x < N$ exactly one of x, $N - x$, $2x$, $N - 2x$ is a square modulo N. Without loss of generality we therefore assume that $p \equiv 3 \pmod 8$ and $q \equiv 7 \pmod 8$. The integer N is called a **Williams integer** in this situation.

Williams [629] suggests encoding a message $1 \le m < N/8 - 1$ (alternatively, $m \in M_\kappa = \{0,1\}^{\kappa-5}$) as an integer x such that x is even and $(\frac{x}{N}) = 1$ (and so x or $-x$ is a square modulo N) by

$$x = P(m) = \begin{cases} 4(2m+1) \; if \left(\frac{2m+1}{N}\right) = 1 \\ 2(2m+1) \; if \left(\frac{2m+1}{N}\right) = -1 \end{cases}$$

The encryption of m is then $c = P(m)^2 \pmod N$. One has $C_\kappa = (Z/NZ)^*$

To decrypt one computes square roots to obtain the unique even integer $1 < x < N$ such that $\left(\frac{x}{N}\right) = 1$ and $x^2 \equiv c \pmod N$. If $8 \mid x$ then decryption fails (return $\perp$). Otherwise, return $m = (x/2 - 1)/2$ if $x \equiv 2 \pmod 4$ and $m = (x/4 - 1)/2$ if $x \equiv 0 \pmod 4$.

Unlike the extra bits scheme, this does not reveal information about the cipher text. It is almost optimal from the point of view of cipher text expansion. But it still requires the encrypter to compute a Jacobi symbol (hence losing the performance advantage of Rabin over RSA). The Rabin cryptosystem with the Williams padding is sometimes called the **Rabin-Williams cryptosystem**.

VI. Rabin Signature Scheme

The Rabin signature scheme is a variant of the RSA signature scheme. It has the advantage over RSA that finding the private and forgery key are both as hard as factoring. In Rabin scheme, public key is an integer n where $n = p \cdot q$ and p and q are prime numbers which form the private key. The message which is to be signed must have a square root mod n otherwise, it has to be modified slightly. Only about ¼ of all possible message have square root mod n.

• **Signature**: $s = m^{\frac{1}{2}} \bmod n$ where s is the signature
• **Verification**: $m = s^2 \bmod n$

The signature is easy to compute if the prime factors of n are known, but probably difficult otherwise- anyone who can forge the signature can also find factor n. The provable security has the side-effect that the prime factor can be recovered under a chosen message attack. This attack can be countered by padding a given message with random bits or modifying the message randomly, at the loss of provable security.

VII. Comparison with RSA Cryptosystem

The cryptosystems RSA and Rabin are very similar. Both are based on the hardness of factorization. The main difference is the fact that it is possible to prove that the problem of the Rabin cryptosystem is as hard as integer factorization, while hardness of solving the RSA problem is not possible to relate to the hardness of factoring, which makes the Rabin cryptosystem more secure in this way than the RSA.

Another difference is in the risk of attack. The Rabin cryptosystem is secure against a chosen plaintext attacks, however, the system can be broken using cipher text attacks enabling the attacker to know the private key. RSA is also vulnerable to a chosen cipher text attack, but the private key always remains unknown.

In terms of efficiency, the Rabin encryption process requires to compute roots modulo n more efficient than the RSA which requires the computation of n^{th} powers. About the decryption process both apply the Chinese remainder theorem. The disadvantage in decryption process of Rabin system is that the process produces four results, three of them false results, while the RSA system just get the correct one.

VIII. Conclusion

This Rabin cryptosystem is an asymmetric cryptosystem where the private key is composed of two primes, p and q, and a public key composed of $n = p \cdot q$. It is based on the hardness of factoring. It is simple to compute square roots modulo a composite if the factorization is known, but very complex when the factorization is unknown.

In terms of computational performance, Rabin encryption is extremely fast (as long as encryption does not require computing a Jacobi symbol) while decryption, using the Chinese remainder theorem, is roughly the same speed as RSA decryption.

The encryption process computes the square modulo n of the message, while the decryption process requires to compute modular square roots. Since the encryption process is not an injective function, four possible results will be obtained after applying the Chinese Remainder Theorem to solve the systems of congruence's.

Difference between Rabin cryptosystem and RSA cryptosystem is clearly mentioned in reference of mode of attacks, security issues and their efficiency.

This paper give a general idea about Rabin cryptosystem and its encryption and decryption procedure are shown with help of few theorem of Chinese Remainder Theorem along with suitable example.

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Obtaining a Path with Maximum Allowed Flow Rate between Source and Destination in a Network

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Abstract— This paper proposes an algorithm to find a path which has the maximum allowed flow rate for data, between source and destination in a network. Unlike max-flow and min-cut theorem, we are selecting single path for data transmission. To find a path in a network there are many techniques. Prim's technique is used recursively in our proposed algorithm to find different paths between source and destination. The maximum allowed flow rate for each of those paths is calculated and finally we take the maximum of those calculated flow rates.

Keywords - *maximum allowed flow rate; max-flow and min-cut theorem; Prim's algorithm.*

I. Introduction

In several transport networks, knowledge about finding a path with maximum flow rate, from source node to destination node is essential. Such knowledge can be acquired through a study of weighted connected graphs in which vertices represent nodes and the edges represent the links of the network. In such graphs, the weight of an edge represents the capacity of the link; namely, the maximum amount of flow possible per unit of time. It will be assumed that there is no accumulation of data at any node along the path and that the node itself can handle as much flow as allowed through the links. It will further be assumed that the links are lossless.

Our proposed algorithm is a maximum flow rate algorithm which mainly finds the path between source and destination such that selected path should have maximum allowed flow rate. Here, maximum allowed flow rate refers to a path with maximum allowable data rate that can flow between selected source and the destination. To find a path between source and destination we have used Prim's algorithm [1]. Prim's algorithm finds a minimum spanning tree in a given network [2]. Here, Prim's algorithm has been utilized to find different paths between source and destination. Our proposed algorithm finds maximum flow for each path selected from Prim's algorithm. Finally, we find maximum of maximum flow rate that can flow in a network from the set of calculated maximum flow rates.

II. Prim's algorithm

Prim's algorithm constructs minimum spanning tree through a sequence of expanding subtrees. The initial subtree in such a sequence consists of a single vertex selected arbitrarily from the set V of the graph's vertices. On each iteration, we expand the current tree in the greedy manner by simply attaching to it the nearest vertex not in that tree. The algorithm stops after all the graph's vertices have been included in the tree being constructed. Since the algorithm expands a tree by exactly one vertex on each of its iterations, the total number of such iterations is n-1, where n is the number of vertices in the graph. The tree generated by the algorithm is obtained as the set of edges used for the tree expansions.

ALGORITHM *Prim* (G)
//Input: A weighted connected graph $G = (V, E)$
//Output: E_T, the set of edges composing a minimum spanning tree of G
1: $V_T \leftarrow \{v_0\}$ //set of tree vertices initialized with any vertex
2: $E_T \leftarrow \emptyset$
3: **for** $i \leftarrow 1$ **to** $|V| - 1$ **do**
4: find a minimum- weight edge $e^*=(v^*, u^*)$ among all
the edges (v, u) such that v is in V_T and u is in V- V_T
5: $V_T \leftarrow V_T \cup \{u^*\}$
6: $E_T \leftarrow E_T \cup \{e^*\}$
7: **return** E_T

III. Maxflow algorithm

Maximum flow algorithm finds a path from source to destination with maximum allowable flow rate. Unlike max-flow and min-cut theorem, we are selecting single path for data transmission [3~6]. In the initial network source node *s* and destination node *d* are selected from the set of nodes *V*. The weights on the link represents maximum allowed flow rate for a particular time period. Using Prim's algorithm we find path between *s* and *d*. On each iteration after finding maximum flow the link with minimum flow rate is deleted. This method is done recursively until there is no path between *s* and *d*. Finally maximum of maximum allowed flow rate is calculated.

MaxFlowRate = 0 //global variable, initialized to 0

ALGORITHM: Maxflow (*G*, *s*, *d*)

1: *visited[]*={0}
2: Copy graph *G* to graph *Rate*
3: *visited[s]*=1
4: *ne*=1
5: while *ne* < $|V|$ and *visited[d]*!=1
6: for *i*←1 to $|V|$ do
7: *min*←∞
8: for *j*←1 to $|V|$ do
9: if *Rate(i, j)* < *min*
10: if *visited[i]*!=0
11: *min*←*Rate*(*i*, *j*)
12: *u*←*i*
13: *v*←*j*
14: if *visited[u]*==0 or *visited[v]*==0
15: *ne*++
16: *edge_minrate = edge_minrate + min*

17: *visited[v]* ←1

18: *Rate*(*u*, *v*) ← *Rate*(*v*, *u*) ← ∞

19: *flag* ← 0

20: if there is a link from at least one visited node to the

unvisited node

21: *flag* ← 1

22: if *flag* == 0

23: go to step 25

24: end while

25: if *flag* == 0 and *visited[d]* == 0

26: Terminate //There is no further path to the destination

27: else

28: *MinFlowRateEdge* ← ∞

29: find the edge with minimum rate

30: *MinimumFlowRateEdge* ← minimum rate of the edge

31: if *MinimumFlowRateEdge* > *MaxFlowRate*

32: if *MinimumFlowRateEdge* != ∞

33: *MaxFlowRate* = *MinimumFlowRateEdge*

34: assign the edge in *G* with minimum flow rate in a path

from *s* to *d* to ∞

35: Maxflow(*G*, *s*, *d*)

The *maxflowrate* is the global variable which is initially set to zero. Line 1 set all the elements of array *visited[]* to zero. Line 2 copy the graph(network) *G* to graph *Rate*. For further calculations we use the graph *Rate* and the operations carried out on the graph *Rate* doesn't reflect on the original graph *G*. Line 3 sets the *visited[s]* to 1. Line 4 sets variable *ne* to 1, which is the initialization condition for while loop. The while loop of lines 5-24 finds the path between source and destination. If there is no path exists from source to destination, variable *flag* is set to zero and the control goes to step 25. Line 25 checks whether the *flag* is set to zero. Also it checks whether *d* is not visited. If both the conditions are true then the Maxflow function terminates. Else, it continues with the step 27. Line 28 sets the *MaxFlowRate* to ∞. Line 29 finds the edge in the path with minimum rate. Line 30 sets the *MinimumFlowRateEdge* to the calculated minimum

rate of the edge. Line 31 checks whether *MinimumFlowRateEdge* is greater than *MaxFlowRate* and Line 32 checks whether *MinimumFlowRateEdge* is not equal to ∞. If both are true then *MaxFlowRate* is set to *MinimumFlowRateEdge*. Line 34 assigns the edge in *G* with minimum flow rate in a path from *s* to *d*, to ∞. Line 35 calls the function Maxflow(*G*, *s*, *d*) recursively.

IV. Detailed example

Consider the network graph as shown in fig.1:

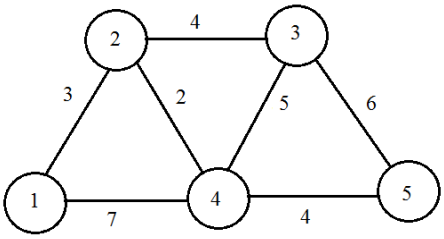

Fig. 1. Initial network graph

The abutment matrix of this example is like this:

$$\begin{bmatrix} 0 & 3 & \infty & 7 & \infty \\ 3 & 0 & 4 & 2 & \infty \\ \infty & 4 & 0 & 5 & 6 \\ 7 & 2 & 5 & 0 & 4 \\ \infty & \infty & 6 & 4 & 0 \end{bmatrix}$$

Iteration 1:

Step 1: Path from source 1 to destination 5 is 1 → 2 → 4 → 5. Here maximum allowed flow rate of individual links 1 → 2, 2 → 4 and 4 → 5 are 3, 2 and 4 respectively.

From the above flow rates of the individual links 3, 2, and 4, minimum allowed flow rate is 2. Therefore here, the maximum allowed flow rate from source node 1 to destination node 5 is **2**.

Step 2: Now delete the link 2 → 4 which has the minimum allowed flow rate among all the individual links in the considered path 1 → 2 → 4 → 5.

The resultant graph after iteration 1 is shown in fig.2:

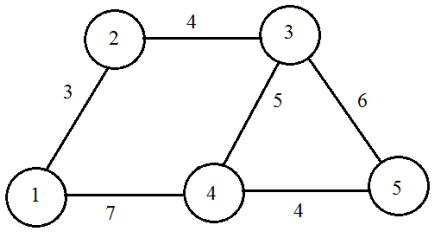

Fig. 2. Residual network after iteration 1

The corresponding matrix for the above graph is:

$$\begin{bmatrix} 0 & 3 & \infty & 7 & \infty \\ 3 & 0 & 4 & \infty & \infty \\ \infty & 4 & 0 & 5 & 6 \\ 7 & \infty & 5 & 0 & 4 \\ \infty & \infty & 6 & 4 & 0 \end{bmatrix}$$

Iteration 2:

Step 1: From the above resultant graph after iteration 1, path from source 1 to destination 5 is 1 → 2 → 3 → 4 → 5. Here maximum allowed flow rate of individual links 1 → 2, 2 → 3, 3 → 4 and 4 → 5 are 3, 4, 5 and 4 respectively.

From the above flow rates of the individual links 3, 4, 5 and 4, minimum allowed flow rate is 3. Here, the maximum allowed flow rate from source node 1 to destination node 5 is **3**.

Step 2: Now delete the link 1 → 2 which has the minimum allowed flow rate among all the individual links in the considered path 1 → 2 → 3 → 4 → 5.

The resultant graph after iteration 2 is shown in fig.3:

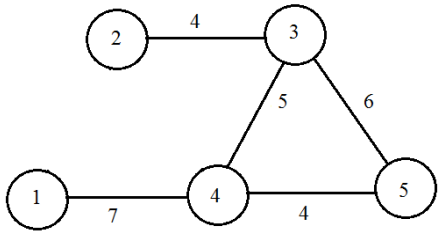

Fig. 3. Residual network after iteration 2

The corresponding matrix for the above graph is:

$$\begin{bmatrix} 0 & \infty & \infty & 7 & \infty \\ \infty & 0 & 4 & \infty & \infty \\ \infty & 4 & 0 & 5 & 6 \\ 7 & \infty & 5 & 0 & 4 \\ \infty & \infty & 6 & 4 & 0 \end{bmatrix}$$

Iteration 3:

Step 1: From the above resultant graph after iteration 2, path from source 1 to destination 5 is 1 → 4 → 5. Here, maximum allowed flow rate of individual links 1 → 4, and 4 → 5 are 7 and 4 respectively.

From the above flow rates of the individual links 7 and 4, minimum allowed flow rate is 4. Here, the maximum allowed flow rate from source node 1 to destination node 5 is **4**.

Step 2: Now delete the link 4 → 5 which has the minimum allowed flow rate among all the individual links in the considered path 1 → 4 → 5.

The resultant graph after iteration 3 is shown in fig.4:

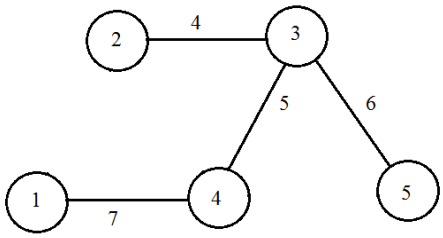

Fig. 4. Residual network after iteration 3

The corresponding matrix for the above graph is:

$$\begin{bmatrix} 0 & \infty & \infty & 7 & \infty \\ \infty & 0 & 4 & \infty & \infty \\ \infty & 4 & 0 & 5 & 6 \\ 7 & \infty & 5 & 0 & \infty \\ \infty & \infty & 6 & \infty & 0 \end{bmatrix}$$

Iteration 4:

Step 1: From the above resultant graph after iteration 3, path from source 1 to destination 5 is 1 → 4 → 3 → 5. Here maximum allowed flow rate of individual links 1 → 4, 4 → 3 and 3 → 5 are 7, 5 and 6 respectively.

From the above flow rates of the individual links 7, 5 and 6, minimum allowed flow rate is 5. Here, the maximum allowed flow rate from source node 1 to destination node 5 is **5**.

Step 2: Now delete the link 4 → 3 which has the minimum allowed flow rate among all the individual links in the considered path 1 → 4 → 3 → 5.

The resultant graph after iteration 4 is shown in fig.5:

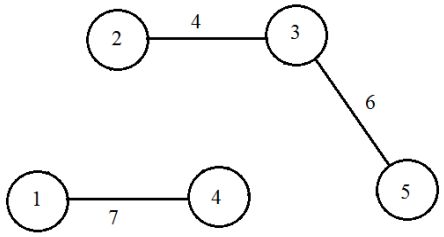

Fig. 5. Residual network after iteration 4

The corresponding matrix for the above graph is:

$$\begin{bmatrix} 0 & \infty & \infty & 7 & \infty \\ \infty & 0 & 4 & \infty & \infty \\ \infty & 4 & 0 & \infty & 6 \\ 7 & \infty & \infty & 0 & \infty \\ \infty & \infty & 6 & \infty & 0 \end{bmatrix}$$

Iteration 5:

From the above resultant graph after iteration 4, we can observe that there exists no path from source 1 to destination 5. Therefore, algorithm terminates.

Maximum flow rates in iteration 1, 2, 3 and 4 are 2, 3, 4 and 5 respectively. Among all the maximum flow rates obtained from iteration 1, 2, 3 and 4, the maximum allowed flow rate is 5. Hence, it shows that the maximum allowed flow rate from source 1 to

destination 5 is 5. The corresponding path for this is 1 → 4 → 3 → 5.

V. Complexity

The efficiency of the proposed algorithm depends on the data structures chosen for the graph itself and for the priority queue of the set V - V_T , whose vertex priorities are the maximum allowed data rate to the nearest tree nodes. If a graph is represented by its adjacency linked lists and the priority queue is implemented as a min-heap, the running time of our algorithm is in O($|E|^2 \log |V|$) approximately.

VI. CONCLUSION

Maximum flow rate algorithm is based on finding a path with maximum allowed flow rate. Our algorithm makes use of classical Prim's algorithm to find a path between source and destination in a given network. We have considered here that the data is sent from source to destination without buffering. The maximum allowed flow rate is calculated in all the paths and finally maximum of maximum allowed flow rate is selected. We have analyzed our algorithm for different number of nodes and calculated the time complexity.

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Automatic Image Enhancement for Better Visualization using Retinex Technique

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Abstract- Image processing is a method to convert an image into a digital form and perform some operations on it, in order to et an enhanced image or to extract some useful information from it. Image enhancement uses no of techniques or improving the visual quality of the image. Retinex image enhancement is an technique which enhances the quality of the image by using histogram generation technique.

Index Terms- Image processing, image enhancement, histogram modeling, retinex image enhancement technique.

I. INTRODUCTION

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph, and output may be image or characteristics associated with that image. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them. It is among rapidly growing technologies today, with its applications in various aspects of a business. Image processing basically includes three steps, 1) importing the image with optical scanner or by digital photography 2) analyzing and manipulating the image which includes data compression and image enhancement and spotting patterns that are not to human eyes like satellite photographs. 3) output is the last stage in which result can be altered image or report that is based on image analysis. Image enhancement refers to accentuation or sharpening of image features such as boundaries, edges or contrast to make a graphic display more useful for display and analysis. The enhancement process does not increase the inherent information content in the data but it does increase the dynamic range of the chosen features so that they can be easily detected. Image enhancement includes gray level and contrast manipulation, noise reduction, edge crispening and sharpening, filtering and so on. The main difficulty in image enhancement is quantifying the criteria for enhancement. Hence large no of image enhancement techniques are empirical and require interactive procedures to obtain proper results. Numerous enhancement techniques have been introduced and these can be divided into three groups as 1) techniques that decompose an image into high and low-frequency signals for manipulation 2) transform-based-techniques 3) histogram modification techniques [1].

First two techniques use multi-scale analysis to decompose the image into different frequency bands and enhance its desired global and local frequencies. These techniques are computationally complex. Hence, histogram modification techniques received the most attention due to their straightforward and intuitive implementation techniques.

II. PROPOSED SYSTEM

2.1 System Architecture:

As shown in fig. 1, our proposed system is useful in improving the visual quality of different types of images. This system generally divides into five parts. It first takes an image as an input. Then we applied modeling techniques on these images. For modeling purpose we have suggested a Retinex image enhancement technique. After applying the technique on modeling we suggested partitioning and mapping of an image which are useful for enhancing an image quality. After mapping the proposed technique is utilized to extend the original image to a color image so that its features can be extracted easily.

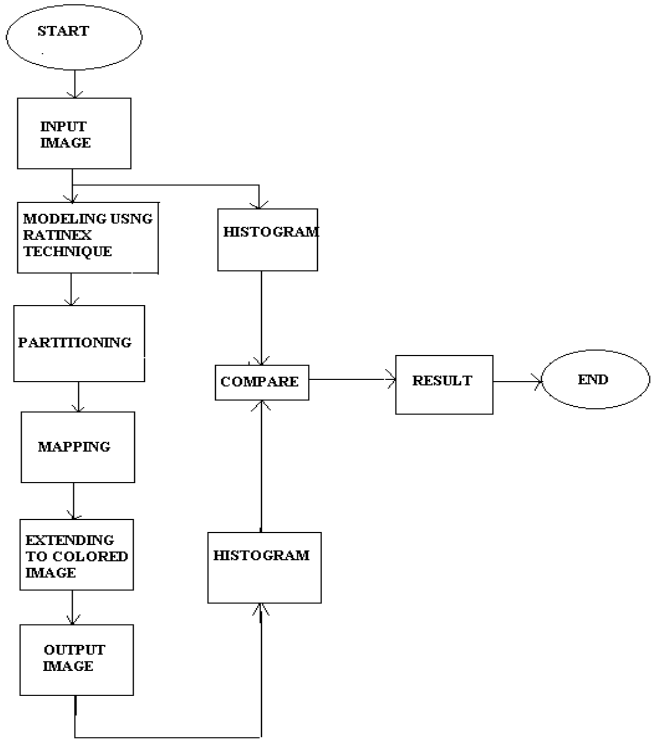

Fig 1: System work flow

The proposed work can be categorized into following modules:

Module 1: Histogram generation for input image:

Histogram modeling:

The histogram of an image represents the relative frequency of occurrence of the various gray levels in the image. Histogram-modeling techniques modify an image so that its histogram has desired shape. This is useful in stretching the low-contrast levels of image with narrow histograms. Among these techniques Linear contrast stretching (LCS) and global histograms equalization (GHE) are widely used for global image enhancement.LCS adjusts the dynamic range of an image and GHE uses an input to output mapping obtained from the cumulative distribution function(CDF).

Since contrast gain is proportional to height of histograms, gray levels with large pixel populations are expanded to a larger range of gray levels. But GHE and LCS are having some drawbacks like they do not always produce good results particularly for image with large spatial variations in contrast also GHE has undesired effect of more attentions any noise in an image. Hence Local histograms equalization (LHE) is used.

LHE methods uses a small window that slides through every image pixel sequentially and only pixels within current position of the window are histograms equalized.

Optimization technique is also employed for contrast enhancement. In this method target histogram is brightness preserving histogram equalization with maximum entropy. But all these methods create problems when enhancing a sequence of images, when the histogram has spikes or when a natural looking enhanced image is required.

Module 2: Modeling using retinex technique:

Retinex Image enhancement algorithm:

Depending on the circumstances, Retinex could achieve Sharpening (Compensation for the blurring introduced by image formation process), Color constancy processing (Improve consistency of output as illumination changes) and dynamic range compression [2].

a. Single-scale retinex (SSR)

The Single-scale retinex is given by

$$R_i(x,y) = \log I_i(x,y) - \log[F(x,y) * I_i(x,y)] \quad (1)$$

Where Ii(x,y) is image distribution in the ith color band, F(x,y) is the normalized surround function.

$$\iint F(x,y)dxdy = 1 \quad (2)$$

The image distribution is the product of scenes reflectance and illumination.

$$I_i(x,y) = S_i(x,y)r_i(x,y) \quad (3)$$

Where Si(x,y) is the spatial distribution of illumination and ri(x,y), the distribution of scene reflectance's. The convolution with surround function works as averaging in the neighborhood. So that

$$R_i(x,y) = \log \frac{S_i(x,y)r_i(x,y)}{S_i(x,y)r_i(x,y)} \quad (4)$$

Generally the illumination has slow spatial variation, which means

$$S_i(x,y) \approx \overline{S_i(x,y)} \quad (5)$$

Then it will be apparent that color constancy (i.e., independence from source illumination spectral and spatial variation) is achieved.

$$R_i(x,y) \approx \log \frac{r_i(x,y)}{r_i(x,y)} \quad (6)$$

Various surround function could be used. Land proposed an inverse square spatial surround function,

$$F(x,y) = 1/r^2 \quad (7)$$

Moore suggested the exponential formula with absolute parameter,

$$F(x,y) = \exp(-r/c) \quad (8)$$

And Hurlbert studied the Gaussian,

$$F(x,y) = K\exp(-r^2/c^2) \quad (9)$$

Jobson stated that Gaussian had the property of being more "regional" and offered good dynamic range compression over a large range of space constant. The selection of space constant is related with visual angel in the direct observation. But the value cannot be theoretically modeled and determined. Basically there is a trade-off between dynamic compression, (for example, details in the shadow), and color rendition. The middle of the range between 50 and 100 pixels represents a reasonable compromise.

b. Multiscale Retinex (MSR)

Because of the tradeoff between dynamic range compression and color rendition, we have to choose a good scale c in the formula of F(x, y) in SSR. If we do not want to sacrifice either dynamic range compression or color rendition, multiscale retinex, which is a combination of weighted different scale of SSR, is a good solution,

$$R_{MSRi} = \sum_{n=1}^{N} \omega_n R_{ni} \quad (10)$$

Where N is the number of the scales, Rni is the ith component of the nth scale. The obvious question about MSR is the number of scales needed, scale values, and weight values. Experiments showed that three scales are enough for most of the images, and the weights can be equal. Generally fixed scales of 15, 80 and 250 can be used, or scales of fixed portion of image size can be used. But these are more experimental than theoretical, because we do not know the scale of image to the real scenes. The weights can be adjusted to weight more on dynamic range compression or color rendition

c. Color restoration method for MSR (MSRCR)

MSR is good for gray images. But it could be a problem for the color images because it does not consider the relative intensity of color bands. This can be seen from formula of MSR, whose output is the relative reflectances in the special domain. Considering the images "out of gray world", whose average intensity for three color band are far from equal, the output of MSR for three channels will be more close, which make it looks more gray. The solution to this problem is to introduce weights for three color channels depending on the relative intensity of the three channels in the original images.

$$C_i(x,y) = f[I_i'(x,y)] \quad (11)$$

Where the relative intensity of three channels

$$I_i'(x,y) = I_i(x,y) / \sum_{i=1}^{S} I_i(x,y) \quad (12)$$

The color restoration function should be monotonic. Several linear and nonlinear functions were tried, Jobson found the best overall color restoration was

$$C_i(x,y) = \beta \log[\alpha I_i'(x,y)] \quad (13)$$

This color restoration method can be described as,

$$R_{MSRCRi}(x,y) = C_i(x,y) R_{MSRi}(x,y) \quad (14)$$

d. MSRCR with gain/offset

Generally the output after MSRCR processing will be out of the display domain. It needs to be shifted and compressed to the display domain. People used the auto gain/offset method, where the gain and offset are based on the specified image statistics. But research showed that the histograms of different images got typical shape and position, which means the gain and offset parameters could be set once and run forever.

Module 3: Partitioning and mapping:

Image partitioning [3] can be a useful tool in facing image degradation. In image segmentation the input is a set of pixels with given grey levels and the output is a partition of the set of pixels into connected regions ("classes"), so that a given set of requirements on the single classes and on adjacent classes is satisfied (i.e. pixels belonging to the same class must have approximately the same grey levels or the same textures and pixels belonging to adjacent classes must have significantly different grey levels or different textures). Once segmentation has been performed, the same grey level is associated with each pixel of the same class. The grey level can either be related to the original grey levels of the class, or can be given by a new grey scale on the ground of contrast optimization criteria. The segmentation technique proposed in this presentation is a method for finding the most homogeneous classes and the best possible contrast in a row by row image processing. In partitioning each row of the image, we have two aims: the partition must be as good as possible in its own right, and it must be as compatible as possible with the partitions of the other rows. If we take into account the two aims simultaneously, then the solution procedure becomes complex. To simplify and speed-up the procedure, we can partition each row independently, and then we can apply region merging techniques to the resulting set of row partitions. In the presentation the problem is formulated as a path partitioning one and a simple O(n p) row-partitioning algorithm based on a shortest path formulation of the problem is given.

Module 4: Enhancing the image to colored image and the histogram generation:

After partitioning mapping is done, in which the image is mapped to X-Y co-ordinate and it is compared with the original image histogram. When partitioning is over, the image is extended to the colored image, and its histogram is generated. The histogram of enhanced colored image gives better results than the original image histogram. At the last we will get the enhanced image which is having better quality than the original image.

Module 5: Histogram comparison and its analysis:

In this module we compare the histogram of original image with the histogram of the enhanced colored image. The histogram having greater quality can be considered as a result of enhanced image result.

III. RELATED WORK

It uses Gaussian mixture model to model the image gray-level distribution, and the intersection points of the Gaussian components in the model are used to partition the dynamic range of the image into input gray-level intervals [1].

It describes Retinex image enhancement technique in detail[2].It gives approach of hypothesis selection filter for image enhancement[4].It propose novel and effective two-stage enhancement scheme in both the spatial domain and the frequency domain by learning from underlying images.It first enhance the fingerprint image in the spatial domain with a spatial ridge-compensation filter by learning from the image and with the help of first stage the second stage filter is employed[5].Description of histogram technique is present in book mentioned in reference [6].

IV. EXPERIMENTAL SETUP

In proposed system, we initially tried an implementation of histogram technique which first loads the image and then generates the histogram of the original image. Once histogram of the image is generated, then retinex modeling technique will be applied on it. It will result an enhanced image.

After that we will generate a histogram for this enhanced image and we will compare it with original one. The result of comparison of both histograms will prove the enhancement. It is used c#.net for generating the histogram.

V. EXPERIMENTAL RESULT

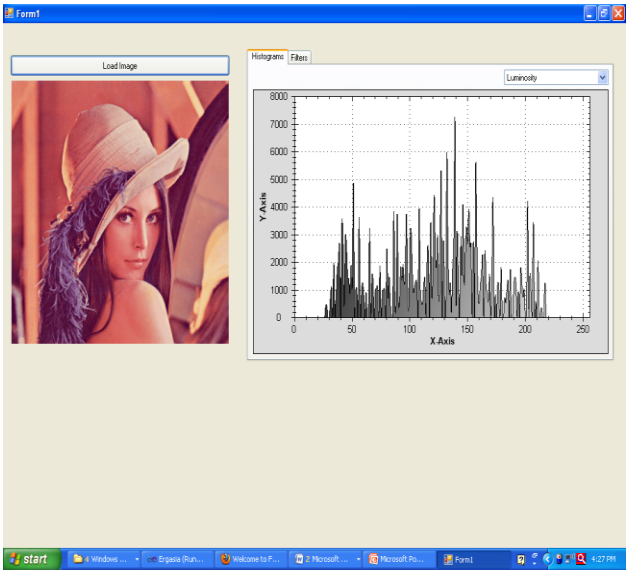

Fig 2: Generated histogram for sample image.

As shown in the fig 2, it first loads a sample image. After loading an image it will generate a histogram of that image.

VI. CONCLUSION AND FUTURE WORK

First literature survey is carried out on image processing techniques. Then we identified the need to enhance the images for better visualization. Then we proposed "Automatic image enhancement for better visualization using retinex technique". We have implemented code for generating histogram of sample image.

Our future work will attempt to implement the remaining system.

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Midline Lethal Granuloma Extra Nodal Natural Killer Cell / T Cell Lymphoma, Nasal Type- A Rare Presentation In Young Adult South Indian Female

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***Abstract*-** Extranodal natural killer/T cell lymphoma, nasal type, is a Non-Hodgkins lymphoma, most commonly affecting the nasal cavity, paranasal sinuses and nasopharynx. Clinically it is characterised by destruction of facial tissues, commencing in the midline. In most cases it either arises from malignant transformation of natural killer cells (NK) or cytotoxic T cells. Extranodal NK/T cell lymphoma, nasal type, is rare, but even rarer in females. The purpose of this article is to report a severe case of extranodal NK/T cell lymphoma, nasal type, in young south Indian female and improvement of midfacial swelling after radiotherapy.

***Index Terms*-** Midline lethal granuloma, Extranodal NK/T cell lymphoma

I. INTRODUCTION

Extranodal natural killer/T cell (NK/T cell) lymphoma, nasal type, is a rare non-Hodgkin lymphoma originating in the nasal cavity or paranasal sinuses. It is strongly associated with Epstein-Barr virus (EBV) infection. Its prevalence is higher in countries in South-East Asia and in Central and South America than in Europe and North America. It occurs in middle-aged persons and affects males more frequently than females [1-5]. Most cases arise from natural killer cells, only a few from cytotoxic T-cells [6, 7]. Clinically, extranodal NK/T cell lymphoma, nasal type, is characterized by progressive midline facial destruction.

We report a rare presentation of extranodal NK/T cell lymphoma, nasal type, in a young adult south Indian female, that had caused extreme deformity of the midface with improvement after radiotherapy.

II. CASE REPORT

A 20yr old female presented to ENT OPD of our hospital with midline facial swelling (Figure 1). The patient stated that about 6 months before, a small growth had appeared in her nose, became ulcerated and then enlarged progressively. As the lesion enlarged, her nose became blocked with a discharge. She frequently complained of headaches. She does not have any adverse habits and had been in good health until the facial condition started. On admission to hospital she had a fever, headache, left conjunctivitis. She had marked swelling of the left eyelids, lower part of the nose, and the entire midface. On anterior rhinoscopy, she had multiple ulcerations in the left inferior turbinate. (Figure 1) There were no intraoral or extra-facial cutaneous lesions. The regional lymph nodes were not enlarged and clinically and radiologically the chest was normal. Intravenous fluids and antibiotics were given. The patient was anaemic, was HIV-seronegative and was negative for syphilis. There was leucocytosis but not lymphocytosis, and the erythrocyte sedimentation rate, C-reactive protein and lactate dehydrogenase were elevated. Computed tomographic (CT) scans showed left frontal, ethmoid and maxillary sinus opacification, mild fullness of left fossa of rosenmuller due to pharyngeal involvement. (Figures 2).

Biopsy from left inferior turbinate showed necrosis, polymorphous proliferation of cells and vascular proliferation. No lining epithelium was seen and detached fragments of fibrinous exudates were also present. Many of the cells showed cleaved nuclei with some scattered mitosis and severe apoptosis. Fungal stain was negative. Immunophenotypically, the tumour cells were positive for CD3 and CD56 but negative for CD20. Some of the large atypical lymphocytes were positive for CD3. As facilities were not available for in situ hybridization analysis to demonstrate whether the malignant cells harboured EBV small-encoded RNA, it was not done.

As the clinical and histological features were consistent with a diagnosis of extranodal NK/T cell lymphoma, nasal type, the patient was referred to the Radiation oncology department for Radiotherapy. Radical dose wide field radiotherapy of 55Gy given for 5 days a week for 6 weeks. Patient had improvement of midfacial swelling after same. Post RT PET CT was taken which revealed minimal soft tissue thickening in the left neck involving the level II upper and mid jugular group encircling the ipsilateral carotid and IJV. It also showed few enhancing nodes in the level IIA jugular group, neck nodes involving the right IIA & IIB levels, mediastinal node involving the aortopulmonary regions. The patient is on regular 2 weekly follow up.

Fig 1 showing before and after radiotherapy in a case of “Midline lethal granuloma” Fig .2 showing CT scan – showing soft tissue encroachment in midline lethal granuloma

Fig 1

Fig 2

III. DISCUSSION

Progressive destructive necrotic lesions involving the midface, nose, paranasal sinuses and mouth were referred to by the generic name 'Midline Lethal granulomata'. However, with the advent of immuno-histochemical phenotyping methods it has become evident that 'midline lethal granuloma' comprises a heterogeneous group of disorders including non-Hodgkin lymphoma, Wegener granulomatosis and various granulomatous infections [2].

Extranodal NK/T cell lymphoma, nasal type, accounts for 7-10% of all non-Hodgkin lymphomas in Asia and Latin America, but for only 1% in Europe and North America [8]. In Korea, it accounts for about 75% of lymphomas arising within the nasal cavity and the paranasal sinuses. To the knowledge of the authors based on published reports, the prevalence of the disease in Indians, especially in south Indian female population is rare. Extranodal NK/T cell lymphoma, nasal type, is characterized histopathologically by angiocentric and angiodestructive growth, by tumour cells that vary in size and may harbour EBV in a clonal episomal form, and by an inflammatory cell infiltrate of plasma cells, histiocytes and eosinophils [1].

Initial signs and symptoms include nasal stuffiness, epistaxis and pain, owing to progressive tumour growth in the nose. As the tumour mass enlarges, invading and destroying structures in the upper anterior aerodigestive tract, it becomes progressively necrotic with a purulent discharge. Signs and symptoms are related to the sites involved. Secondary infection and haemorrhage are not infrequent [5, 6]. Metastasis is uncommon [8]. As extranodal NK/T cell lymphoma, nasal type, may clinically mimic other destructive disease entities affecting mid-facial structures including other lymphomas, nasopharyngeal squamous cell carcinoma, tertiary syphilis, Wegener granulomatosis and fungal infections, the definitive diagnosis must be based on histopathological, immunological and molecular studies [5].

Localised extranodal NK/T cell lymphoma, nasal type usually responds favourably to radiotherapy. As in any neoplasm the best clinical outcome is achieved when treatment is started early in the course of the disease. When the tumour has invaded or with bony erosion, radiotherapy must be supplemented with chemotherapy. Nevertheless, local recurrence occurs in about 50% of cases. Extensive local invasion, regional lymph node involvement, elevated serum lactate dehydrogenase, raised EBV DNA titres and systemic signs (fever, night sweats, weight loss) are associated with a poor prognosis [3,4,6,9], and overall, the prognosis is poor. The five year survival rate is reportedly between 38% and 85%. About 25% of lymphomas that fulfil the histological, immunological and molecular criteria of diagnosis for extranodal NK/T cell lymphoma, nasal type, may arise in other sites of the upper aerodigestive tract (e.g. nasopharynx, palate), and in sites outside the upper aerodigestive tract including the skin, the gastrointestinal tract and the testis. It appears that no matter where it arises in the upper aerodigestive tract, the course of the disease is similar; but when it arises at other sites it runs a more aggressive clinical course, frequently disseminating to the spleen, skin or to bone marrow [1].

Immunophenotypically, the malignant tumour cells, like the natural killer cells from which they originate express CD2, cytoplasmic CD3 and CD56. In some cases they may also express cytotoxic granular-associated proteins, granzyme B, perforin, and T cell-restricted intracellular antigen (TIA-1). Genotypically, the malignant tumour cell expresses the T cell receptor gene in its germline configuration, but there is no monoclonal rearrangement of the T cell receptor [1]. However, there are cases in which the malignant cells lack CD56 and thus do not express the classic phenotype of NK cells or they express an aberrant profile of CD8+ T cell antigens. Nevertheless these are well-recognised subsets of extranodal NK/T cell lymphoma, nasal type, because the clinical and histological features are characteristic [1]. As NK cells and T cells may arise from common progenitor cells, NK cells may express some T cell

antigens, and T cells may express some NK cell antigens, so that cells of extranodal NK/T cell lymphoma, nasal type, may express both NK cell and T cell antigens [8].

Our patient's tumour showed an angiocentric pattern of growth, and immunophenotypically, the tumour cells were CD56 positive, confirming the histological diagnosis of extranodal NK/T cell lymphoma, nasal type. Some extranodal NK/T cell lymphomas, nasal type consist of large cells expressing CD3[1]. The large atypical cells in our patient was also positive for CD3 apart from CD56, it was confirmed that she was suffering from extranodal NK/T cell lymphoma, nasal type. In the nose and paranasal sinuses, extranodal NK/T cell lymphoma, nasal type, is characterized by extensive local destruction of soft tissue, cartilage and bone, brought about by the aggressive angiocentric and angioinvasive nature of the tumour that results in functional incompetence of the vasculature with consequent ischaemia. [4, 6].

Typically, as seen on CT scans, the established soft tissue tumour obliterates the nasal passages and frequently invades and obliterates the maxillary sinuses. Our patient presented with extensive mid facial swelling, and her disease was diagnosed only late in the course of the disease, about six months after the initial symptoms. By then the tumour had already largely destroyed the structure of the nose and had invaded the maxillary, ethmoidal, frontal, sphenoidal sinuses and the nasopharynx.

Our patient was diagnosed as T3 stage of the tumour based on the TNM staging. The extent of invasion by the tumour is classified by TNM staging: T1 refers to a tumour confined to the nose; T2 to additional tumour invasion of the maxillary and anterior ethmoidal sinuses and/or the hard palate; T3 to further tumour invasion involving the posterior ethmoidal sinuses, sphenoidal sinuses, orbit, maxillary alveolar process of bone, and buccal tissues; and T4 to tumour invasion extending to the mandibular alveolar process of bone, to the infratemporal fossa, to the nasopharynx and to the cranial fossa [1, 5].

The almost invariable presence of EBV in a latent clonal episomal form in the cells of the extranodal NK/T cell lymphoma, nasal type, strongly suggests a direct role of the virus in the pathogenesis of the tumour [1, 6]. EBV infects the NK/T cells and establishes latent infection before initial transformation of NK/T cells has occurred, prior to the clonal divergence and clonal expansion of the cancerous cells. The presence of this clonotypic EBV genome in a latent form in the tumour cells strongly supports, but does not prove the pathogenic role of EBV in NK/T lymphomagenesis [7]. The active involvement of EBV in the pathogenesis of extranodal NK/T cell lymphoma, nasal type, is further supported by the direct positive correlation between EBV load in the tumour and the extent of the disease, and by the high titres of IgG antibodies to EBV in persons with the disease. Plasma titre of EBV DNA serves as a marker of tumour viral burden and fluctuates with the status of the disease and the response to treatment because EBV DNA fragments are released from apoptotic tumour cells and escape into the circulation [4, 6, and 8]. In our hospital, as there were no facilities for in-situ hybridization studies, we were not able to determine whether or not the cells of the extranodal NK/T cell lymphoma, nasal type, of our patient carried EBV encoded early RNA.

Chemotherapy is the mainstay of treatment for advanced stage NK cell lymphomas. Conventional CHOP or CHOP like regimens give poor outcome.

When the clinical and histological features were consistent with a diagnosis of extranodal NK/T cell lymphoma, nasal type the management of choice is a radical dose, wide field radiotherapy of 55Gy and chemotherapy. Initial biopsy can prove to be negative; hence multiple site biopsies with high degree of suspicion are important

IV. CONCLUSION

We present a case of extranodal NK/T cell lymphoma, nasal type in a young adult south Indian female, and a tumour which appears to be rare in south Indian females. We could find few cases so far reported in the literature of this rare presentation in south Indian female population.

The purpose of this article is to add to the information available with regard to extranodal NK/T cell lymphoma, nasal type about its clinical features, pathology, investigations and management of the disease. A high degree of suspicion regarding same will help in early diagnosis and early appropriate intervention. Immunohistochemistry is mandatory to identify lesion for its appropriate management.

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Behaviourism as a Precursor of Identity Theory of Mind

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Abstract- Behaviourism stands for a group of theories, which define consciousness in terms of bodily behaviour which is observable to others. Behaviour is easily observed and verifiable by others. The intension of this theory is emphasizes on behaviour and to demystify mind. This theory out rightly denies the existence of mind as an independent substance and supposes that behaviour is out and out determined by the physical conditions of the body and its interaction with the environment. Moreover, this theory does not accept any unobservable stimuli rather it focuses solely on observable stimuli, responses and its consequences.Now in this paper I will delineate the main theme of Behaviourism including its different types emphasising my discussion on Analytical Behaviourism. Finally I will highlight the drawbacks of Analytical Behaviourism and hoe does this theory paves the development of Identity Theory of Mind.

I. ORIGIN OF THE THEORY

In 1913, psychologist J. B. Watson systematically approached the issues relating to mind from behavioural perspective and was the founder of behavioural school of psychology. This academic and highly influential school of psychology dominated in the USA between World War I and II. The main purpose of this school was to begin psychology with a new method of study and to discard the traditional method of introspection. Traditionally it was believed that psychology is the science of mind. But what is mind? How can it be studied? etc. are the questions which the advocates of this theory faced and consequently this definition was rejected. Thus facing the problem of definition of mind the subsequent psychologists define it as the study of the consciousness. In his book "Principles of Psychology" published in 1890 William James defined psychology as that it is the description and explanation of state of consciousness as such. Almost the same view is given by William Woundt and his disciple Edward Bradford Titchener in defining psychology. According to them psychology is the science of consciousness. Thus the traditional psychologists believed that the task of psychology is to describe and explain the states of consciousness. Their chief intention was to relate mental phenomena with bodily processes. To serve these purposes they used the introspective method – the process of looking within. They used this method on the assumption that mental processes occur within the mind which cannot be perceived by others. So the best way to know the occurrences of one's mind is the person himself, which is called self-observation. So introspection is called a subjective method.

But the traditional definition of psychology was rejected by the subsequent psychologists on the grounds that this definition is narrow in range as it does not cover subconscious and unconscious activities of the mind. And their method of studying mind is also unscientific as it is subjective in nature. Moreover, by consciousness they mean human consciousness only and not animal consciousness. Thus the traditional definition and method of study could not satisfy the psychologists for whom science was the ideal.

On the first part of the 19th century a new definition of psychology and a new method of its study are found. The first man who defined psychology otherwise was an English Psychologist William Mc Dougall. According to him, psychology is the science of behaviour. In 1905 he published his book 'Physiological Psychology' where he wrote that psychology is a positive science which studies the conduct of living creatures. In 1908 he added the word 'behaviour' in his book 'Introduction to Social Psychology'. And subsequently in his book 'An Outline of Psychology' he has given a meaning to psychology by saying that the aim of psychology is to give us a better understanding and control of behaviour of the whole organism.

Thus the subject matter of psychology is behaviour was stated by many psychologists before Watson. But Watson's definition is much wider in scope than others. He included in the scope of psychology both human and animal behaviour.

Watson very categorically stated that the idea of consciousness as believed by the traditional psychologists is wholly absurd. Because it neither can be perceived by any sense organs nor can it be tested by any test tube. Those who believe its reality cannot study it satisfactorily because it is wholly a subjective notion and only a matter of private inspection. Thus in order to make psychology a science of behaviour, he concentrated his studies only on observable and measurable behaviour. The ground on which he discarded consciousness is the same ground on which he discarded the reality of all other mentalistic notions like soul, mind, mental life, images and ideas etc. Regarding thought and imagination he holds that these are nothing but implicit muscular behaviour. Similarly, his hypothesis regarding emotion is that it consists in "Profound changes of the bodily mechanism as a whole, but particularly of the visceral and glandular systems."[1]

In his later writings Watson totally rejected all kinds of hereditary mental traits including instinct. Regarding the behaviour of an individual he holds that it is wholly determined by the environment. This view of Watson is the logical consequence of his reflex theory. His view of sensation and perception is that these are sensory response of the organism. In his latter period Watson adopted the theory of the conditioned reflex, propounded by the Russian Behaviourist Pavlov, to explain the process of learning.

1. J.B.Watson (1919), *Psychology From the standpoint of a Behaviourist*, p- 195

Thus his theory is truly known as Behaviourism. In his own words Behaviourism "attempted to make a fresh, clean start in psychology, breaking both with current theories and with traditional concepts and terminology." [2]

Thus Watson intended to introduce a method in psychology as objective as we find in physics or chemistry and to discard introspective method. He favoured a method that takes observables because the same object or event could be observed independently by different observers. Moreover, it is only by this process psychology can become an experimental branch of natural science which is purely objective in nature.

While discussing the method of psychology we find that there are two aspects of Behaviourism- positive and negative. On the positive side it believes that the method of psychology should be objective like that of natural science. On the negative side, it denies the introspective method as the proper method of psychology. This is because of the fact that introspection gives us ambiguous, unscientific and unreliable information.

Thus, Behaviourism of Watson has brought a new era in the field of psychology. This is done on the ground that this theory makes psychology materialistic, mechanistic, deterministic and objective. But in spite of its great contribution this theory has its critics.

I. Critics point out that behaviourist attempt of exclusion of mind from the domain of psychology is untenable. It is "as grotesque as an attempt to stage Hamlet with the Prince of Denmark left out". (Psychology: S.C. Dutta, p-387) Moreover, consciousness is an important factor in psychology and it must remain a central topic of psychology forever. Like outward behaviour, psychology is a science of inner experience.

II. It is an indisputable fact that all human beings possess consciousness. In rejecting consciousness and accepting body for mind and physiology for psychology, the behaviourist committed the old materialistic fallacy that nothing is real except visible and tangible.

It is to be mentioned here that Watson's conception of psychology was much influenced by Ivan Pavlov, a Russian Psychologist who experimented on dog's digestive system by conditioned reflex. Watson also was interested to find out the role of stimuli in producing responses, and that is why he is often described as an S-R (stimulus-responses) Psychologist.

Watson's behaviouristic conception of Psychology had many ups and downs but there were many psychologists who contributed further. Three major figures were Edward Guthrie (1886-1959), Clark Hull, and B.F. Skinner. But the basic question remains, what is behaviour? The answer may be given in a simple statement that what organisms do is behaviour. And on this assumption the whole theory of behaviourism is built up. The purpose of this theory is to promote the scientific study of behaviour. Thus there are two different ways to designate behaviourism- loosely and strictly. In loose manner behaviourism is taken as an attitude but in strict manner it is described as a doctrine. Now an obvious question comes up, who is a behaviourist? This answer is given by Wilfred Sellars a distinguished philosopher, in a very simple way. He says that any person can be qualified as a behaviourist if she or he insists on confirming "hypothesis about psychological events in terms of behavioural criteria."[3]

Thus all psychological theorists who demand behavioural evidence are called behaviourists. A behaviourist generally does not believe in the difference between two states of mind until and unless the difference is shown in behaviour.

According to behaviourism, Behaviour is the only plausible worth investigating and interesting thing and it is the best or even only means for investigation of mental processes or psychological processes. The Behaviourism also claims that apart from the reference to behaviour, the mental terms, such as, 'belief', 'goal' etc. have no other reference.

1.2 Different types of behaviourism

Behaviourism is of three different forms- (1) Psychological Behaviourism (2) Methodological Behaviourism and (3) Analytical Behaviourism. Each of these forms has its own claims.

i) Psychological Behaviourism:

The primary claims of this type are to rectify the method for psychology and to introduce a correct method for scientific psychology. With this end in view this theory appears in the early part of 20th century. The famous traditional psychologists named Wundt, James and Titchener used introspection as a method of psychology. They also believed that consciousness is the subject matter of psychology and consciousness can be studied only with the method of introspection. But rejecting this view Watson put forward a different opinion. According to him, behaviour can be observed objectively and thus scientific psychology should concern itself with what is objectively observable, i.e., behaviour.

(ii) Methodological behaviourism:

This type of behaviourism claims that Psychology is the science of behaviour and as such it is not a science of mind. According to this view, psychology should not concern itself with any mental events or states but should concern itself with the behaviour of organisms- both human and non-human animals. It is for this reason that this theory is called a normative theory for it deals with the scientific conduct of psychology. Methodological behaviourism tries to understand the source of behaviour in physical conditions and thus reference to mental states, such as, desires or beliefs have no additional advantage to this theory. Mental states are beyond the range of empirical study as because these are purely private entities. This type of behaviourism is prominently found in the writings of John Watson.

Methodological Behaviourism is also called Eliminative Behaviourism as it repudiates all or most of our common sense mental concepts, such as, beliefs, conscious mental states, sensations and so on.

This theory believes that all our behaviours originate from external stimulation in the environment. Mind or internal processes have no role to play in the explanation of behavioural manifestation. Thus with the help of external physical stimuli, responses, learning histories and reinforcement it tries to explain the meaning of human or animal behaviour. It is for this reason that this type of behaviourism is a research programme within

2.*Ibid*, p-4.

3 .W Seller (1962), *Philosophy and The scientific Image of Man*, p-22

Psychology. This type of behaviourism is found in the work of Ivan Pavlov, Edward Thorndike and to some extent in Watson. In the work of B.F. Skinner the fullest and influential expression of the Psychological behaviourism is revealed. Skinner's theory of behaviourism is best known as radical behaviourism. Skinner did his experimental works mainly in comparative psychology. His development of behaviourist psychology was a distinct kind and that is why his theory is generally known as radical behaviourism.

Skinner virtually rejected the psychological behaviourism and favoured strongest version of Watson's views. He argued that behaviour should not be studied for observing mental processes. It should be studied for its own sake. Moreover, according to Skinner, apart from behaviour, there is no interest to study the mental process, because mental processes are manifested in behaviour. Thus mental processes are to produce behaviour only and as such these have no supposed consequences. It is only behaviour with which science needs to concern. Thus radical behaviourism does not believe any reference to inner states of organism that may be the causes of behaviour. On the other hand, this type of behaviourism firmly believes that the study of behaviour should be a natural science, such as, Chemistry or Physics. This is the basic premise of radical behaviourism.

Moreover, Skinner's view of reflex is a correlation between stimulus and response. His stimulus response psychology is not physiological psychology because he does not believe the physiological link between stimulus and responses. While Watson believes that behaviour depends on preceding stimulus, Skinner believes that behaviours are dependent upon what happens *after* the response. In maintaining the functional relation between stimulus S and response R, he says that it is R=f(s).

It is to be noted here that the above mentioned three types of behaviourism are distinct from logical point of view. But in Skinner's radical behaviourism combines all three forms of behaviourism and therefore all these three forms are often found in one behaviourism.

Skinner's radical behaviourism can be categorised as a form of methodological behaviourism when this theory concerns with the behaviour of organism without considering internal processing.

iii) ***Analytical Behaviourism:***

Analytical behaviourism is also known as Philosophical or logical behaviourism. This type of behaviourism deals with the meaning of mental terms or concepts within philosophy. This theory states that what is called mental states or conditions are nothing but behavioural dispositions or tendencies or family of behavioural dispositions or tendencies. This type of behaviourism is found in the work of Gilbert Ryle and later works of L. Wittgenstein. Take for example the mental term 'belief'. Ryle says that 'belief' is a deterministic dispositional word among other words. Dispositional words signify abilities, tendencies or pronenesses to do. These also signify things in a lot of different kinds. In describing the category of verb of the word 'Believe' Ryle says that it is a tendency verb which does not connote that anything is brought off or got right. He puts forward his opinion that there are different adjectives by which the term 'belief' can be qualified. To exemplify adjectives, he mentions "obstinate, wavering, unswerving, unconquerable, stupid, fanatical, whole-hearted, intermittent, passionate, and childlike ……."[4]

Ryle also says that some or all of these adjectives are appropriate to different nouns, such as, trust, loyalty, bent, aversion, hope, habit, zeal and addiction. In explaining further the nature of belief Ryle says, "Beliefs, like habits, can be inveterate, slipped into and given up; like partisanships, devotions and hopes they can be blind and obsessing; like fashions and tastes they can be contagious; like loyalties and animosities they can be induced by tricks."[5]

When the term 'belief' is attributed to someone, it characterizes what the person might do in a particular situation and it does not attribute the person concerned with a particular internal state or condition.

Thus far I have given a brief account of the different types of behaviourism. But here I should clearly state that the purpose of my paper is to discuss behaviourism from philosophical point of view, i. e., Analytic Behaviourism., So hereafter I should concentrate my discussion on behaviourism only from the philosophical point of view.

Each and every type of behaviourism has its historical foundation and analytical behaviourism is not an exception from it. The roots of analytical behaviourism can be traced in the 20th century philosophical movement known as Logical Positivism. In the first part of 20th century this school appears in the philosophical world with their distinct purpose and the method they used was *verification*. By 'verification' they meant observation. According to this school, the terms and statements used in science must be verifiable in order to justify their truths. As this school stood on verification principle, their doctrine is known as 'Verificationism'. The views of B. F. Skinner and Hempel are common to many logical positivists and that is why Skinner is called a 'part-time analytic behaviourist'. According to them, all meaningful statements of psychology, the statements which are verifiable in principle, can be translated into the statements of physics and they need not involve any psychological concepts. This strong thesis is derived by Hempel from the following two premises. These are –

1. Verificationist theory of meaning, according to which the meaning of a statement is to be established by the possibility of verification of the state of affairs the statement describes, is to be used as a method for determining the meaningfulness of an expression in a language.
2. To ascribe particular mental state to someone, his physical behaviour plays an essential and large part of the evidence.

Thus, putting together these two premises Hampel concludes that the statements about mental states are equivalent largely to the statement about physical behaviour.

But critics point out that Hempel is not a thoroughgoing behaviourist on the ground that he does not reject mental processes altogether. Hempel believes that to verify mental processes of a person behavioural expression includes certain

4. G: Ryle (1949), *The Concept of Mind*, p- 128.

5. *Ibid*: P-128.

other things viz., changes in the central nervous system, blood pressure, digestive system etc. For example, 'Paul has a toothache' includes certain changes in his central nervous system, his blood pressure and his digestive system, over and above the verification conditions. But Hempel firmly believes that although these changes take place in Paul's physic, it is gross bodily movements that play a large role to verify the psychological statements and to determine their meanings. Thus in Hempel's theory bodily movements are not the only factor to determine the meaning of mental processes although it helps largely. And as bodily movements play a great role in his theory, he is called a behaviourist to a significant extent.

Gilbert Ryle is often called an analytical behaviourist who has much influence on behaviourism. But his behaviourism is quite different, both in content and motivation, from the behaviourism of Hempel who is called a positivistic sort of behaviourist.

Ryle develops his behaviourism by criticizing the Substance dualism, particularly Descartes interactionism. A substance dualist believes that human being possesses a body and a mind. Mind is something non-physical and thus non spatial. All mental states reside in such a non-spatial, non-physical mental substance. So mind is private but body is publicly observable. But Ryle says that there is no such thing as private entity. In his own words: "To talk of a person's mind is not to talk of a repository which is permitted to house objects that something called 'the physical world' is forbidden to house; it is talk of a person's abilities, liabilities and inclinations to do and undergo certain sorts of things, and of the doing and undergoing of these things in the ordinary world." [6]

Ryle says that the dualistic theory of mind-body relation is false in principle. It is not fact that this theory suffers from different kinds of particular mistakes combined together but from one big mistake which he called 'category mistake'. This is a special kind of mistake according to him. This mistake arises when the mental life is assumed to belong to one category when it really belongs to another category. The philosopher's myth is therefore called by Ryle as 'dogma'. The concept of 'category mistake' is explained by him by giving a series of examples. One such example is that a foreigner when for the first time visits Oxford or Cambridge to see the university and he is shown all the colleges, libraries, playgrounds, museum, scientific departments and administrative offices. But after seeing all these he assumes that he has not seen the university. He admits that he has seen all those that are shown but asks where about of the university. He forgets that all that he has already seen together constitute the university. University is seen when all these are seen. Denial of seeing university is based on a mistaken assumption. Thus category mistake occurs due to misunderstanding of the use of ordinary language.

In explaining the nature of the mind Ryle says that mind is composed of sensations, feeling and image which are the stuff of mind. To talk about mind or consciousness as some world behind or beyond the activities is a mistake. The meaningful reference of the concept of mind is a description of how people behave.

Again, Ryle says that 'Intelligence' is a mental word. It is not significantly used as an adjective of stones that are fully material and governed by mechanical laws. Now, recognizing that words like 'Intelligence' which express mental concepts does not name entities that obey mechanical laws. Ryle says that in that case philosophers are tempted to think that they must name entities which obey non-mechanical, spiritual laws. In fact, however, it is a category mistake to suppose that they name some entities. The function of the word 'Intelligence' is to describe a specific kind of human behaviour and the functions of the word 'stupidity' is to describe another specific kind of human behaviour verifiable by sense perception. These words expressing mental concepts do not name occult, private entities that are spiritual.

Ryle explains mind in term of behaviour, skills, tendencies, propensities, dispositions, inclinations. He even says that the higher operations of mind are the higher order abilities which are developed by proper education in society and by the learning method of trial and error. He declines to talk of mind in a Para-mechanical language because he does not believe that there is something occult, mysterious or other worldly where mind exists. L. Wittgenstein also developed his theory by criticizing Cartesian dualism. Unlike dualistic theory Wittgenstein maintains that there is nothing *in the mind* which is called 'mental states' and so it cannot be described in the way a room can be. For him, mind stands not for mental entities but for mental activities.

Wittgenstein admits the possibility of knowing other person's pain as one can know his own. Thus regarding the privacy of sensation he says, "In one way this is false, and in another nonsense. If we are using the word 'to know' as it is normally used (and how else are we to use it), then other people very often know when I am in pain."[7]

He further says, "I can be as *certain* of someone else's sensations as of any fact". [8]

Wittgenstein firmly believes that the way to know other persons being in pain is his behaviour and his words, and the circumstances. As he says, "An 'inner process' stands in need of outward criteria."[9]

II. A Critique of Analytical Behaviourism

C. A. Mac points out that analytical behaviourism does not deal with the truths about a person's mind or states of consciousness which are expressed in our everyday statements. Their claim is that such statements are about the behaviour of material things and by 'material things' they mean about a person's bodily states, bodily acts, bodily states of readiness, dispositions to act in various ways.

It is argued that Ryle's theory of analytical behaviourism fails to explain higher process of mind like creative thinking, integral vision of things and artistic imagination because he confined the sphere of mind to abilities and behaviour. The integration of human personality is very much essential for evolving higher process of mind. Creativity and integration give meaning and significance in human life. But Ryle fails to include

6. *Ibid.* P – 190.

7. L. Wittgenstein (1953), *Philosophical Investigation*, Sec 146

8. *Ibid*, p-224

9 . *Ibid,* sec-580

these in his theory of mind. He explained his theory of mind only from the standpoint of behaviouristic and empirical consideration.

Thus, critics point out that Ryle is not successful in analysing the mind as there are certain prejudices in his theory and it does not give full justice to all realms of mental life. This is due to the fact that he stopped his analysis on disposition and did not go ahead. Against the dualistic philosophy he was so much prejudiced and influenced by behaviourism that he forgets many truths of experiences and make hasty generalizations.

Logical Behaviourism deals with the meanings of our mental state terms and concepts. According to this theory, the meaning of all statements about mental states and processes and statements about behavioural dispositions are same. To say that, for example, "Henry has a toothache" and "Henry is disposed to cry out or moan and to rub his jaw" are equivalent in meaning if and only if other things are found equal. Again, if both the statements about mental states and the meanings of the statements about behavioural disposition are equal in meaning, then there is no problem to apply mental state terms to oneself and to others, and there will be no problem to teach and learn. But philosophers like Chisholm and others argue that this account of mental terms is implausible.

On the light of above discussion of different types of behaviourism, such as psychological, methodological and analytical, it is clear that they are distinct from one another. All these three forms are combined in Skinner's radical behaviourism. In his 'Verbal Behaviour' (1957) and other writings Skinner tries to show that behavioural interpretations can be given to mental terms. He very emphatically stated in his 'About Behaviourism' (1974) that mental terms can be translated into behavioural terms when these cannot be eliminated.

Similarly, radical behaviourism can be shown as a form of methodological behaviourism as it is not concerned with internal processing but with the behaviour of organism. From another point of view radical behaviourism can be shown as a form of psychological behaviourism. It is psychological when this type of behaviourism understands behaviour as a reflection of frequency effects among stimuli.

Now, I will give a sketch of likeness and differences between behaviourism and the identity theory. These two theories are found alike when the term 'disposition' is discussed which is used by the behaviourist. An object is said to have a disposition when in a particular state certain things happen to it, other things will happen to it. An object is said to be brittle if in an appropriate situation, e.g., when a certain amount of sudden force applied, it shatters. In a similar way, a body has disposition means the body has the capacity to behave in a particular way in particular situation. Dispositions of that particular body are the possible *states of that body*. Thus both the Identity theory and the Behaviourism identify mental states and bodily states.

But in spite of their agreement on the above point, both the theories differ on important issues. They differ in defining or characterizing those states of the body. Highlighting the difference between these two theories J. A. Shaffer says:

"Behaviourists wish to define those states in terms of what changes they result in when certain specifiable conditions obtain. Identity theorists wish to define them in terms of identifiable structures of the body, ongoing processes and states of the bodily organ, and, in the last analysis, the very cells which go to make up those organs."[10]

Not only this, identity theory differs from behaviourism on other important respects too. In analysing the meaning of the mentalistic terms, the behaviourists offered the notion of 'dispositions' to behave in certain ways. But unlike behaviourists, the identity theorists do not attempt to analyse the meanings of mentalistic terms. For identity theory to have particular thought in someone's mind means that in the nervous system of that person certain events are going on. But it is not possible for someone to understand what these events are. Even the neurophysiologists of present time are not capable of being to understand these events. Neurophysiologists firmly believe that to understand the cause of behaviour the only way is the direct study of the brain. Hence it is said by the critics that behaviourism has lost much of its strength and influence.

Behaviourism as a theory in psychology or philosophy reigned supreme up to the middle decades of the twentieth century. But this theory fails to solve a lot of problems and the difficulties of this theory had led to its general weakening and subsequently this theory lost all its appeal. Methodological Behaviourism was effectively attacked by the linguistic Noam Chomsky and in psychology this theory has lost its appeal as doctrine. According to Chomsky, the claim of methodological psychologists that when we study psychology we actually study behaviour is as unintelligent as the claim that the study of physics is the study of meter readings. In physics when 'meter readings' is used, it is actually used as evidence. So also in psychology behaviour is used as evidence and nothing more. Thus the subject matter and evidence about a subject matter are not synonymous. It is a mistake to confuse these two different things. Chomsky emphatically stated that human mind is the subject matter of psychology and behaviour is a feature of mind and evidence that mind exists. Thus behaviour itself is not mind.

Moreover, it is possible on the part of a person to have mental states without having the relevant behavioural dispositions. Similarly, a person may have behavioural dispositions without any mental state. For example, a person suffering from a severe pain but may not show any pain-behaviour if he is motivated to suppress the pain. Similarly, a skilled actor can show pain behaviour under certain conditions, even though he does not actually feel pain. Thus according to critics of behaviourism, it is implausible to assume that mental states by itself gives rise to particular behaviour without possessing different types of additional mental states.

So far I have given a brief outline of the defects of the methodological behaviourism but the difficulties that have been faced by the logical behaviourists are more vigorous. This theory holds that a statement about a person's mental state can be translated into a set of statements about that person's actual and possible behaviour. But this claim is not practical. It is impossible for anybody else to give a plausible account of remote mental state of a person and its actual and possible behavioural expressions. It is difficult to specify the antecedent of the hypotheticals and this problem leads to circularity. For example, Mr. John believes that it is going to rain. This mental state of Mr. John would be analysed by the behaviourist into an assumption

10 . J. A Shaffer (1994), *Philosophy of Mind*, P- 42.

of a set of behaviour which would help Mr. John to avoid rain and remain dry. On the basis of John's belief that it is raining, the behaviourists assume that he will carry an umbrella and this assumption will be plausible if it is supposed that the desire of Mr. John is to remain dry. But here is circularity in this reduction and this circularity is the analysis of belief in terms of desire. Here the reduction is not really the reduction of belief to behaviour; rather it is a reduction to behaviour plus desire and this desire is no doubt a mental state and therefore, it is necessary to analyse this mental state.

Again, it can be seen that about the reduction of desire, analogous remarks could be made. If it is said that it is a desire of Mr. John to be remain dry then it depends on the disposition of him to carry an umbrella and all these will be plausible on our assumption of the fact that Mr. John believes that it is going to rain.

Similar objection can be raised against the analysis of mental statements in terms of behavioural statements.

Another difficulty for the behaviourist is that they deny the causal relation between internal mental states and external behaviour which goes against our intuition. It is commonly believed that if someone is in pain then it causes him to cry and this cry causes him to take aspirin in order to get relief from pain. Similarly, it is an apparent truth that someone's belief that it is going to rain and his desire to stay dry cause him to take an umbrella. This denial of causal relation by the behaviourist is due to the fact that they do not admit the existence of any internal mental states.

It is true that all the drawbacks that have been stated against the behaviourist theory make the theory sheer implausible and consequently this theory lost its efficacious by the 1960s. This change of status led the materialist-minded philosophers to think for an alternative and behaviourism was gradually replaced by the doctrine called 'Physicalism', which is sometimes called the 'Identity Theory'. Thus this theory appears in the philosophical domain as a reaction to the failure of behaviourism. In this connection I may refer Edward Feser's view, who says,

"Inspire by the fact that mental states and processes seem clearly to be inner processes of some sort, and states and processes that cause outward behaviour, materialist *turned* away from behaviourism in the 1950s and 1960s, and tended to favour instead the *identity theory."*[11]

Thus, the basic insight of behaviourism is that there are no two entities but one- the body and that the so called mind has to be explained in terms of body. According to this theory, a statement about mental state of a person can be translated into a set of statements about person's actual and possible behaviour. This theory denies causal relation between internal mental states and external behaviour. It is because of the fact that over and above external behaviour, this theory does not admit any internal experience. These and some other features of behaviourism that I discussed are the main problems to which the identity theory reacts. The propounders of identity theory attempt to solve these problems and develop a more plausible theory of mind according to which mental states and brain states are identical. It is due to this fact that behaviourism is said to be a precursor of identity theory of mind.

11 . E. Feser (2009), *Philosophy of Mind*, P-64.

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Strength Properties of Metakaolin Admixed Concrete

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Abstract- Supplementary cementitious materials (SCMs) have been widely used all over the world in concrete due to their economic and environmental benefits; hence, they have drawn much attention in recent years**.** Mineral admixtures such as fly ash, rice husk ash, silica fume etc are more commonly used SCMs. They help in obtaining both higher performance and economy. Metakaolin is also one of such non - conventional material which can be utilized beneficially in the construction industry. This paper presents the results of an experimental investigations carried out to find the suitability of metakaolin in production of concrete. In the present work, the results of a study carried out to investigate the effects of Metakaolin on strength of concrete are presented. The referral concrete M30 was made using 53 grade OPC and the other mixes were prepared by replacing part of OPC with Metakaolin. The replacement levels were 5%, 10%, 15% upto 20% (by weight) for Metakaolin . The various results which indicate the effect of replacement of cement by metakalion on concrete are presented in this paper to draw useful conclusions. The results were compared with reference mix. Test results indicate that use of replacement cement by metakalion in concrete has improved performance of concrete up to 15%.

Index Terms - Metakaolin, Compressive strength, Pozzolan, OPC.

I. INTRODUCTION

The use of supplementary cementitous materials (SCMs) is fundamental in developing low cost construction materials for use in developing countries. By addition of some pozzolanic materials, the various properties of concrerte like workability, durability, strength, resistance to cracks and permeability can be improved. Many modern concrete mixes are modified with addition of admixtures, which improve the microstructure as well as decrease the calcium hydroxide concentration by consuming it through a pozzolanic reaction. The subsequent modification of the microstructure of cement composites improves the mechanical properties, durability and increases the service-life properties. When fine pozzolana particles are dissipated in the paste, they generate a large number of nucleation sites for the precipitation of the hydration products. Therefore, this mechanism makes paste more homogeneous. This is due to the reaction between the amorphous silica of the pozzolanic and calcium hydroxide, produced during the cement hydration reactions. In addition, the physical effect of the fine grains allows dense packing within the cement and reduces the wall effect in the transition zone between the paste and aggregate. This weaker zone is strengthened due to the higher bond development between these two phases, improving the concrete microstructure and properties. In general, the pozzolanic effect depends not only on the pozzolanic reaction, but also on the physical or filler effect of the smaller particles in the mixture. Therefore, the addition of pozzolanas to ordinary portland cement (OPC) increases its mechanical strength and durability as compared to the referral paste, because of the interface reinforcement. The physical action of the pozzolanas provides a denser, more homogeneous and uniform paste.

Metakaolin is a pozzolanic material which is manufactured from selected kaolins, after refinement and calcination under specific conditions. It is a highly efficient pozzolana and reacts rapidly with the excess calcium hydroxide resulting from OPC hydration, via a pozzolanic reaction, to produce calcium silicate hydrates and calcium aluminosilicate hydrates. It differs from other supplementary cementitious materials like fly ash, slag or silica fume, in that it is not a by-product of an industrial process; it is manufactured for a specific purpose under controlled conditions. It is produced by heating kaolin, one of the most abundant natural clay minerals, to temperatures of 650-900°C. This heat treatment or calcination, serves to break down the structure of kaolin. Bound hydroxyl ions are removed and resulting disorder among alumina and silica layers yields a highly reactive, amorphous material with pozzolanic and latent hydraulic reactivity, suitable for use in cementing applications. Metakaolin is a fine, natural white clay which contains the highest content of siliceous, so called as High Reactivity Metakaolin(HRM). During the cement hydration process, water reacts with Portland cement and forms calcium-silicate hydrate (CSH). The by-product of this reaction is the formation of calcium hydroxide (lime). This lime has weak link in concrete, and hence reduces the effect of the CSH. When Metakaolin is added in the hydration process, it reacts with the free lime to form additional CSH material, thereby making the concrete stronger and more durable.

II. RESEARCH SIGNIFICANCE

Enhancing the structural properties of concrete is one of the major concerns in construction industries now a day. Many researchers clearly demonstrated the development of structural properties of cement concrete blended with Metakaolin. Some of them are given below:

Murthy et al., (2012) investigated the effect of Metakaolin on the modulus of elasticity of concrete. The cement is partially replaced by Metakaolin at different percentages such as 7.5, 10, 12.5, 15 and 17.5 by weight of cement. The modulus of elasticity is determined by testing of cylinders of size 150mm diameter and 300mm height at various percentages of Metakaolin after curing for 28 days.

Variation of Young's modulus at different percentages of Metakaolin is compared with controlled concrete as 0% replacement of cement. The value of Young's modulus increase from 0% up to 10% of Metakaloin addition and then decrease. Murali et al., (2012) investigated the properties of concrete with varying percentage replacement of metakaolin. Four mixes were obtained by repalacing 0, 5, 7.5 and 10% mass of cement by metakaolin. The admixture metakaolin when used at optimum quantity tend to increase the strength of concrete mix when compared with conventional concrete. Metakaolin increased the compressive strength, split tensile strength and flexural strength of concrete. Akasha et al., (2008) studied the effect of metakaolin by 0%, 10%, 15% and20% replacement of Portland cement pastes and mortars and the parameters such as compressive and tensile strengths were investigated. The use of metakaolin material effectively improved the mechanical strength of mortarincluding tensile and compressive strength,Poon et al. (2001) conducted studies on rate of pozzolanic reaction of metakaolin in cement pastes. The results obtained indicate that the rates of initial reactivity in metakaolin blended cement pastes were higher than in silica fume or fly ash blended cement pastes. Due to its high initial reactivity, metakaolin resulted in a higher rate of compressive strength development for cement pastes when compared with silica fume. Brooks and Joharis (2001) investigated the effect of metakaolin on creep and shrinkage of concrete. The studies revealed that the reduction in early age autogenous shrinkage is greater at higher replacement levels. Also, comparing with control concrete, greater part of the total shrinkage of the metakaolin concrete is considered to be autogenous shrinkage. This observation does not appear to be influenced by the replacement level. Total creep, basic creep and drying creep of the concrete are considerably reduced due to metakaolin inclusion particularly at higher replacement levels. Curcio et al. (1998) studied the effect of 15% replacement of cement in mortar with four metakaolin samples and compared to concrete containing silica fume. Results showed that in mortars using metakaolin samples, the compressive strength development at early stages is at a higher rate than that of silica fume. 10-15% replacement by metakaolin increases compressive strength at 14 days with respect to control sample by about 30% with OPC .

III. EXPERIMENTAL PROGRAM

The main aim of this experimentation is to study the effect of partial replacement of cement by metakaolin on the properties of concrete. To study this effect the following parameters were considered in this experimentation:

A. Materials Used

- Cement

Ordinary Portland Cement (53 grade) Dalmia cement conforming to IS 8112 was used. The different laboratory tests were conducted on cement to determine standard consistency, initial and final setting time, and specific gravity as per IS 4031 and IS 269-1989. The results are tabulated in Table 1. The results conforms to the IS recommendations.

Table 1: Physical properties of Ordinary Portland Cement-53 grade

Properties		**Results**	**Permissible limit as per IS: 12269-1987**
Standard consistency		32.25%	Varies from 26% to 33%
Specific gravity		3.15	Varies from 3.1 to 3.15
Setting Time	Initial	60 minutes	Should not be less than 30 Min
	Final	480 minutes	Should not be more than 600 Min

- Coarse Aggregate

The crushed granite aggregate were collected from the local quarry. The coarse aggregate was used in the experimentation were of 20mm and down size aggregate and tested as per IS: 2386-1963 (I, II and III) specifications. Specific gravity of coarse aggregate was found to be 2.64. Particle size distribution Curve for coarse aggregate is given in Figure 1.

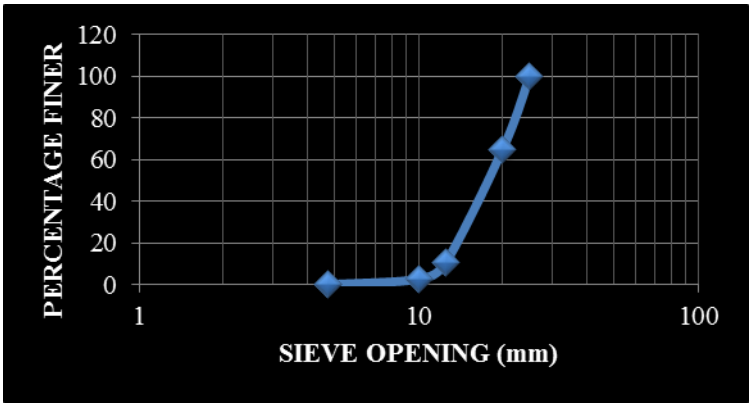

Figure 1: Particle size distribution Curve for coarse aggregate

- Fine aggregate

Locally available river sand was used as fine aggregate. The sand used was having a specific gravity of 2.62 and confirmed to grading zone-II as per IS: 383-1970 specification. Physical properties of tested fine aggregate are given in Table 3.3

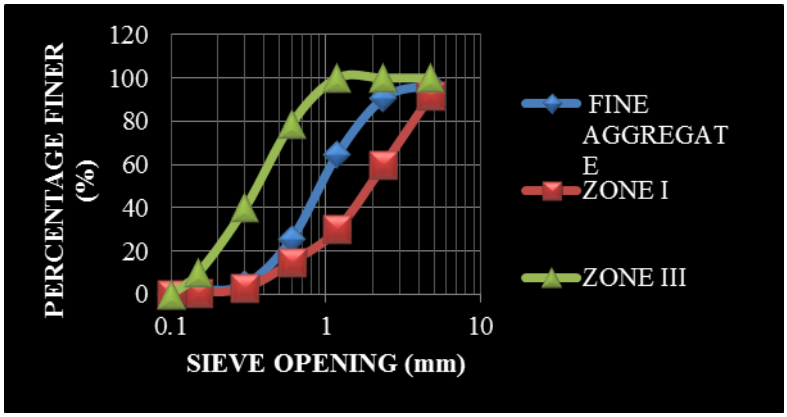

Figure 2: Particle size distribution for fine aggregate

- Metakaolin

The mineral admixture Metakaolin was obtained from the ENGLISH CLAY LIMITED company at Cochu Veli in Trivandrum. The Metakaolin was in conformity with the general requirements of pozzolana. Properties of Metakaolin are given in below Table 2 & 3.

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Figure 3: Metakaolin

Table 2: Physical Properties of Metakaolin

Particulars	Values
Appearance	Off- White Powder
pH (10% solids)	4.0 - 5.0
Bulk Density (Kg/1)	0.4 - 0.5
Specific Gravity	2.6
Loss on Ignition (%)	1.5
Lime Reactivity	1050mg $Ca(OH)_2$/g
Grit (+300#)	< 1%
D 50	1.5~2

Table 3: Chemical Composition of Metakaolin

Chemical Composition	Mass (%)
SiO_2	52.0 - 54.0
Al_2O_3	44.0 - 46.0
Fe_2O_3 (Max)	0.60 - 1.2
TiO_2(Max)	0.65
CaO (Max)	0.09
MgO (Max)	0.03
Na_2O (Max)	0.10
K_2O (Max)	0.03

- Water

Ordinary potable water free from organic content, turbidity and salts was used for mixing and for curing throughout the investigation.

B. Mix proportion

For the present investigation, mix design for M30 grade of concrete was carried out using the above coarse aggregate, fine aggregate, and the binder. The proportion of the materials by weight was 1: 1.47: 2.52 (Cement: Fine aggregate: Coarse aggregate). The cement constituent was subsequently replaced with percentage of metakaolin (by mass). The percentage of the Cement was varied between 0% and 20%, at 5% intervals, with the Metakaolin which gives a total of five mixes. In each mix, water cementitious

materials ratio was fixed at 0.45 and the fine and coarse aggregate kept constant. The various combinations are as presented in Table 4.

Table 4: Detail of Concrete Mixes

Ingredients	Mixes				
	Control	Metakaolin 5%	Metakaolin 10%	Metakaolin 15%	Metakaolin 20%
	C	M_1	M_2	M_3	M_4
Cement (kg/m^3)	437.78	415.89	394	372.11	350.22
Metakaolin (kg/m^3)	-	21.89	43.78	65.67	87.56
Water (kg/m^3)	197	197	197	197	197
Fine Aggregate (kg/m^3)	643.68	643.68	643.68	643.68	643.68
Coarse Aggregate (kg/m^3)	1104.36	1104.36	1104.36	1104.36	1104.36

C. Experimental Procedure

- Mixing of Constituent Materials

The cement and Metakaolin were measured and mixed together until a uniform colour was obtained. The blended mix was spread on already measured fine aggregate placed on an impermeable platform and mixed thoroughly before the coarse aggregate and water were added.

- Casting and Curing of Specimens

The specimens were cast in well lubricated moulds. Concrete were placed on the mould and compacted thereafter and they were left at room temperature for 24hrs before being transferred into the curing tank. After 24 hours, they were immersed in water curing tanks until their testing ages. To investigate the effect of inclusion of metakaolin (as part replacement of cement), 150mm cube specimens, 150mm diameter and 300mm height cylinder specimes and 100mm × 100mm × 500mm size beam specimens were cast for referral and other mixes having variable metakaolin content.

- Testing of Specimens

The compressive strength of different mixes was found out at 7 and 28 days whereas Split Tensile Strength and Flexural Strength were found out at 28 days as per the procedure laid down in IS: 516 - 1981.The concrete specimens were tested for compressive strength and tensile splitting strength in a compression testing machine of capacity 2000KN and flexural Strength was tested in a Flexure Strength Testing Machine respectively. Three specimens were used in computing the mean on each testing age of each mix and the final results are tabulated in comparison with reference mix.

- Compressive strength, F_{cu}, estimated as:

$$F_{cu} = \frac{P}{A}$$

where, P = magnitude of the load that causes breaking (expressed in Kilo Newton)
A = cross sectional area of cube (mm^2)

- Tensile splitting strength, F_{sp}, estimated as:

$$F_{sp} = \frac{2P}{\pi D l}$$

where, P = maximum load causing splitting of the cylinder
D = Diameter of specimen in mm
l = Length of the specimen in mm

- Flexural strength, F_b, estimated as:

$$F_b = \frac{pl}{bd^2}$$

where, b is the width of specimen
d is the depth of specimen
l is the length of the span on which the specimen is supported
p is the maximum load applied to the specimen.

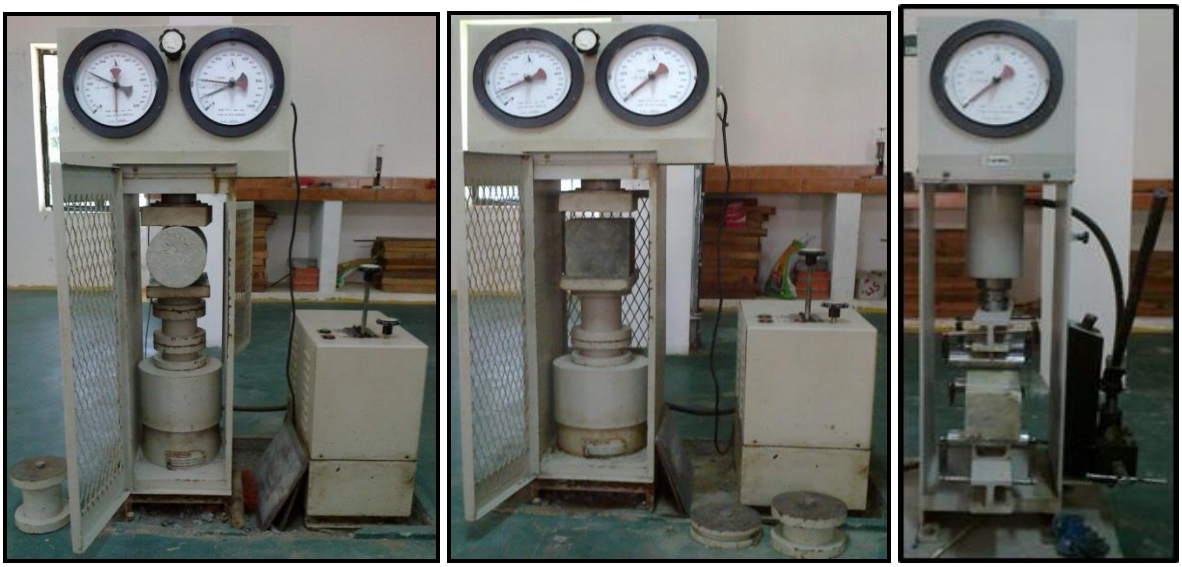

Figure 4: Testing of Specimens in Compression Testing Machine & Flexural Strength Testing Machine

IV. EXPERIMENTAL RESULTS AND DISCUSSIONS

- Compressive strength Result

The development of compressive strength with age for all mixes investigated is presented in Table 5 & Figure 5. From the plot it is clear that the Metakaolin admixed mixes attains higher compressive strength values than the control mix. The compressive strength development depends upon the metakaolin dosage and age of concrete. 15% replacement percentage had higher ultimate strength than concrete made with Portland cement. It has a higher proportion of the strength-enhancing calcium silicate hydrates (CSH) than concrete made with Portland cement only, and a reduced content of free lime, which does not contribute to concrete strength.

Table 5: Compressive Strength of all Mixes

MIX	Compressive Strength (N/mm^2)	
	7 days	28 days
C	28.74	37.04
M_1	32.07	38.22
M_2	38.07	43.7
M_3	41.19	51.56
M_4	38.96	45.49

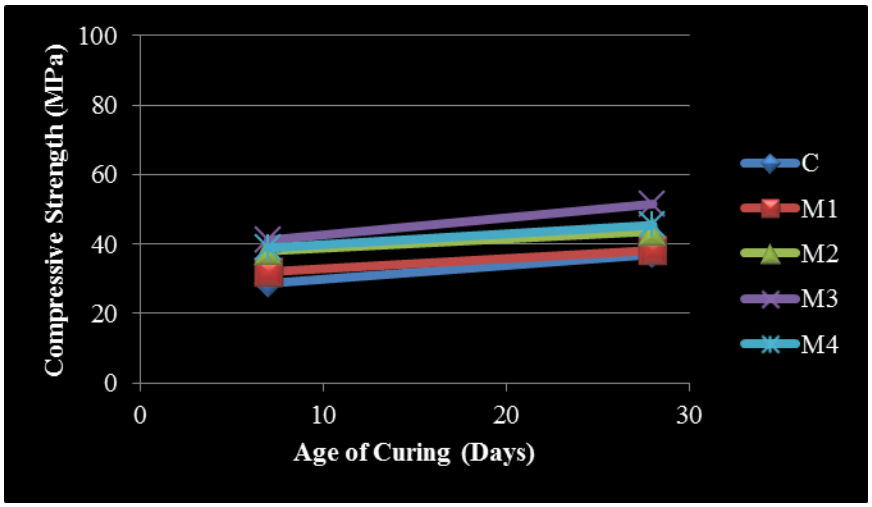

Figure 5: Variation of Compressive Strength

- Split Tensile Strength Result

The results of split tensile strength of cylinder for 28 days are given in Table 6 and the variation of split tensile strength of all mixes is clearly shown in Figure 6. The tensile strength value of concrete increases with increase in percentage of cement replacement with metakaolin upto a percentage of 15%. The tensile strength increases a maximum of 3.04 Mpa for 15 % metakaloine content and as the metakaolin content exceeds the value of 20%, the split tensile strength decreases to 2.95 MPa. The split tensile strength gain is maximum at 15% replacement of cement with metakaolin.

Table 6: Split Tensile Strength of all Mixes

MIX	Split Tensile Strength (N/mm^2)
	28 days
C	2.79
M_1	2.81
M_2	2.9
M_3	3.04
M_4	2.95

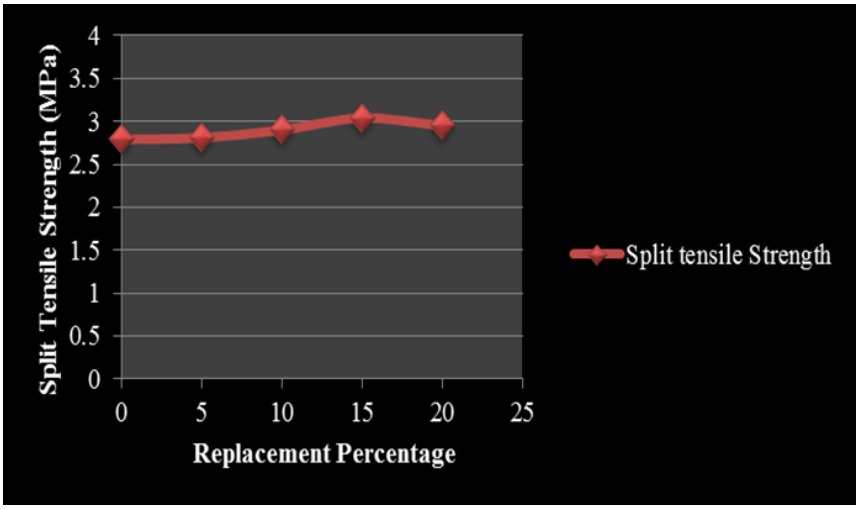

Figure 6: Variation of Split Tensile Strength

- Flexural Strength Result

The results of flexural strength at 28 days are tabulated in Table 7 and are illustrated in Figure 7. It shows that the flexural strength of concrete mix also increases with increase in metakaolin replacement. The flexural strength at 28 days curing for control mixture (C) is achieved 5.84 Mpa. For the Mixes M1, M2, M3 andM4 a strength gain of 4.79%, 8.22%, 15.24% and 10.45% was obtained respectively in comparison with control mix 'C'. The maximum value of flexural strength was obtained for 15% replacement.

Table 7: Flexural Strength of all Mixes

MIX	Flexural Strength (N/mm^2)
	28 days
C	5.84
M_1	6.12
M_2	6.32
M_3	6.73
M_4	6.45

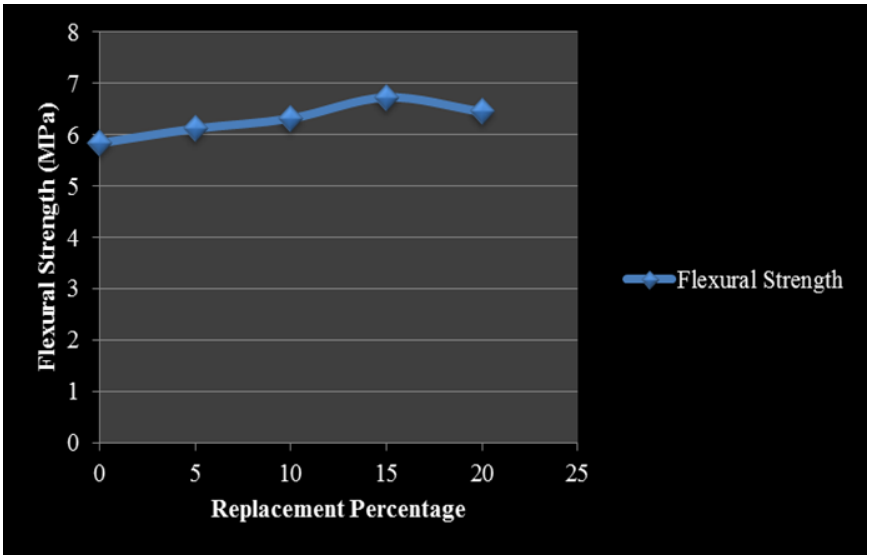

Figure 7: Variation of Flexural Strength

V. CONCLUSION

From the present investigation on the effect of partial replacement of cement with metakaolin in cement concrete, following conclusions can be drawn:

- The inclusion of metakaolin results in faster early age strength development of concrete.
- The strength of all Metakaolin admixed concrete mixes overshoot the strength of OPC.
- Mix with 15% metakaolin is superior to all other mixes.
- The increase in metakaolin content improves the compressive strength, Split Tensile Strength and Flexural Strength upto 15% replacement.
- The results encourage the use of Metakaolin, as pozzolanic material for partial cement replacement in producing high strength concrete.
- The utilization of supplementary cementitious material like Metakaolin in concrete can compensate for environmental, technical and economic issues caused by cement production.

Inclusion of Metakaolin serves as an invaluable means to protect environmental resources, which may result in more viable constructions in the future.

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A Heuristic Approach for the Detection of Malicious Activity at Autonomous System

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Abstract- On the internet, an autonomous system is the unit of router policy which is also sometimes referred to as a routing domain. An autonomous system is assigned a globally unique number called Autonomous System Number (ASN). The investigators and network operators have recently identified that the high profile autonomous systems exhibit disproportionately high malicious behavior since they are attacked by malicious network. In this paper we explore whether some AS's are safe zone for communication through internet. We look for ISPs and ASs that exhibit disproportionately high malicious behavior using 10 popular blacklists, plus local spam data, and extensive DNS resolutions based on the contents of the blacklists. We find that some ASs have over 80% of their routable IP address space blacklisted. Overall, we conclude that examining malicious activity at AS granularity can unearth networks with lax security or those that harbor cybercrime.

Index Terms- Border Gateway Protocol (BGP), security, Internet Service Provider (ISP), Botnet.

I. INTRODUCTION

As we know that Internet Service Provider provides internet service to the customer but the service level agreement made by them and service accomplishment will not be same. This is because of communication media and error in the network. Along with these problems if malicious activity is also takes place in ISP then service will be lesser than that. The Internet is plagued by malicious activity, from spam and phishing to malware and denial-of-service (DoS) attacks. Much of it thrives on armies of compromised hosts, or *botnets*, which are scattered throughout the Internet. Furthermore, some networks may exist solely to engage in malicious activity.

The ISP such as the Atrivo has involved in malicious activity so it has been banned by United States government.

In this paper, we [1] examine whether we can find malicious networks in a systematic manner using existing blacklists. The necessary of detecting malicious network is to make the ISP to inform to their customer to limit the amount of malicious activity in their networks to avoid harboring criminals. ISPs could also use the metrics to determine the effectiveness of their efforts to combat abuse and compare themselves to other networks. Also, when receiving traffic, a destination network could prioritize traffic based on the cleanliness of ASs, which the metrics can help estimate. This would allow a network under attack to prioritize traffic that is less likely to be associated with attackers. Finally, such metrics could also aid spam filtering programs in their scoring of e-mail messages.

Below figures show how the phishing and malware activity is done by redirecting the user details to attacker sites.

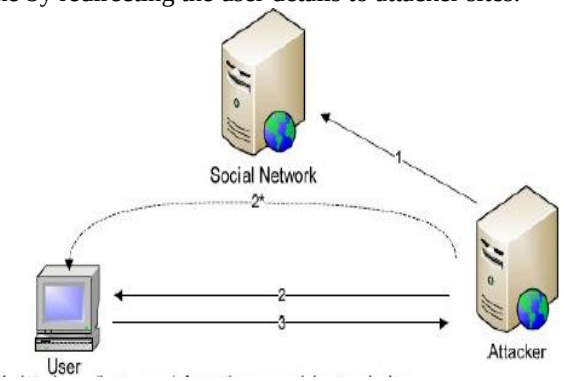


Figure 1.a Attacker leverage the available information on social network

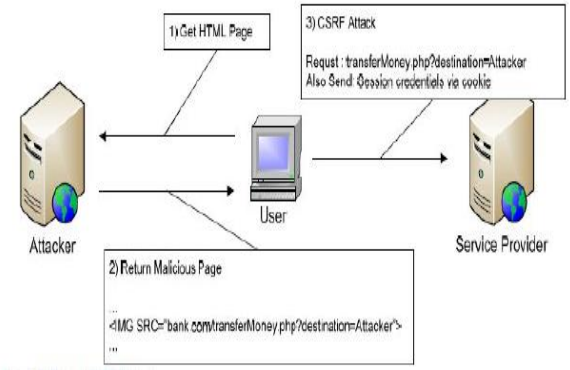


Figure 1.b Typical CSRF scheme

To determine which ASs are malicious, we [1] use 10 of the most commonly used blacklists for spam, phishing, malware, and botnet activities for a period of a month. These blacklists either contain host names or IP addresses to be blacklisted. For host-name-based blacklists, we first determine the IP addresses for each blocked host using real-time DNS queries.

This gives us IP addresses of all blacklisted hosts in our blacklists. We [1] then use BGP routing tables to group these IP addresses into their originating ASs. Upon grouping these addresses by AS, we compare ASs by the percent of infected machines and the rate at which they are cleaned up. We [1] examine other characteristics of the malicious ASs, such as whether their connectivity to other Ass changes more often than

those without malicious activity. The key findings of our study are the following.

• A large fraction of routable space is malicious for some ASs: Four ISPs—two from Ukraine, one from Iran, and one from Belarus—have over 80% of their routable IP addresses blacklisted. This raises concerns regarding the purpose of such ISPs.

•Some providers regularly peer with malicious ASs: We find 22 provider ISPs with 100%of their customer ASs engaged in significant malicious activity.

• Malicious ASs differ from benign ones in other ways. They are more likely to become completely unreachable than those that have less malicious activity, and they are likely to have more peers. However, the duration of unreachability is short for these ASs, which may have implications for orchestrated depeering attempts.

Overall, these results confirm that examining malicious activity at the AS granularity can help find networks that are disproportionately bad, providing a metric for focusing network cleanup efforts.

II. RELATED WORK

In this section we mainly concentrate on the data collection and the BGP routing table.

A .DATA COLLECTION

To create a comprehensive evaluation of an AS, we [1] use a diverse set of data sources. Each of our data sources lists machines reported as engaging in some form of malicious activity.

1) Phishing Sites: Phishing sites attempt to collect sensitive data, such as login credentials, credit card numbers, account numbers, and social security numbers, from users by impersonating legitimate organizations or brands. The Anti-Phishing Working Group and Phish Tank have among the largest data feeds listing such phishing sites.

2) Spam Senders: A mail server can use IP blacklisting to prevent compromised machines from sending mail directly. Spamhaus runs the most widely used blacklist in this context.

3) Exploited Hosts: Spamhaus also maintains a second blacklist, known as the XBL. This list contains prefixes (often individual IP addresses) of hosts infected with exploits often used to send spam. This includes open proxies, computers infected with viruses that are known to send spam, and other exploits. This data is updated every half hour and is labeled Spamhaus XBL

4) Malware Downloads: Malicious software, or *malware*, including viruses, worms, and trojans, have harmful effects on the computers they infect. Three of our data sets list Web sites that host malware downloads. The Clean-MX Viruswatch mailing list, eSoft, and Malware Patrol all independently collect URLs that host malware.

6) Bot Command and Control: Botnets consist of groups of compromised machines used for malicious purposes on the Internet.. Bots must get their instructions from their bot masters, often through command and control servers. The ShadowServer Foundation provides lists of botnet command and control servers along with their IP addresses.

TABLE 2.1
Degree to which an IP address appears in multiple blacklists

Number of Blacklists with Given IP Address	Number of IP Addresses
1	29,631,573
2	9,566
3	3,650
4	1,290
5	320
6	112
7	29
8	7
9	8

In Table 2.1, we show the number of data sets containing each IP address. The Spamhaus XBL is roughly three orders of magnitude larger than any other data set, so the vast majority of IP addresses appear only in that single data set. It is further unsurprising that some IP addresses appear in two or three data sets. The below Table 2.2 gives the overview of datasets.

Here we have considered top ten websites like APWG, esoft, Spamhaus and so an are going to monitor the ISP's for a month and detect the malicious AS IP addresses.

Table 2.2 Overview of Datasets

Label	Description	Duration (in days)	Unique IP Addresses	Unique ASs	Median IPs Per AS	Std. Dev. IPs per AS
APWG	Phishing URLs from the Anti-Phishing Working Group	30	9,560	1,803	2	18.0
Bot C&C	Botnet command and control IPs from the ShadowServer Foundation	30	1,986	611	1	11.4
CleanMX	Malware serving sites from the CleanMX VirusWatch mailing list	30	2,974	687	1	12.0
eSoft	Malware serving sites from eSoft, Inc.	30	8,000	1,196	2	27.2
Local Spam	URLs from spam messages received by the IU CS Department	30	5,495	1,024	1	16.5
Malware Patrol	MalwarePatrol's block list for malware-serving sites	30	871	368	1	5.3
PhishTank	Phishing URLs from PhishTank	28	7,143	1,580	1	14.2
Spamhaus SBL	Verified spam sources from Spamhaus.org Block List	29	6,422	2,005	1	8.9
Spamhaus XBL	Hijacked machines from Spamhaus.org Exploit Block List	29	29,585,604	13,580	9	31,568.1
SI-Feed	URLs and IP addresses from spam emails from Support Intelligence	30	7,591	1,420	1	20.2
SI-DNS	IP addresses from DNS resolutions on the `SI-Feed` data set	30	4,448	911	1	11.8
SURBL	Host names appearing in spam messages from SURBL	30	29,324	2,739	2	47.2

The below figure 2.a shows the percentage of malicious hosts in AS.

Mmml

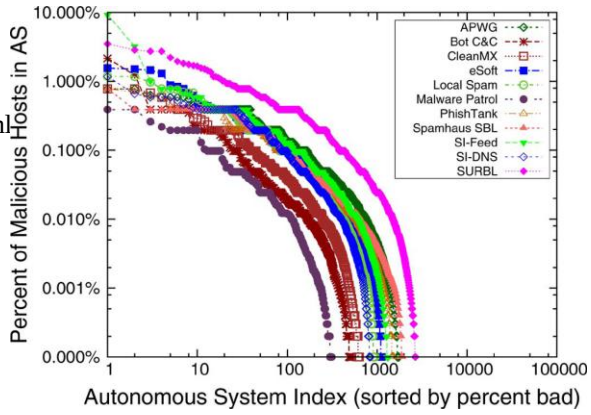


Figure 2.a Percentage of badness for each AS

B.INTERNET ARCHITECTURE

The INTERNET has experienced a tremendous growth in its size and complexity since its commercialization. The Internet connects thousands of autonomous systems (ASs) operated by many different administrative domains such as Internet service providers (ISPs), companies and universities. Since two ISPs might merge into one and each administrative domain can possess several ASs, an administrative domain can operate one or several ASs.

Routing within an AS is controlled by intradomain routing protocols such as static routing, OSPF, IS-IS, and RIP. A pair of ASs interconnects via dedicated links and/or public network access points, and routing between ASs is determined by the interdomain routing protocol such as Border Gateway

Protocol (BGP). One key distinct feature of the interdomain routing protocol is that it allows each AS to choose its own administrative policy in selecting the best route, and announcing and accepting routes. One of the most important factors in determining routing policies is the commercial contractual relationships between administrative domains.

We [2] propose an augmented AS graph representation to capture AS relationships. We classify the relationship between a pair of interconnected ASs into customer–provider, peering, and sibling relationships. There is no publicly available information about inter-AS relationships. ISPs do not register their relationships to the Internet registries. Internet Routing Registries (IRR) was created as a repository of routing policies. However, some ISPs are not willing to reveal their policies, and even if they were, these routing policies might not specify AS relationships.

We [2] present heuristic algorithms that infer the augmented AS graph from BGP routing tables. BGP routing tables are retrieved from the Route Views server in Oregon, which is publicly available and has the most complete view currently available. The RouteViews server establishes BGP peering sessions with many tier-1 and tier-2 ISPs. Among the connected AS pairs, the algorithms infer that more than 90.5% of the AS pairs have customer– provider relationships, less than 1.5% of the AS pairs have sibling relationships, and less than 8% of the AS pairs have peering relationships.

We can model the connectivity between ASs in the Internet using an AS graph G=(V, E) where the node set V consists of ASs and the edge set E consists of AS pairs that exchange traffic with each other Fig.2.b shows an example of an AS graph. The *degree* of an AS is the number of ASs that are its neighbors. Formally, the degree of AS u, D(u)={v|(u,v) $\in$ E}

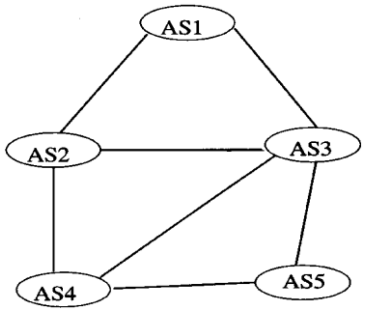


Figure 2.b AS graph example

III. PROPOSED WORK

In this section we [2] describe a heuristic algorithm for inferring AS relationships and method to overcome BGP vulnerability.

A. HEURISTIC ALGORITHMS FOR INFERRING AS RELATIONSHIPS

The below algorithm will be treated as a final heuristic algorithm because identify peering relationships from the rest of connected AS pairs by using the heuristic that two peering ASs' degrees do not differ by more than R times where R is some constant that has to fine tuned.

Input: BGP routing tables
Output: Annotated AS graph G

Phase 1: Use either Basic or Refined algorithm to coarsely classify AS pairs into provider-customer or sibling relationships

Phase 2: Identify AS pairs that can not have a peering relationship

1. For each AS path $(u_1, u_2, \ldots, u_n)$,
2. find the AS u_j such that degree$[u_j]$=max$_{1\le i\le n}$ degree$[u_i]$
3. for $i = 1, \ldots, j-2$,
4. notpeering$[u_i, u_{i+1}]$=1
5. for $i = j+1, \ldots, n-1$,
6. notpeering$[u_i, u_{i+1}]$=1
7. if edge$[u_{j-1}, u_j] \neq$ sibling-to-sibling and edge$[u_j, u_{j+1}] \neq$ sibling-to-sibling
8. if degree$[u_{j-1}]$>degree$[u_{j+1}]$
9. notpeering$[u_j, u_{j+1}]$= 1
10. else
11. notpeering$[u_{j-1}, u_j]$= 1

Phase 3: Assign peering relationships to AS pairs

1. For each AS path $(u_1, u_2, \ldots, u_n)$,
2. for j=1, ..., n-1,
3. if notpeering$[u_j, u_{j+1}] \neq 1$ and notpeering$[u_{j+1}, u_j] \neq 1$ and degree$[u_j]$/degree$[u_{j+1}]$< R and degree$[u_j]$/degree$[u_{j+1}]$> $1/R$
4. edge$[u_j, u_{j+1}]$ = peer-to-peer

B. SECURE BGP ROUTE DISTRIBUTION

The approach we[3] adopted to securing BGP route distribution involves two Public Key Infrastructures3 (PKI's), a new path attribute containing "attestations," and the use of IPsec. These components are used by a BGP speaker to validate the authenticity and data integrity of BGP UPDATE's that it receives, and to verify the identity and authorization of the senders

Public Key Infrastructures (PKI's) and Certificates

S-BGP uses two PKI's, based on X.509 (v3) certificates, to enable BGP speakers to validate the identities and authorization of BGP speakers and of owners of ASes and of portions of the IP address space. These PKI's parallel the existing IP address and AS number assignment delegation system and take advantage of this extant infrastructure.

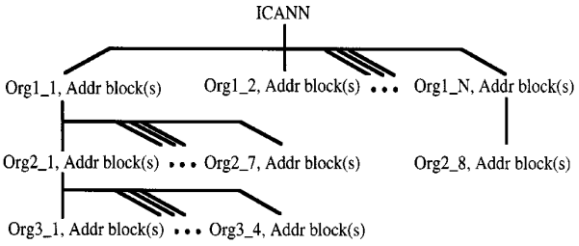
The two PKI's involve four types of certificates, as illustrated below (in the diagrams).

• The higher node is the issuer for the certificates defined in the tier below it.

• The name of the current tree node (organization, AS, router, etc.) is the subject of the certificate.

• Any additional fields shown in the node, e.g., address block(s), are in an extension in the certificate.

• Other X.509 certificate fields are assumed, but not Shown—sequence number, subject public key, signature, validity period, etc.



Subject	Description
Org1_x	a 1st tier organization (usually a registry)
Org2_x	a 2nd tier organization (usually an ISP or DSP)
Org3_x	a 3rd tier organization (usually a DSP or user organization)

Extension	Description
Addr blocks(s)	one or more IP address blocks assigned to the organization

Figure 3.a Address allocation for PKI structure

Route Validation

Attestations and certificates are used by BGP speakers to validate routes asserted in UPDATE messages, i.e., to verify that the first AS in the route has been authorized to advertise the address block(s) by the address block owner(s), and that each subsequent AS has been authorized to advertise the route for theaddress block(s) by the preceding AS in the route.

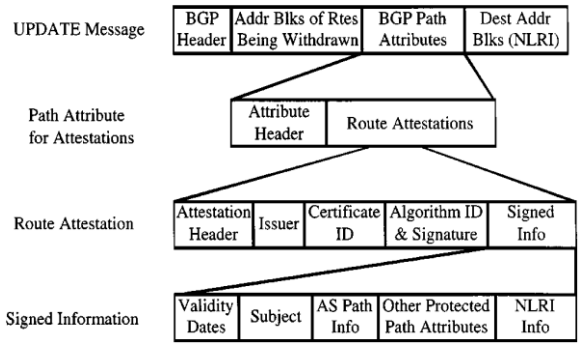


Figure 3.b UPDATE format with route attestation

IV. CONCLUSION

This paper has examined whether some networks are safe harbors for malicious activity. This paper found that several ASs have high concentrations of malicious IP addresses, while others represent disproportionately higher malicious activity than their equivalently sized peers. Our analysis can be used to help increase ISP accountability and can become a mechanism to combat malicious activity. This paper provides efficient methods for AS path selection and also provides methods for overcoming from BGP vulnerability. The limitations of the proposed system are changing the black listed IP address by administrator, IP address of the black listed AS is not properly converted to host name and inaccuracy of the heuristic algorithm.

The above limitations can be overcome by collecting the attack history from the destination or by network routing infrastructure. Network and host-based intrusion detection services may collect and aggregate data on attacks and provide them to the security service vendors to analyze. Instead of using Heuristic algorithm for BGP path selection we can make use of BGP Decision algorithm and decision will be done using attributes like AS_PATH, origin, next hop attribute and many more.

ACKNOWLEDGMENT

I would like to express sincere thank to my guide Prof. Chandrasekhar S for his guidance and support to publish this paper.

I would also like to thank all my friends and family members who helped me indirectly to present the paper.

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The Study of Methylene Blue Removal by Using Mixed-Tio_2 as a Catalyst under Solar Light Irradiation

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Abstract- To investigate the removal efficiency of Methylene blue (MB) by using TiO_2 with second metal (M) such as Cu, Al, Mg, Fe, Tb, La and Ce as catalyst which were prepared by im-pregnation method in amount of 2% M/TiO_2. The catalyst ratio that used in this reaction was 2 g/L, pH 5, temperature 30˚C and 100 min in reaction time. The most effective catalyst was 2%Cu/ TiO_2. Then the preparations of 2%Cu/ TiO_2 were compared; im-pregnation and sol-gel process. The study found that 2%Cu/ TiO_2 prepared by the im-pregnation method performed better activity. Therefore, we selected to prepare the catalyst by the im-pregnation method to study the amount of Cu in Cu/TiO_2 which was 0.5%, 1%, 4% and 8%Cu / TiO_2, results showed that 0.5%Cu/ TiO_2 performance is the highest. Then, the used amount of 0.5%Cu/ TiO_2 in reaction was studied which were 0.5, 1, 1.5 and 2 g/L. It found that 0.5 g/L showed the best ratio in MB removal. Moreover, the effects of pH in the range of 3-10, temperature between 30˚C - 70˚C, concentration of the MB solution and influence of irradiated light were examined. The results showed that at pH 9, temperature 30˚C, lower concentration of MB solution were suitable for the removal of MB and the solar light is effective to degrade MB in solution.

Index Terms- Photodegradation; Mixed- TiO2; Methylene blue; Catalyst

I. Introduction

Nowadays, we cannot refuse that the environmental concern has been attracted much attention in every organizations. For the industrial that participated in dye usages could also enhance the pollution to environmental through the waste water without proper treatment. The main chemical in waste water from this industrial was the excess dyes from their product. The main industrial which have been faced these problem such as textile, leather, cosmetic and printing – publication business. It is about 10,000 industrial worldwide which is dye consumed and it is excess of 107 kg/year [1]. In this number, it is about 1-15% of the dyes used are released to waste water.

There are water treatment methods such as such as coagulation, chemical oxidation, membrane separation, electrochemical process, adsorption techniques and photodegradation. Photodegradation has been considered as the promising method for organic waste removal from solution. [2] According to this reaction could be environmentally friendly and the catalyst could be re-used. Moreover, the solar light is effective enough for being irradiation light and it is inexpensive. The most well-known catalyst is the TiO_2 because it shows high photocatalytic activity, photo-stability, non-toxic and commercial availability [3], [4]. The process is initiated by the photo adsorbed over the surface of TiO_2, the energy of photon need to be equal to or greater than band gap energy of semiconductor catalyst. Then, the electron may then be promoted from the valence band (VB) to the conduction band (CB). After the electron transit from VB, the electron hole (h^+) is generated, this is electron deficiency. This step is induced the redox process with the adsorbed pollutant such as dye or other organic pollutant. The adsorbed water over the surface of TiO_2 which reacted with hole was proposed to produce the hydroxyl radical [5], [6], [7]. These radical could then react with the pollutant as well. However, the electron and hole could also recombine, leading to low photodegradation activity. The improvement of this process can be divided into 2 main categories. First, the catalyst could be reduced the possibility of the recombination. Second, increasing the pollutant adsorbed over the surface of catalyst. However, some of the researchers also improve other properties of catalyst such as the porous structure, the agglomeration over surface, crystal structure etc.

The enhancement of photocatalytic properties of TiO_2 by doping transition metal is the promising and attractive method because this could improve the separation of electron – hole and surface modification (porous, surface area,) [8], [9]. The normal doping metals such as Sn, V, Cr, W, Co, Cu, Fe, Ta, Ga, Tb, Ce, La, etc because they are found to be effective and the active site for these gas species easy to be produced [10] –[14]. After these metal mixed with TiO_2, they could from the rare earth oxide over surface of TiO_2. These species are found have polymorph, strong adsorption selectivity, good thermal stability, etc, due to their f-electron and multiple-electron configuration [15].

In this study, the second metal such as Cu, Fe, Tb, Ce, La, Al and Mg was added to TiO_2 for preparing as mixed TiO_2 catalyst. The suitable catalyst was then studied the optimum conditions in Methylene Blue (MB) through photodegradation process such as prepration method, pH, temperature, catalyst content, concentration of MB and reaction time.

II. Experimental

1. The preparation of M/TiO_2

For impregnation method,TiO_2 pellets which was purchased from CARLO ERBA was calcined at 500 °C for 4 hours and grinded in mortar before used. Then, the proper amount of metal salt (preparing Mg/TiO_2, used $Mg(NO_3)_3.6H_2O$) in solution was dropped to TiO_2. The mixture was stirred for well mixing and dried at 100 ˚C for overnight. The dried sample was crunched

and calcined at 500 ˚C for 4 hours. The resulting mixed oxide was then used as catalyst. The different mix oxide with TiO_2 was prepared in similar method but the specific metal salts were required.

The second method which is in interesting is sol-gel method, for preparing TiO_2-CuO_2. The starting metal salts of Ti and Cu are Titanium (IV) n-butoxide and $Cu(NO_3)_2$ which are dissolved in ethanol and water, respectively. Poly-ethylene glycol (PEG) was added to $Cu(NO_3)_2$ solution under vigorous stirring. Then the titanium (IV) n-butoxide solution was dropped into the mixture. The white precipitate was produced during dropping. Then, the 5 M NaOH and 5 M hydrazine were sequentially in to above slurry and the yellow precipitate was formed. The mixture was kept stirring for 15 min. The mixture was then washed by water and acetone and filtrated. The cake was then dried at 100 ˚C for overnight and calcined at 500 ˚C for 4 hours. [16]

2. Photocatalytic reaction

In order to study the effect of the second metal in M/TiO2 catalyst which prepared by impregnation method, the different M which are Cu, Fe, Tb, Ce, La, Al and Mg over TiO_2 was selected. The solution of Methylene Blue (MB) was prepared at specific concentration and adjusted pH at 5. The solution of MB was stirred and heated to 30 ˚C, then the M/TiO_2 catalyst was added to the solution at content 2 g/L. The mixture was kept stirring and heated for 100 min while some of mixture was sampled at every 10-20 min. The mixture was subjected to centrifuge and the supernatant was measure the concentration of residual MB by Spectrophotometer at 665 nm.

For different parameter study, the experiment was similarly as above procedure whereas the interested parameter was varied.

3. Analytical method

The efficiency of catalyst was related to the % of MB removal which was calculated by following equation;

$$\% \text{ MB removal} = \frac{C_{in} - C_{final}}{C_{in}} \times 100$$

where C_{in} and C_{final} denote to the initial and final concentration of MB (M), respectively.

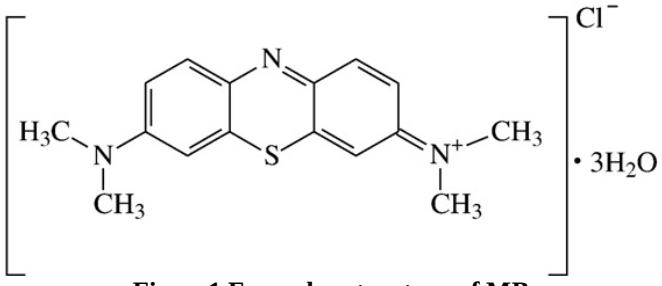

Figure1 Formular structure of MB

III. RESULTS AND DISCUSSION

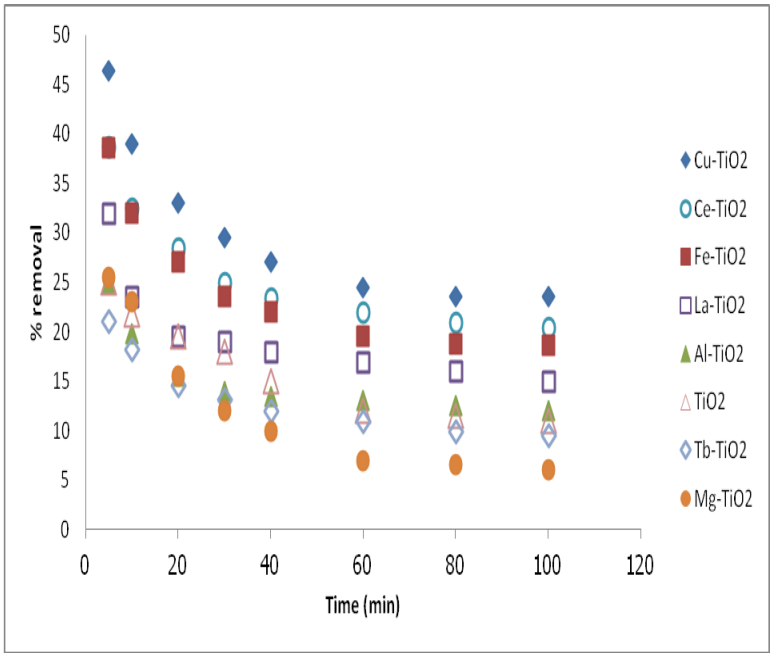

Figure1: Photodegradation of MB over mixed-oxide at pH 5, temperature; 30 °C, MB concentration; 3.2 mg/l, catalyst content; 2 g/l

Figure1 shows the effect of different second metal loading to TiO_2 by impregnation method. It is clearly that some mixed oxide showed lower activity than pure TiO_2 which are Tb-TiO_2 and Mg-TiO_2 whereas Cu-TiO_2 showed the highest photodegradation activity. Firstly, Hara et al. [17] found that the Cu_2O powder could be a catalyst for the decomposition of water to H_2 and O_2 under solar light. This could due to the easiness of the electron and hole generation over CuO_2 because the band gap of CuO_2 is only 2.0 eV. However, the main problem of pure Cu_2O in photocatalysis reaction is the recombination of electron and hole. Therefore, the mixed oxide with Cu_2O was prepared to discover the solution for this problem. Sevevirathna et al. [18]deposition nanoparticle of Cu_2O over TiO_2 powder and found that this composite catalyst could be active catalyst for the decomposition of water under light irradiation. Bessekhouad et al. [19] also studied the photoactivity of the same type of composite material using as catalyst in photodegration of Orange II. The results show that this composite showed the superior photoactivity in the degradation of Orange II. They seem to suggest that the Cu_2O generated electron and hole, and then electron was transferred to the conduction band of TiO_2; resulting the preventing of the recombination process. Therefore, more electron from catalyst was produced and transferred to the target pollutant in solution. The enhancement of photodegradation of this composite system was achieved when compared to pure Cu_2O and TiO_2. This could be the reason to explain the results from Figure1 in the high activity of Cu-TiO_2.

The well known and simple methods to prepared mixed oxide for using as heterogenous catalyst are impregnation and co-precipitation (sol-gel process) methods. Therefore, this mixed oxide was prepared by these 2 methods and then the resulting catalyst was studied the activity in photodegradation of MB

under solar light irradiation. The results were shown in Figure2 and suggested that the sol-gel process show higher activity. It has been mentioned that the photocatalyst activity was strongly related to the preparation method. For example, Au-TiO_2 was used as catalyst in water dissociation and the different fabrication methods were investigated [20]; deposition-precipitation, photo-deposition and wet impregnation methods. The results showed that the photo-deposition showed greater activity than others techniques. Boccuzzi et al.[21], [22] were also studied the properties and activity of Cu-TiO_2 in the hydrogenation of 1,3-cyclooctadiene. They found that the catalysts fabricated from different methods showed different properties and activity up to 100 times different. Recently, Shiping Xu et al. [23] studied 5 different methods which is widely used for prepared mixed oxide (metal-TiO_2) such as sol-gel , wet impregnation , chemical reduction of Cu salt by $NaBH_4$ (NR) and in situ photo-deposition in hydrogen generation from water. The results showed that the catalyst prepared from sol-gel method show highest activity which similarly to our results.

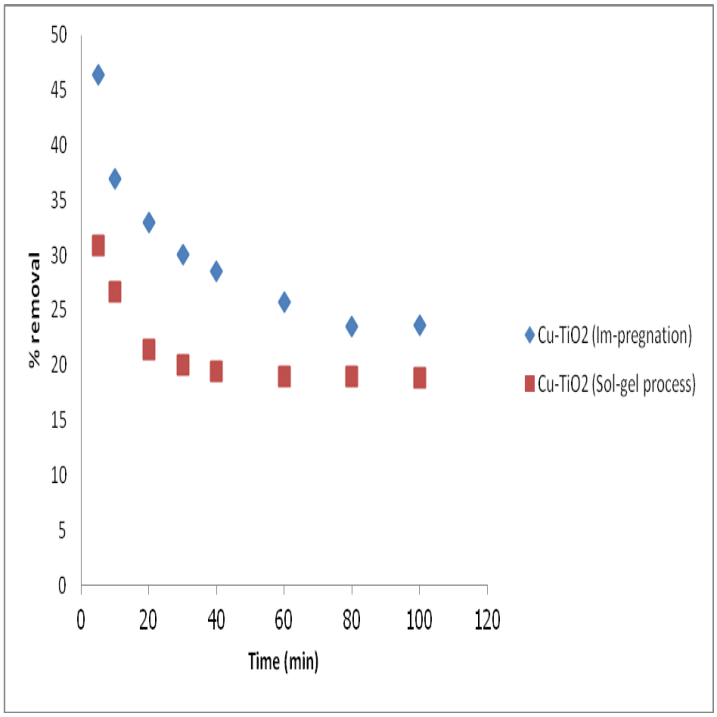

Figure 2: Photodegradation of MB over different Cu/TiO_2 at pH 5, temperature; 30 °C, MB concentration; 3.2 mg/l, catalyst content; 2 g/l

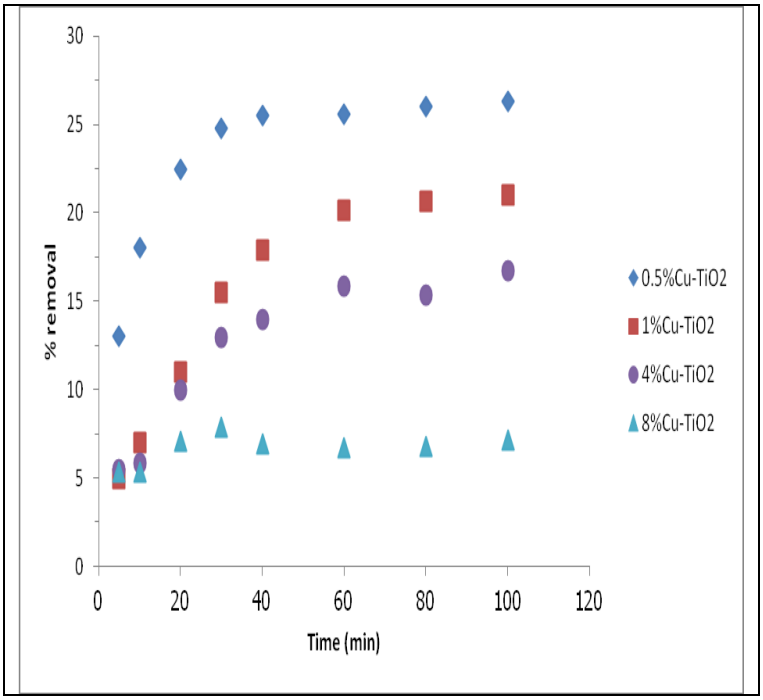

Figure 3: Photodegradation of MB over different loading Cu over TiO_2 at pH 5, temperature; 30 °C, MB concentration; 3.2 mg/l, catalyst content; 2 g/l

Figure3 showed the effect of Cu loading in TiO_2 which are 0.5, 1, 4 and 8%. It clears that at lower Cu loading showed higher photocatalytic activity. It has been studied that the amount of metal in mixed oxide clearly effects the activity of catalyst [23], [24], [25]. They [23], [24], [25] claimed that only the optimum amount of the metal in mixed oxide could enhanced the activity with specific reaction and condition. M. Zhou et al. [24] studied the photodegradation of surfactant by investigates the effect of Fe loading in TiO_2. They also suggested that only specific ratio of Fe:Ti at 0.25 could reach the maximum activity of catalyst. Similary, the results was supported in the studied of Mst. S. Nahar et al. [26] which investigated Fe-TiO_2 activity over the phenol degradation over visible light and also K. Melghit et al. [25] which studied the Congo red degradation under solar light with M-TiO_2 (M=V, Fe) as catalyst. However, the same catalyst could showed the different results as found in the investigation of N. A. Jamalluddin [27]. They studied the degradation of reactive dye by Fe-TiO_2 under ultrasonic irradiation. The effect of Fe loading study showed that at lower amount of Fe (between 0.2 – 1%) showed higher activity. They explained that crystal phase of TiO_2 could played the rule. The interfacial between the Fe and TiO_2 could be sufficiently factor. At higher loading could present the less interfacial surface. Therefore at lower loading of second metal could result in the high dispersion of second metal over TiO_2 and related to higher interfacial area. This reason could also explain our results and also support with the mechanism of normal photo degradation that the produced electron at CB will be transferred to the second metal surface. If the catalyst shows the higher interfacial area this process could occur easily and this will prevent the recombination of electron and hole effectively. This will result in the higher photoactivity of the catalyst.

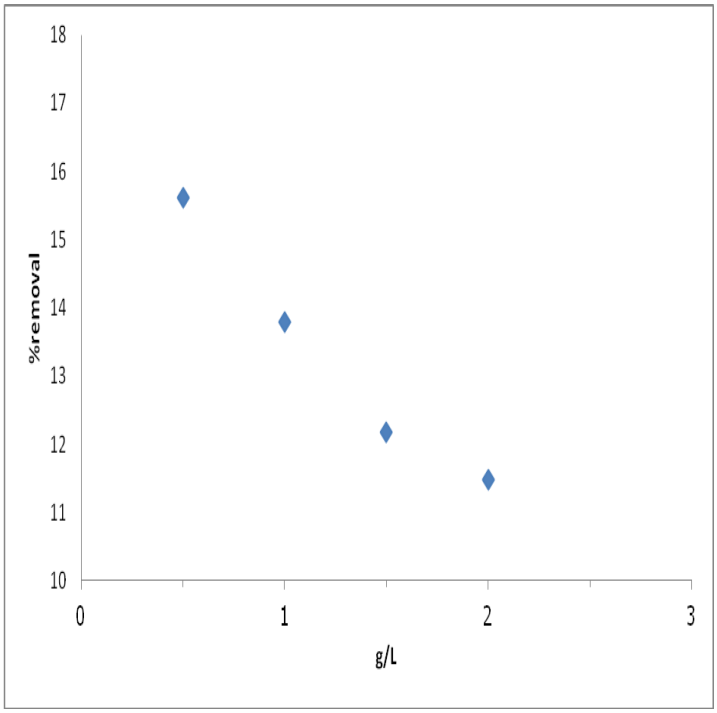

Figure 4: Photodegradation of MB over 0.5%Cu/TiO_2 with different content at pH 5, temperature; 30 °C, MB concentration; 3.2 mg/l.

The effect of catalyst amount which is 0.5%Cu/TiO_2 in the degradation of MB under solar light was studied and the results showed in Figure4. The catalyst amount between 0.5 – 2 g/L illustrated that at higher loading the % removal was lower than at less amount of catalyst. This showed that the more working sites over surface of catalyst were found in reaction at catalyst at 0.5 g/L. The similarly results were found in C. Chen et al. [28]. They studied the effect of catalyst concentration between 0.1-0.5 g/L in the photodegradation of Ma lachite green over TiO_2 under UV light. They confirm that at lower concentration, the increasing of photodegradation rate was achieved. Their results were also in agreement with the study of M. Saquib et al. [29]. They [28] were explained that at higher dosage of catalyst could enhance the aggregation of catalyst particles which causing the decreasing of surface area of catalyst. However, they also claimed that the light scattering by TiO_2 could occur when using high concentration of TiO_2, leading to the less photon adsorption to the catalyst and causing the decreasing of catalyst activity. This could be also the reason to explain our results in Figure4.

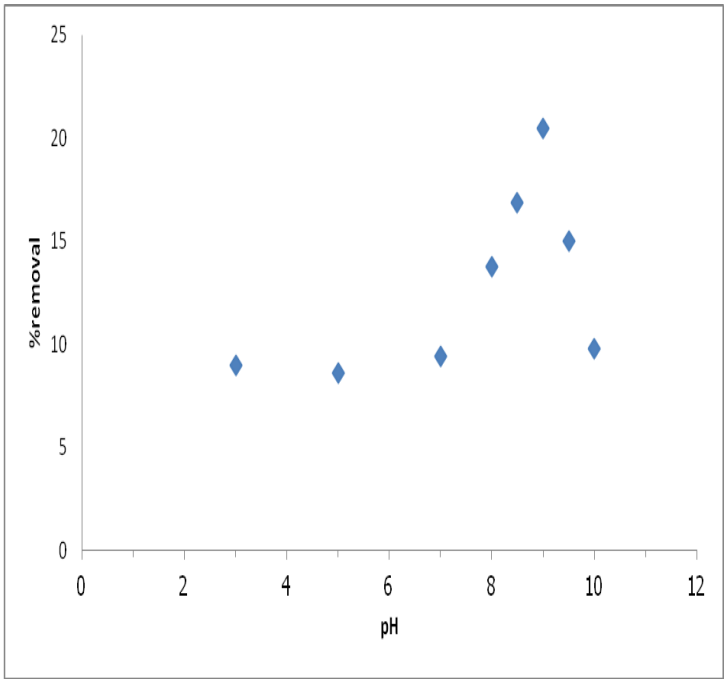

Figure 5: Photodegradation of MB over 0.5%Cu/TiO_2 at different pH, temperature; 30 °C, MB concentration; 3.2 mg/l, catalyst content 0.5 g/l.

The surface charge of TiO_2 could also effect by pH, therefore, effect of pH was also studied (pH between 3-10). The results were showed in Figure5 and clearly showed that pH = 9 was the optimum condition for the MB degradation under 0.5%Cu-TiO_2 catalyst. Normally, TiO_2 in aqueous system is amphoteric [30]. Therefore, at pH higher than isoeletric point the surface of TiO_2 is mainly in negatively charge. Thus, the electrical property of the TiO_2 is dependent with pH and this will affect the adsorb species. According to MB is cationic dyes, pH of dispersion should be in basic range or higher than zero point charge. S. Senthikumaar et al. [31] studied the photodegradation of textile dye (MB) by TiO_2 under ultrasonic irradiation. The results showed that at higher pH, the % removal of MB was increased and stayed constant from pH at 10. Similarly, the optimum pH for the degradation of phenanthrene in surfactant solution containing TiO_2 was about 8 when compare pH at 3, 8 [32]. They also explained the results using the iso-electric point (IEP) of catalyst which claimed that IEP of TiO_2 is about 6.8 [33]. Therefore, roughly the proper pH for adsorption the positively species should be higher than 6.8. Regarding to our results, it could be also explained by using the IEP of Cu-TiO_2 which is below 7 as well as pure TiO_2 [34]. Therefore, the optimum pH for our system should be higher than 7 as in agreement with results from Fig 5 (pH higher than 6, the % removal was gradually increasing). However, at higher pH than 9 the % removal was slowly decreasing again, this could be due to the strongly negatively charge of TiO_2 was protonated and loss the negatively property for adsorption cationic dye.

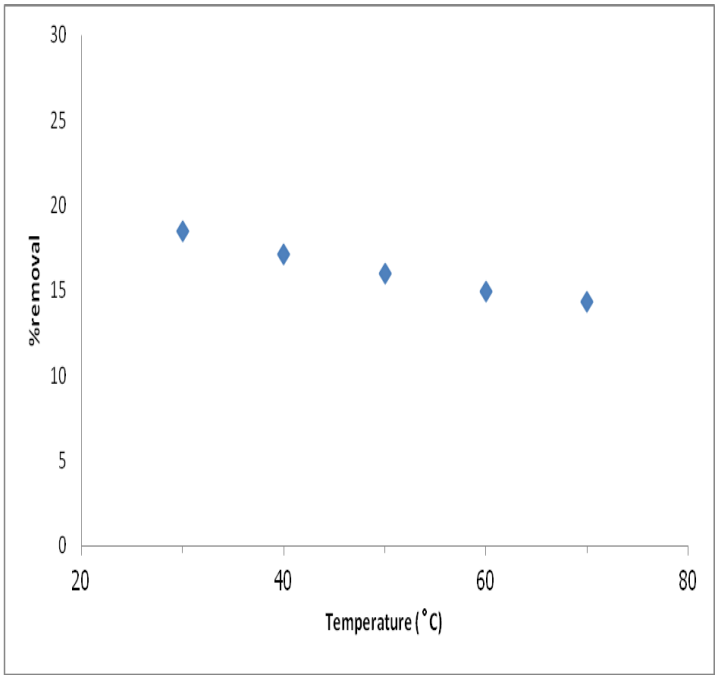

Figure 6: Photodegradation of MB over 0.5%Cu/TiO_2 at different temperature, pH 9, MB concentration; 3.2 mg/l, catalyst content 0.5 g/l.

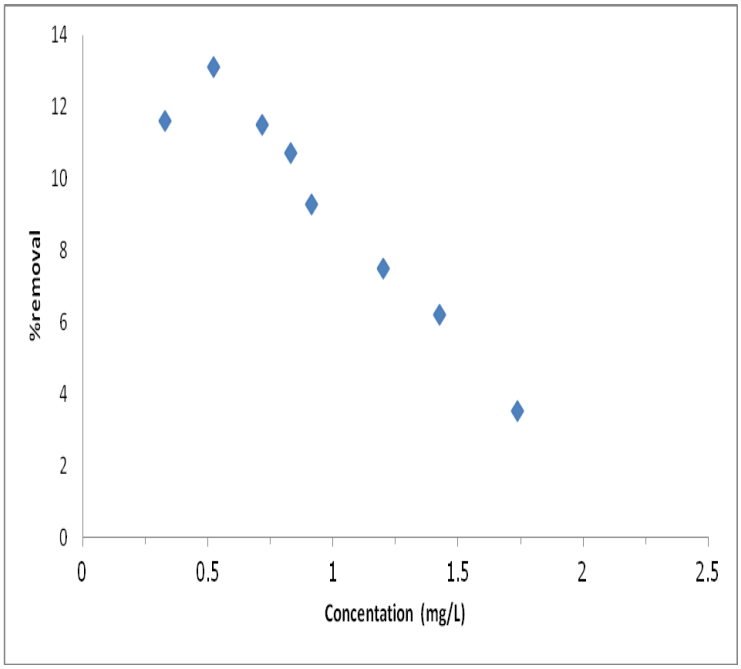

Figure 7: Photodegradation of MB over 0.5%Cu/TiO_2 at different initial MB concentration, pH 9, temperature 30 °C, catalyst content 0.5 g/l.

From Figure6, the % removal of MB is slightly constant. It indicated that the MB degradation is independent with temperature. In the other hand, it could be concluded that the mixed oxide is tolerant to temperature or stable with temperature between 30- 70 °C. This means that the temperature could not change the surface morphology and property of TiO_2 to methylene blue. However, Ling et al. [36] studied the photodegradation of phenol and methylene blue using immobilized TiO_2 film. They found that the temperature between 30 – 50 °C could not affect the photoactivity of this catalyst. They explained that this reaction need very low activation energy or zero which achieved from photonic activation (5-20 $kJmol^{-1}$) [37]. These level is closed to the hydroxyl radica; reaction, suggested that this reaction may be involved hydroxyl radical reaction.

Figure7 showed the effect of the initial MB concentration in MB removal by using TiO_2 as photocatalyst. It clears that at lower concentration of MB, the removal of MB was increased. The similarly results were found in the study of Chen et al. [28], Ling et al. [36], Liang et al. [35]. Chen et al. [28] studied the degradation of Malachite green using TiO_2, at lower concentration of Malachite green can enhanced the % degradation. They explained that at higher concentration, the adsorption rate of malachite green was high and these could cause the competition of OH- adsorption over TiO_2. Therefore, the $OH^{\cdot}$ production was low. These will cause the lower degradation efficiency. Ling et al. [36] also explained shortly of this influence that it is typical application of photocatalysis.

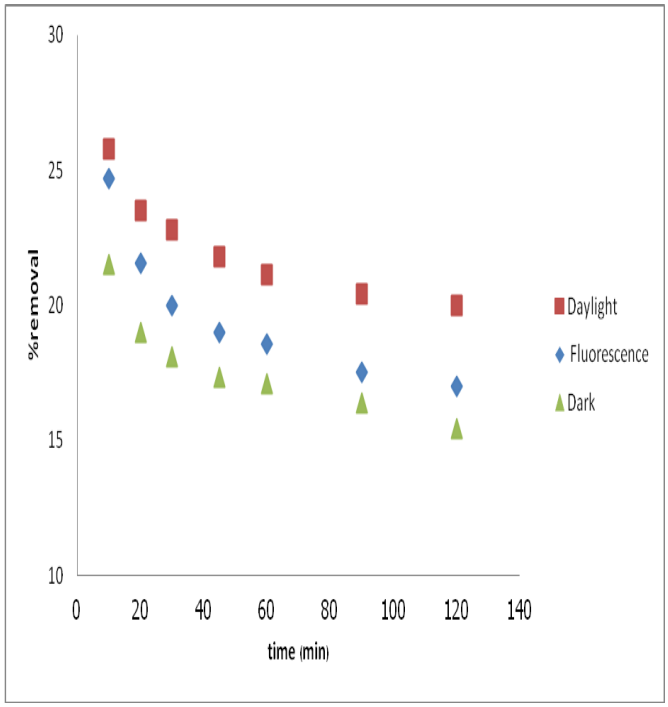

Figure 7: Photodegradation of MB over 0.5%Cu/TiO_2 at different light irradiation, initial MB concentration 0.5 mg/l, pH 9, temperature 30 °C, catalyst content 0.5 g/l.

The results in Figure7 studied the effect of light irradiation. The reaction was taken place at 3 different conditions which were at daytime about noon (called daylight), at night and turn on the fluorescent light (called fluorescence) and at night time but turn of the light (called dark). These reactions were operated in the same laboratory and used the same condition. The results showed that the reaction at day time showed higher % MB removal, followed by the reaction at night time which turned on and off the fluorescence light. The reaction that operated in the dark is the removal of MB by adsorption process only whereas the reaction with light irradiation contained both adsorption and photodegradation of MB. Therefore, the % removal of MB was higher for the reaction with light irradiation. The comparison of the reaction with solar light and fluorescence, it is clearly that the reaction at day time showed higher % degradation. It is well known that the higher light density can excite more e- and hole in TiO_2 and these will enhance photodegradation activity. The fluorescence light that used in this study was the normal fluorescence lamp at ceiling, it was not contact directly to the solution. Therefore, the excitation of TiO_2 could be less effective that the solar irradiation.

IV. Conclusions

A series of mixed oxide with TiO_2 were prepared by impregnation of metal salt to TiO_2 commercial grade. Tb/TiO_2 and Mg/TiO_2 show lower photodegradation activity than pure TiO_2 whereas Cu/TiO_2 showed the highest activity. The preparation of Cu/TiO_2 was then investigated, resulting that co-precipitation was the proper method. Then the experiment parameters was examine, % Cu loading, catalyst content, pH, temperature, MB concentration and reaction time. The results showed that the optimum conditions were lower % Cu loading, catalyst content, MB concentration and temperature. In term of pH, it clears that pH about 9 showing the high % MB removal. The source of light irradiation was also studied; day light showed better activity than fluorescence. The reaction took place in the dark was the lowest activity.

Acknowledgements

I would like to thank Facultry of Science, Mahasarakham University for financial support. The authors acknowledge department of Chemistry, Faculty of science, Mahasarakham University. And financial support from the Center of Excellence for Innovation in Chemistry (PERCH-CIC), Office of the Higher Education Commission, Ministry of Education is gratefully acknowledged.

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Temperature Trends at Four Stations of Assam during the period 1981-2010

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Abstract- One of the very important issues discussed in the recent two decades is climate change. Temperature is one of the indicative factors of climate change. The present research aimed at studying temporal variation in temperature over Guwahati, Tezpur, Dibrugarh (Mohanbari) and Silchar stations, Assam, India, during the period 1981–2010. Trends in annual and seasonal temperature series were analyzed using Mann-Kendall test. The analysis reveals that majority of the trends, both annual and seasonal, showed increasing tendency in temperature during the period 1981-2010.

Index Terms- Climate change, Temperature, Trend, Mann-Kendall test.

I. INTRODUCTION

Earth's linearly averaged surface temperature has increased by 0.74°C during the period 1901-2005 as reported by the latest estimates by IPCC (2007). The rates of climate change are significantly different among regions (IPCC 2007). According to Hingane, Rupa Kumar and Ramana Murty (1985) during the last century, surface temperature over India has shown significant increasing trend which is attributed to rise in maximum temperature. Rupa Kumar and Hingane (1988) investigated long-term variations of seasonal and annual surface air temperature at six Indian industrial and non-industrial cities each and have concluded that the non-industrial stations did not show significant trends and there was either a cooling tendency or cessation of warming after the late 1950s at most of the Industrial cities. Thapliyal and Kulshreshtha (1991) study on temperature trends over Indian cities indicates a slight warming trend between 1901 and 1990. Hingane (1996) study estimates rising trends of 0.84 and 1.39 1C per 100 years in the mean surface temperature calculated for Mumbai and Kolkata, respectively. Rupa Kumar et al. (2002) highlighted that the warming trends were visible during all the four seasons in all-India mean surface air temperatures during 1901-2000 from a network of 31 well-distributed representative stations over India. The results showed higher rate of temperature increase during winter (0.04°C/decade) and post-monsoon (0.05°C/decade) seasons compared to that of annual (0.03°C/decade). The variability of minimum and maximum temperature in Poland reveals that the strongest increase in minimum and maximum temperatures occurs in mid and late winter which has been studied by Wibig and Glowicki, (2002). Though beginning of winter and summer indicates decreasing tendencies. Rao, Murty & Joshi (2005) analysed the extreme weather events such as high and low temperatures, heavy rainfall in connection with the climate change over India and concluded that during summer 60-70% of the coastal stations are showing an increasing trend in critical extreme maximum day temperature and increase in night temperatures. Dhodre et al. (2009) research aimed at quantifying the change in surface air temperature at India's four most populated cities - Delhi, Kolkata, Mumbai and Chennai. While Mondal et al. study (2012) dealt mainly concerned with the changing trend of rainfall of a river basin of Orissa near the coastal region.

Therefore, this study is proposed to investigate the annual and seasonal temperature trends at four stations in Assam namely Guwahati, Tezpur, Dibrugarh (Mohanbari), and Silchar. Our interest also arises to find out whether the overall change in temperature is due to change in minimum or maximum temperature giving a clue to know changes in night and day temperatures as well.

The study area Assam is located south of the eastern Himalayas. The study area Assam comprises the Brahmaputra and the Barak river valleys along with the Karbi Anglong and the Dima Hasao district. Guwahati (26° 11'N, 91° 44'E) city is between the southern bank of the Brahmaputra River and the foothills of the Shillong plateau. Tezpur (26° 38'N, 92° 48'E) is a town in the state of Assam in northeastern India. Tezpur is on the banks of the river Brahmaputra. The town of Dibrugarh (Mohanbari) (27° 48'N, 95° 02'E) is situated in the eastern part of Assam. Silchar (Kumbhirgram) (24° 49'N, 92° 48'E) town is located in the southern part of Assam. It is situated on the banks of the Barak River.

II. MATERIALS AND METHODS

For this study, monthly mean series of maximum and minimum temperature were obtained from Regional Meteorological Centre, Guwahati, India. From the monthly mean maximum and mean minimum temperature we calculated the monthly mean temperature separately for each month. Accordingly the yearly totals were calculated for each year. From the monthly mean maximum, mean minimum and mean temperature mean, standard deviation and coefficient of variation have been computed for each month and each season namely winter, summer, monsoon and post monsoon. For the analysis of winter temperature December, January and February months are considered as these three months record lower temperatures. While computing the mean for winter season December of the previous year is included. March, April and May are months with highest mean maximum temperatures and, therefore, represent

the summer season. June to September months constitute monsoon season and October and November form the post monsoon season. Temporal changes in the annual and seasonal values were analysed by Mann–Kendall rank statistics to confirm the significance of the observed trend. Mann-Kendall test had been formulated by Mann (1945) as non-parametric test for trend detection and the test statistic distribution had been given by Kendall (1975) for testing non-linear trend and turning point.

According to Mavromatis and Stathis (2011) Mann Kendall test is a statistical test widely used for the analysis of trend in climatologic and in hydrologic time series (Yue et al., (2004)). The Mann-Kendall S Statistic is computed as follows

$$S = \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} sign(T_j - T_i)$$

where T_j and T_i are the annual values in years j and i, j > i, respectively. (Motiee and McBean (2009)). If n < 10, the value of |S| is compared directly to the theoretical distribution of S derived by Mann and Kendall. For n ≥ 10, the statistic *S* is approximately normally distributed with the mean and variance as follows

$$E(S) = 0.$$

The variance (σ^2) for the S-statistic is defined by

$$\sigma^2 = \frac{n(n-1)(2n+5) - \sum t_i(i)(i-1)(2i+5)}{18}$$

in which t_i denotes the number of ties to extent i. The summation term in the numerator is used only if the data series contains tied values. The standard test statistic Z_s is calculated as follows

$$Z_S = \begin{cases} \frac{S-1}{\sigma}; S > 0 \\ 0; S = 0 \\ \frac{S+1}{\sigma}; S < 0 \end{cases}$$

The test statistic Z_S is used a measure of significance of trend. Another statistics obtained on running the Mann-Kendall test is Kendall's tau, which is a measure of correlation and therefore measures the strength of the relationship between the two variables (Kendall's Tau).

III. Results and Discussion

The maximum temperature, minimum temperature and mean temperature can be characterized by mean, standard deviation and coefficient of variation. The study reveals that Silchar received the highest mean of annual monthly mean maximum temperature amount during Indian summer. In addition, it can be concluded that Guwahati received the highest mean of annual monthly mean minimum temperature amount during Indian winter.

In Guwahati, the winter mean temperature shows an increasing trend, which is highly statistically significant at 0.01 level. The trend of minimum temperature is significant at 0.001 level. The maximum temperature during winter shows increase, statistically significant at 0.05 level. Significant increase in winter mean temperature can be endorsed to increase in minimum temperature. The summer mean temperature also shows increasing trend, significant at 0.001 level. This increase is caused by significant rise in maximum temperature unlike winter season. The Mann–Kendall test indicates that minimum temperature increase is significant at 0.001 level, while maximum temperature shows significant increase at 0.01 level. Therefore, it can be said that daytime temperatures in summer are significantly increasing. The monsoon season, depicts significant increase in the mean temperature. This is due to the increase in minimum temperature being significant at 0.001 level giving an indication that night temperatures during recent years have gone up during monsoon. The post monsoon mean temperature also shows increasing trend, significant at 0.001 level. Minimum temperature increase is significant at 0.001 level, while maximum temperature also shows significant trend at 0.01 level. Therefore, it can be inferred that daytime temperatures in post monsoon are significantly increasing. Mean minimum and mean maximum temperature has been studied for individual months by subjecting them to the Mann–Kendall test. It is interesting to note that the minimum temperature and maximum temperature value shows significant trend in majority of the months. The beginning of winter, shows increasing trend in minimum temperature, statistically significant at 0.001 level. The later part of winter (i.e. January and February) shows increasing trend significant at 0.01 level. The increasing trend of maximum temperature is seen during the monsoon months statistically significant.

The winter mean temperature, minimum temperature, maximum temperature in Tezpur shows an increasing trend, however not statistically significant. The summer mean, maximum, minimum temperature also shows an increasing trend. This increase is caused by significant rise in maximum temperature. The monsoon season, depicts a significant increase in the mean temperature. This is due to the increase in minimum temperature depicting the fact that the night temperatures during recent years have gone up during monsoon. In Tezpur, the post monsoon mean temperature also shows increasing trend, however not statistically significant. Behaviour of minimum and maximum temperature has been studied for individual months. The beginning of winter shows increasing trend in minimum temperature. The later part of winter shows increasing trend. The increasing trend of maximum temperature is seen during the monsoon months statistically significant in Guwahati and Tezpur.

The winter mean temperature in Mohanbari shows an increasing trend, which is highly statistically significant at 0.001 level. The summer mean temperature also shows an increasing trend, significant at 0.001 level. We can therefore conclude that daytime temperatures in summer are significantly increasing in Mohanbari. The monsoon season, depicts a significant increase in the mean temperature. This is due to the increase in minimum temperature being significant at 0.001 level. The post Monsoon mean temperature also shows an increasing trend, significant at 0.001 level. Therefore, it can be inferred that daytime temperatures in post monsoon season are significantly increasing.

In Silchar, the winter mean temperature shows an increasing trend, however not statistically significant. However, the trend of

minimum temperature is significant at 0.05 level. The summer mean temperature and minimum temperature also shows an increasing trend, significant at 0.001 level. The monsoon season, depicts a significant increase in the mean temperature. This is due to the increase in minimum temperature being significant at 0.001 level. This indicates that the night temperatures during recent years have gone up during monsoon season in Silchar. The post monsoon mean temperature also shows an increasing trend. The Mann–Kendall test indicates that minimum temperature increase is significant at 0.01 level, while maximum temperature shows a decreasing trend, not statistically significant. Therefore, it can be inferred that in Silchar, daytime temperature in post monsoon season are significantly increasing. In majority of the months the minimum and maximum temperature show significant trend. The beginning of winter shows increasing trend in minimum temperature, statistically significant at 0.05 level. The later part of winter though shows increasing trend, not statistically significant. The increasing trend of maximum temperature is seen during the monsoon months statistically significant. However, the month of June show decreasing trend.

IV. Conclusion

The present study analyzed the temperature data for 30 years from 1981 to 2010 at four stations in Assam for the determination of the trend of temperature. From the above results it is clear that majority of the trends, both annual and seasonal, showed increasing tendency in temperature during the period 1981-2010. The winter mean temperature shows significant increase in all the four stations in Assam. The day time temperature is significantly increasing. The night temperature also increased during recent years. However the limitations of this works are that the period of 30 years may be regarded as short duration for the determination of trend.

ACKNOWLEDGMENT

The authors wish to thank, Department of Science and Technology (DST), New Delhi for providing financial support through Women Scientists Scheme (WOS-A) in the Department of Statistics, Gauhati University, Guwahati.

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Ephemeral Feature Presentation of Covert Channels in Network Protocols

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Abstract- Covert channels leaks information where information travels overlooked. Encryption used to protect the communication from being deciphered by unlawful users. But covert channels hide the presence of communication. Covert channels are serious security intimidation. There are many existing techniques available for development of covert channels by influencing certain fields in the network protocols such as HTTP, IP, TCP, etc. The available packet length based covert channels are having tamper resistance capability but due to abnormal traffic distribution results in recognition possibility. In this paper we present overview of different protocol as well as some packet length based covert channels.

Index Terms- covert channels, packet length, high bandwidth, network protocols, packet payload, computer network

I. INTRODUCTION

Computer networks are a vital part of our lives. The different fields like educational system, commerce, banking organizations, industry, military everywhere we witness the manifestation of computer networks. Computer networks is linking tool for communication and association of information. Due to exposed information security facets of information is indispensable. Information Security has now become everyone's prerequisite, either directly or indirectly associated with network environs. The information may include the share market values, the database of the company, the quotations; military secrete data, and so on. So basically the information can be video, audio or in text form. The transfer of information is done by gmail, rediffmail such applications for mailing and for video conferencing Skype like applications are used. But due to this the need of information or the data security also increased in proportion to the data.

There are many techniques that are present in the market and explained in the academia also for the secure communication. Different cryptographic algorithms, data hiding techniques are used for information security. Encryption can just oppose the unauthorized access by third party, compared to these covert channels data hiding techniques are used for hiding the presence of the communication [6].

The covert channels are a great threat to information security as the communication is carried out undetected. The performance of the system and the network get affected due to the hidden and unclear (may be illegal) use of resources or functions of the covert channel.

II. RELATED WORK AVAILABLE TECHNIQUES

Covert channels are used for confidential data communication during transmission. Lampson focused on covert channels and represented the concept firstly in 1973[1].According to him covert channels are divided into storage, legitimate and covert categories. Covert channels are also classified as storage and timing channels [13, 22].
In paper [16] presented some characteristics of Covert Channels like behavior, path, spread, efficiency. Various other parameters to be considered to characterize covert channels were introduced in [20] as noise, bandwidth, synchronization and aggregation.

Classification of Covert Channels:
There are mainly two types of covert channels, which are storage and timing channels.

Storage Channels:

- It implicates process writes at the storage place and another process reads it directly or rather indirectly.
- Examples of storage locations are disk space, print spacing, and file naming.

Figure 1: Example Storage Channels

Timing Channels:

- In timing channels, Hints information to another by using modulation effect of system supply (resource) such that the manipulation of the response time by second process gives the hidden information.
- The events that can be utilized as timing channels are CPU utilization, Resource availability etc.

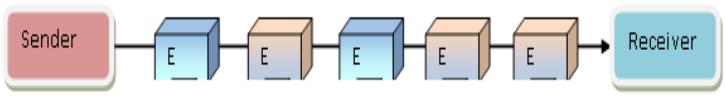

Figure 2: Example Timing Channels

Applications of Covert Channels:

Covert channels are exclusively used for message communication over space as a reliable signal carrier. Therefore it is having few permissible and many unlawful applications [6] as:

1. Communication by security organizations so as to cover their passages and practices.
2. Snooping
3. Information trafficking
4. Paul Henry [4] mentioned that, numerous malicious programs make use of covert channels for setting DDos attack.
5. Conveying encoded data covertly in which application harmless and untraceable transmission is vital.
6. Hacking of the information
7. In the organization or system information leakage.
8. Information hiding to repudiate its presence.

III. AVAILABLE TECHNIQUES

There are many techniques based on covert channels. But there are many factors like delay measurement, network conditions, congestion, traffic load etc. Due to which timing channels are may get affected by noise. So we are basically considering storage channels. There are many techniques available which utilizes packet header unused or reserved bits as covert channels.Ahasan[5] introduced IP's Don't fragment bit as covert channel whereas Sebastian Zander[11] used IP protocol's TTL field .TTL fields in IPv6 are referenced in [15,18,19]

LAN Environment Covert Channels

Girling [3] first consider network covert channels. He concentrated on local area networks (LANs) and identified three obvious covert channels (one timing & two storage channels). This demonstrates the real examples of the bandwidth possibilities for simple covert channels in LANs. For a definite LAN setting, the author hosted the view of a wire tapper which observes events of a particular transmitter on LAN. The covert communication is carried out in between the wire tapper and transmitter. To calculate the transmission time for a data block calculated following factors are considered: time for software processing, speed of the network, protocol overhead and block size of network. By assuming transmission of different size of blocks on the LAN, based on novel and average time evaluation the software overhead is figured out to evaluate the covert channel capacity (bandwidth). Besides, way out for decreasing the covert channel bandwidth is also offered. Besides, way out for decreasing the covert channel bandwidth is also offered. To be precise, [3] does not considered the effect of the presence of covert channels on performance of overall network conditions.

LAN Protocol Covert Channels:

In [24], the results offered by Wolf can be observed as a logical extension of [3], but used with LAN protocols. Wolf institutes the point that encryption, which is used for LAN security, cannot safeguard the suitable blocking of unlawful info through the covert channels. The work focus on the idle bandwidth promising for covert communication in the most frequently used LAN architecture standards like IEEE 802.2, 802.3, 802.4, and 802.5. The motivation is on LAN implementations contrasting to the architecture itself. The thesis denotes that in each system where shared resources are used the existence of covert channels can be expected. Author highlights the association between protocol format and covert storage channels as well as the relationship between protocol technique elements and covert timing channels by considering frame layouts of the LAN protocols. Padding field, the reserved fields and unused fields of the frame are used by the Covert storage channels. By applying programmed mechanism the detection of the fields identified (which is used as means to covertly send information). Such type of mechanisms just monitors such type of fields, which would dispose of such frames using these fields regardless of their purpose.

OSI Model Covert Channels:

In paper [14], Handel and Sanford focussed on focus on network protocol covert channels with wide perspective. They referenced the OSI (Open System Interconnection)model as a base for covert channel to hide the data .The accepted method has advantages over [3]and [24] due to the standards divergent to particular network environments or architectures are considered. Flawless stenographic schemes are not developed. Instead, basic principles for hiding the data in each OSI layers are designed. Moreover proposing the use of the protocol header's reserved fields (are detected easily) at high network layers, authors also recommended the probability of CSMA/CD manipulation at the physical layer as timing channels. The merits of covert channels are figured out in this paper such as

- Detectability: Covert channel must be determinate simply by the envisioned recipient.
- In distinguishability: Covert channel must pretend like overt channel.
- Bandwidth: With respect to covert channel the number of hidden data bits per channel use is bandwidth.
- Uncertainty and Redundancy.

But the downside of in this paper are the issues such as data hiding effects with respect to compatibility and complexity on the network ,interoperability of the covert data practices with other network nodes, bandwidth estimation of covert channel.

TCP/IP Protocol Suite Covert Channels:

Covert channels in the TCP and IP headers of TCP/IP protocol suite are introduced in a specific way by Rowland [10]. Rowland developed suitable encrypting and decrypting techniques by using the fields such as the TCP initial sequence number, IP identification field, and acknowledgement field , sequence number fields. These approaches are designed in a utility service written for Linux systems with version 2.0. Rowland delivered an idea of the presence as well as the manipulation of covert channels in TCP/IP protocol suite. The implemented encrypting and deciphering techniques are more logical in comparison with earlier proposed work. These techniques are evaluated after considering security methods such as network address translation and firewall. Still, the secret communication method's non-detectability is doubtful

Retransmission Covert Channels:

Many other innovative and impressive techniques are also available like RSTEG [8] and CLACK [12]. In [8] authors have presented retransmission mechanism by using covert channel in all type of network protocols as shown in the figure 3. In this design purposely invoked retransmitted packet which are used to carry a covert data in the payload field of the packet. Retransmission Steganography (RSTEG) doesn't send successive acknowledge for received packet to sender. This is the provision to deliberately appeals retransmission. RSTEG returns acknowledgment to positively received packets as well as for purposefully invoked retransmission packets. The author used TCP retransmission process as covert channel. The RSTEG algorithm can be used along with timeout for Fast Retransmit/Recovery (FR/R) Retransmission (RTO), Selective Acknowledgement (SACK). The difference between normal retransmitted packets with purposefully invoked retransmitted packet is carried out by sender by marking the intended packets for covert information. There is a secret Stego-Key (SK), and a hash function (H) is used to calculate the Identifying Sequence (IS) for covert information which is shared by both the parties sender and receiver. RTO-based retransmissions for avoiding the detection should be utilized in RSTEG.Also the planned retransmissions are produced in a natural way. However, SACK-based RSTEG is efficient for maximizing the stego bandwidth. RSTEG can also be used for IPv6 and IPv4 for covert communication. The author confesses about the scheme that it can be detected, during excessive intentional retransmissions.

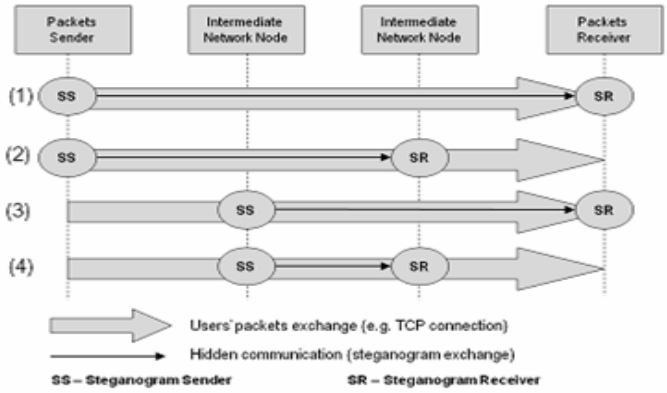

Figure 3: Retransmission Covert Channel

Acknowledgment Field Covert Channels:

Sending data in the ACK field of the packet is another different concept, shown in figure 4 presented in CLACK [12]. In paper [12] authors presented CLACK .This method uses partial acknowledgments. The encoder in CLACK inserts covert data in partial acknowledgments (ACKs) field of a TCP and manages the TCP data led from the server as acknowledgments for transmitting hidden information. Besides other techniques in CLACK the TCP receiver is an encoder and a decoder is actually a sender. The covert message is engraved in the ACK field of TCP by the encoder. CLACK encoder only desires to receive the data and forward the pure ACKs.There are certain constraints of the scheme like there should not be any retransmission, ideal network condition i.e. Should be lossless, and packet ordering must be preserved. In this technique the server has to continuously send the data and Nagle algorithm should be off.

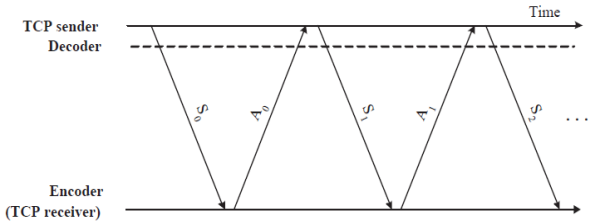

Figure 4: CLACK: Sending of data & Ack

Packet Length Based Covert Channels:

There are specific models which uses the packet length for designing the covert channels. Link layer frame length utilization for hidden communication is proposed by Padlipsky [7] and Girling [3].In this [3, 7] link layer frame length is mapped to each byte of covert message. So ultimately at least 256 message lengths are needed for single hidden byte. Predefined message lengths are used by sender and receiver. The main disadvantage of this system is the communication is detectable due to the statistical computations. The reason is due to predefined length (not real time) abnormal (not real) network traffic distribution.

LAWB model was proposed by Yao [21] in 2008.But due to abnormal traffic it's vulnerable to detection. Like our proposed model sender and receiver has shared a secrete matrix. The matrix is filled with unique packet length L .For sending a message sender selects a row ID as a covert message, and from the matrix selects a random cell in that row denoted by Len. When the packet arrives at receiver end it checks for the rowid of the cell in which the L contains. Periodic matrix transformation at both the sides is implemented by the author [21].

One more packet length based algorithm is introduced by Liping and Ji [9] in which the model is based on normal traffic distribution. As a Reference normal packet lengths from the network are captured from both ends of the system. The packet length to be transmitted is randomly selected from the list of Reference as well as the length for the next packet is generated by adding the covert message and send to the receiver. The reference list is modified by the sender when the packet sending is over. After arrival of the packet at receiver end, it extracts the covert data from the packet length received with the help of Reference list. The major drawback of this system is the newly generated packet length sometimes doesn't fit in normal length traffic distribution which results in detection of covert communication.

In the next paper of Liping Ji [17], he introduced Normal Traffic Network Covert channel. In this the real time packet lengths are taken as a Reference in sorted order. Equal size of buckets with specific packet length range is arranged. While sending the data sender select the group of covert bits and convert them into equivalent decimal. By selecting the equivalent decimal bucket with reference to packet length list, sender randomly selects the packet length from the bucket and sends it to receiver. At receiver end, checks for packet length and search into reference bucket range. If the bucket found the bucket number is nothing but the required covert data. This technique is utilizing normal packet lengths. The sender maintains the reference list at his end and receiver maintains the bucket ranges so the advantage of the technique is time and space efficiency. But if seen statistically

then a pattern can be formed and detection is possible due to constant transmission which never gets updated. Also the covert data carrying capacity is low as compared to our technique.

In the paper [2] author Hussain approached packet length based covert channels. It can be said that it's the advance version of previous algorithm [17].He presented an idea of tamper resistant model. In this he utilized the stego column concept which is the heart of the system. In this the matrix of real packet length is shared rather pre shared by both parties. The message need to be converted into its binary form and chunks of w bits (2, 3, or 4) grouped together to select a row in the matrix. According to any random cell selection in that row decides how to send the data. If the cell fall in the stego column then data is transferred as the payload else the rowid itself is the covert data.

In the paper the above paper is further enhanced by two features capacity improvement and added security feature in paper[23].In this paper along with the stego column the stego row concept is used in which the stego row will append the data at receiver side to the selected rowid to form the message. For security improvement the encoding of the payload is introduced in this paper. It utilizes normal network communication messages for referencing the length of the packet. The main advantage of using the real time packet length is for achieving undetected data transmission due to normal traffic distribution. Packet length based methods are important with respect to the quality of attack resistant.

IV. CONCLUSION

Now from the different algorithms we can conclude that there are many techniques available as covert channels. There are many base papers from which we can improve the existing covert channels as well as can research on detecting the covert channel mechanisms so that they can't be used for unlawful purposes. As a future work the combination of different network protocols can also be used as hybrid model. In this case again in a random fashion we can utilize the protocols and rearrange the message at the receiver side.

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EFFECT OF GRID CONNECTED P.V POWER PLANT ON ELECTRICITY MARKET

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Abstract: This paper examines the key determinants that foster the adoption of photovoltaic (PV) power supply systems. The authors provide empirical evidence which suggest that 'government initiatives' and institutional 'finance' are important influencers of the decision to adopt PV power supply systems in developing countries. In order to diffuse PV technology it is also necessary to provide decision-makers with opportunities for direct and vicarious experience of PV systems through 'demonstration sites'. These factors have been ignored in earlier models of the innovation–decision process formulated by Rogers and the new innovation-decision framework proposed by Kaplan. Governments need to play a leadership role, and this coupled with the availability of Finance and Demonstration Sites will result in an increased interest leading to the adoption of PV technology in India. This research has led to the identification of variables such as the government initiatives, demonstration sites and finance, which are critical to the adoption of PV systems in developing countries like India. The research provided empirical evidence that is currently lacking in the area of adoption of PV technology in developing countries. About 72 million households in rural India do not have access to electricity and rely primarily on traditional bio fuels. This research investigates how rural electrification could be achieved in India using different energy sources and what the effects for climate change mitigation could be. We use the Regional Energy Model (REM) to develop scenarios for rural electrification for the period 2005–2030 and to assess the effects on greenhouse gas emissions, primary energy use and costs.

Index Terms: Theoretical consideration, Sampling and data collection**,** concerning rural electrification, Methodology, Modelling rural India, Potential of solar thermal power in India, Natural or Non-renewable energy resources

I. INTRODUCTION

Globally, we are entering a period of commercial acceptance of energy from alternate sources. The visible change has been in the shift in the world energy markets. Renewable energy technologies offer alternatives to fossil fuel use, which not only has constraints in terms of resource availability but is also accompanied by environmental deterioration. Renewable energy technologies are increasingly recognized as one of the central pillars in the development of a sustainable energy strategy. Wind, biomass and solar are the three promising renewable energy technologies. Among these renewable energy sources, solar energy has enormous potential for alleviating dependence on oil and contributing to a sustainable development process [1–4]. Solar radiation striking the Earth is 175,000 TW (1 TW ¼ 1 million watt). Of this, 49% is absorbed and re-radiated or reflected back to space by the atmosphere, 4% is back-scattered from the ground and 47% is absorbed by the earth's surface [5]. We compare the business-as-usual scenario (BAU) with different electrification scenarios based on electricity from renewable energy, diesel and the grid. Our results indicate that diesel systems tend to have the highest CO2 emissions, followed by grid systems. Rural electrification with primarily renewable energy-based end users could save up to 99% of total CO2 emissions and 35% of primary energy use in 2030 compared to BAU. Our research indicates that electrification with decentralized diesel systems is likely to be the most expensive option.

The total commercial energy used for all human activities in the world is less than 15 TW. A major part of the Sun's energy can clearly be tapped into solar power.

II. THEORETICAL CONSIDERATIONS

Photovoltaic's (PVs) have attracted increased attention in the recent years. Since 1954, PV technology has progressed in leaps and bounds. Improvements in efficiency, progressive reductions in cost and increasingly high reliability have contributed to the expansion of PV globally [6]. The factors which influence the adoption of PV systems in India were identified from an extensive review of existing literature. The study traced the origin of the various models of the adoption/diffusion process to the AIDA model which was first proposed in the early part of the 20th century. After examination of various models, this research is built on the innovation–decision process formulated by Rogers [7]. According to Rogers, knowledge leads to persuasion or interest, and this is followed by the decision to either adopt or reject the innovation. Kaplan [8] expanded the scope of Rogers' model by introducing constructs such as motivation, context, experience and familiarity. Kaplan has proposed in his new innovation–decision framework that motivation and context precede knowledge. He also showed that knowledge is the

product of motivation and experience, while familiarity is the product of experience and knowledge. In Kaplan's model, motivation and context are the independent variables, while knowledge, experience and familiarity are intervening variables. The dependent variable in Kaplan's model is interest. The effect of other independent variables such as government initiatives and demonstration sites on experience, knowledge and interest has not been studied in relation to the diffusion of solar-based technology in a developing country like India. Finance is another intervening variable which has been ignored in past studies. Government initiatives, demonstration sites and the availability of finance are important factors which foster the adoption of PV-based power supply systems in developing countries like India [9]. The objective of this paper is to give an overview of the results of the descriptive analysis of the key determinants that influence the adoption of PV-based power supply systems in the hospitality industry in India. These variables include those that have been hitherto R. Peter et al. / Renewable Energy 31 (2006) 2272–2283 2273 ignored in earlier models of the adoption/diffusion process such as Rogers [7] and Kaplan [8].

III. DATA COLLECTION

3.1 Sampling & data collection

The Directory of Hotels and Resorts in India was used as the sampling frame, as it provided a comprehensive listing of the target population. The hotels were categorized according to their star ratings, and adequate care was taken to ensure a representative sample. The sample size is 205. Sampling error and non-sampling errors are two key factors, which affect the overall quality of data [10]. Sampling error is the difference between the result of a sample and the result of a census conducted using identical procedures. It is a statistical fluctuation that occurs because of chance variations in the elements selected for a sample. Sampling errors arise from errors in constructing a sampling frame and selecting a sample. Adequate steps were taken to minimize potential sources of error during the process of data collection. The target population consists of 769 hotels and, as in the case of many industrial products, a census approach was feasible since the target population was not very large. The questionnaires were initially administered to the population through mail surveys. The mail survey was administered across all the elements of the target population. The respondents were requested to mail the completed questionnaires back to the local academic's contact address via the mail-back envelopes that were provided. However, low response rates (3%) necessitated a change to the adoption of administering the questionnaires through trained interviewers. Stratified random sampling was used to ensure that the sample adequately represented the population. More particularly, the proportional stratified random sample was used to ensure that the number of sampling units drawn from each stratum was in proportion to the relative population size of that stratum. The target population comprises of 769 hotels of different star ratings and these are spread across the country. The distribution of these hotels across the four different regions and across the different star ratings are given in Table 1. In order to ensure randomness of the sample drawn, a computer program called 'Research Randomizer' was used to generate random numbers from the list of hotels in the different regions. The distribution of hotels in the sample has been maintained to be the same as the population distribution of hotels across the four different regions in India. In choosing the stratification variable [11] recommends that the elements within the stratum should be as homogeneous as possible, whereas the elements in the different strata should be as heterogeneous as possible. This criterion has been followed and the star rating of the hotels has been used as the stratification variable. Therefore, in selecting the

Sample for administering the questionnaires through trained interviewers, the process of stratification and randomization was followed in order to minimize sampling errors. Thus, great care was taken to avoid imbalances in the representativeness of the sample. The data was collected by a prestigious market research firm in India, in six Indian cities spread across the different regions of the country. The sample distribution of hotels across the different star ratings and across the different regions is given in Table 2.

Table 1. Population of hostels

Hotel	North	South	East	West	All India
Total number of 4-5 star hotels	77	45	17	70	209
Total number of 3 star hotels	91	74	32	62	259
1-2 star hotels and Govt. approved hotel	90	82	20	109	301
Total	258	201	69	241	769

Table 2. Sample distribution of hostels

Types of hotel	North (%)	South (%)	East (%)	West (%)	All India (%)
4-5 star hotels	20(37%)	12(22%)	4(8%)	18(33%)	55(27%)
3-star hotel	23(35%)	18(29%)	8(12%)	17(26%)	65(32%)
1-2 star hotel and Govt approved hotels	25(30%)	23(27%)	6(7%)	31(36%)	85(41%)
Total	68(34%)	53(26%)	18(9%)	66(32%)	205(100%)

3.2. Concerning rural electrification

Sinha and Kandpal [12] found already in the 1990s that decentralized renewable energy can be a cost-effective measure for rural electrification in India compared to the grid. Chakrabarti and Chakrabarti [13] elaborate possibilities for rural electrification of remote island communities in India. Nouni et al. [14] explore several options of providing decentralised electricity access to remote areas in India and Bastakoti [15] relates rural electrification to ways of creating energy enterprises. Though energy-related research on India is broad, research on rural electrification and its impacts on climate change mitigation for rural India, as performed in this study, has not been done before.

IV. GRID CONECTED PV SYSTEM

4.1 Block diagram

The basic Grid Connected PV system design has the following components (shows in fig.4.2).

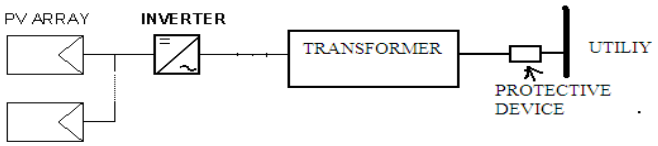

Figure 4.1. Block diagram Grid Connected System

1. PV array: A number of PV panels connected in series and/or in parallel giving a DC Output out of the incident irradiance. Orientation and tilt of these panels are important Design parameters, as well as shading from surrounding obstructions.

2. Inverter: A power converter that 'inverts' the DC power from the panels into AC Power. The characteristics of the output signal should match the voltage, frequency and Power quality limits in the supply network.

3. Transformer: A transformer can boost up the ac output voltage from inverter when needed. Otherwise transformer less design is also acceptable.

4. Load: Stands for the network connected appliances that are fed from the inverter, or, alternatively, from the grid.

5. Meters: They account for the energy being drawn from or fed into the local supply network.

6. Protective devices: Some protective devices is also installed, like under voltage relay, circuit breakers etc for resisting power flow from utility to SPV system.

7. Other devices: Other devices like dc-dc boost converter, ac filter can also be used for better performance.

4.2. Methodology

Modelling with the Regional Energy Model (REM) REM originated from the global energy and GHG emission model ESCAPE4 [16-20]. The ESCAPE model, as well as the slightly adapted REM model, is based on the end-use approach. An end-use function in a certain sector at time t = 0 is taken as a starting point e.g. the function lighting in the residential sector. The useful energy demand (UED) for lighting can be calculated from the amount of kilowatt-hours (kW h) needed for lighting, the fraction (Fr) and the used efficiency (Eff) of the appliances (see Eq. (1)).

$$UED_{t=0}=\sum_{s=1}^{s=n}\cdot\sum_{f=1}^{f=m} ED_{sf_{t=0}} * \sum_{a=1}^{a=K_{sf}} (Fr_a * Eff_a)_{sf} \quad (1)$$

where UED is the useful energy demand; ED, energy demand; Fr, fraction; Eff, efficiency; t, time; s, sector; f, function; a is the appliance. In (1), the total UED for the region or country is calculated for sector (s) for s = 1 to s = n, for function (f) for f = 1 to f = m and for appliance (a) for a = 1 to a = k. The next step is to calculate the UED in the future for time t = t. Several variables can influence this future demand: population at time t (Pop), GDP at time t (GDP) and sector shifts (SAE) as indicated in Eq. (2).

$$UED_t = \sum_{s=1}^{s=n}\cdot\sum_{f=1}^{f=m} UD_{sf_{t=0}} * Pop_t * SAE_{s_t} \quad (2)$$

where UED is the useful energy demand; UE, useful energy; Pop, population at time t; GDP, GDP at time t and SAE, sectoral activity; t, time; s, sector; f, function; a is the appliance. In the last step, the energy demand in time t = t is calculated based on the UED in t = t, the fractions and efficiencies of the appliances in time t = t (see Eq. (3)).

$$TED = \sum_{s=1}^{s=n}\cdot\sum_{f=1}^{f=m}\sum_{a=1}^{a=k_{sf}} (UED * Fr_a/Eff_a)_{sf} \quad (3)$$

where TED is the energy demand at t = 1; UED, useful energy demand; ED, energy demand; Fr, fraction; Eff, efficiency; s, sector; f, function; a is the appliance.

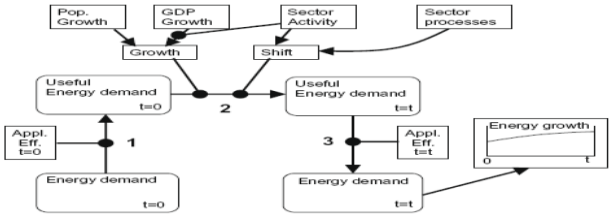

Fig.4.2. Schematic overview of the calculation model in REM.

The above described end-use approach forms the core of the model. Since the model is very flexible, the user can define own sectors (e.g. agriculture, industry, residential, services and transport) and functions (e.g. cooling, cooking, lighting, and space heating). For all sectors, the same functions are defined, but can be used optionally. All appliances present in a certain sector should be placed in one of these defined functions for energy demand. Several appliances per function for a certain sector are allowed. For example, the function lighting in the residential sector of rural India has five types of lamps: kerosene lamps, photovoltaic (PV) lamps, conventional light bulbs, energy-saving light bulbs and Light Emitting Diode (LED) light bulbs. The efficiency of each appliance can increase over time and a sector can shift within a function from one appliance to another, e.g. from mainly kerosene lamps to conventional light bulbs. Besides this sector–function matrix, REM contains a module for the supply side: the energy conversion sector accounting for electricity production, refineries and Combined Heat and Power (CHP). For the supply side, several types of technologies can be defined. The fractions determine how much electricity, heat or oil is generated with a certain technology e.g. wind, coal-fired power plant, district heating, etc.

4.3 Modelling rural India

Most energy models assess energy resources, technologies, and emissions. Only few energy models analyse the needs and services related to energy, like the latent energy demand in rural areas in developing countries. This part of the system is hardly modelled, because of its complexity and uncertainty about the underlying processes and assumptions. We however attempt to model the energy needs and services for rural India. With 1.1 billion inhabitants in 2006, India is the second most populous country in the world [21] and is expected to be the world's most populous country in 2050 [22]. In terms of energy, India is the world's fourth highest consumer of energy just after the USA, (the) People's Republic of China and the Russian Federation [23]. India is also one of the world's top five GHG emitters measured in absolute terms. In per capita terms however, an average Indian citizen uses about 15 times less energy than an average US American citizen, emits about 17 times less GHG emissions and uses about 30 times less electricity [21]. In economic terms, India has a steeply increasing GDP growth and an expanding economy. At the same time, India hosts a large population living below poverty line, namely35% of its total population in 2003 [21]. High differences between urban and rural areas prevail. While the Indian economy generates most of its income from services and industries, more than 70% of the

total population live in rural areas [22] and depend primarily on non-mechanized agriculture for sustaining their living. Energy poverty is clearly an issue: electrification rates were as low as 50% in rural areas and 62% in total India in 2005.

V. TEST PROBLEM & RESULT

5.1 Introduction

The result of three test problem cases that is IEEE 9 bus case and IEEE 14 bus case are given here.

In 1st case (IEEE9 Bus) describes the two buses that is bus no.5 & 9 each bus contain two case (5MW added, 10MW added).

In 2nd case (IEEE 14 Bus) describes the two buses that is bus no. 2, 3 & 4 each bus contain only single case (5MW added).

5.2 Test problem 1 for IEEE 9 bus system

5.2.1 When 5 MW solar Power added at bus no. 5

TABLE 5.1

When 5 MW solar PV Generation added at bus no. 5

Solar power (MW)	Saving conventional energy I ($/hr)	Saving losses (Losses× λ at ref. bus) in ($/hr)	Amount Receive by solar from load (capacity× λ at bus) in ($/hr)	Net contribution of solar Generation in ($/hr)	Net contribution of solar Generation in (Rs/KWhr)	Reduction in SG subsidy (16-contribution of solar)in (Rs./KWhr)	Net Reduction in Govt. subsidy (12-SG)/KWhr
1	99.84	2.56	99.674	202.47	9.31	5.69	6.31
2	200.35	5.7	198.708	404.76	9.309	5.69	6.31
3	298.55	8.54	297.10	604.19	9.264	5.74	6.26
4	397.42	11.35	394.86	803.63	9.241	5.76	6.24
5	495.98	14.04	491.96	1002.0	9.218	5.78	6.22

I. Fig.5.1 shows the variation in Lambda/marginal price (λ) at all buses with 5MW solar power generation at bus no.5, when the capacity of solar power increase at the bus then the subsidy can be gradually decrease.

II. Fig.5.2 shows the variation of marginal price (λ) with variation of 5MW solar power generation at bus no.5, variation in marginal price can be decrease when in the capacity of solar power increase at the bus.

III Fig.5.3 shows the variation of reduction in subsidy with variation in 5 MW solar power Generation added at bus no.5, in this case approximately half subsidy will be provide from real subsidy because solar generation approximately more to half generation.

Without solar power added

With solar power added

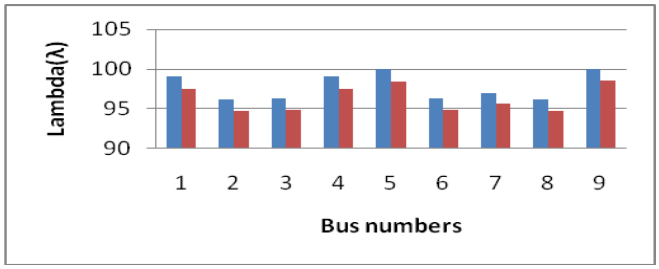

Fig.5.1 5MW PV plant added to bus no. 5

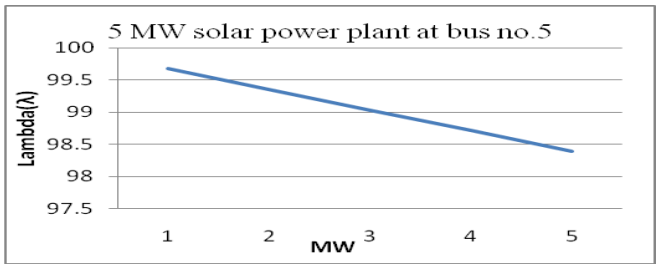

Fig.5.2 5 MW solar plant added at bus no. 5 then variation in Marginal Price (λ)

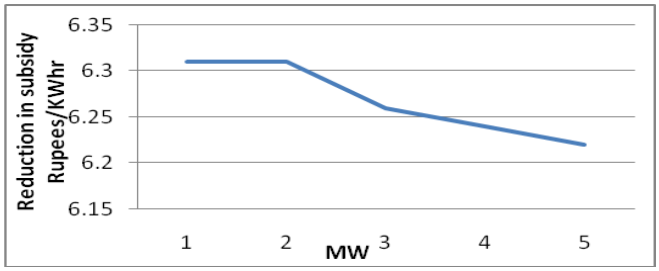

Fig.5.3. 5MW solar plant added at bus no. 5 then variation of reduction in Subsidy

In this case the value of marginal price (λ) can be decrease at all buses and also decrease at 5 different cases when 1MW to 5 MW solar power added to bus no.5. When 1MW to 5MW solar power added at same bus then the reduction in subsidy are 5-6 Rs/KWhr and approximately 40-50% subsidy in 9 bus system case.

5.2.2 When 10 MW solar Power added at bus no. 5

TABLE 5.2

When 10 MW solar PV Generation added at bus no. 5

Solar power (MW)	Saving conventional energy I ($/hr)	Saving losses (Losses× λ at ref. bus) in ($/hr)	Amount Receive by solar from load (capacity × λ at bus) in ($/hr)	Net contribution of solar Generation in ($/hr)	Net contribution of solar Generation in (Rs/KWhr)	Reduction in subsidy (16-contribution of solar)in (Rs./KWhr)	Net Reduction in Govt. subsidy (12-SG)/KWhr
2	199.34	5.71	198.70	403.75	9.29	5.71	6.29
4	397.42	11.34	394.86	803.62	9.24	5.76	6.24
6	594.21	16.63	588.46	1199.30	9.20	5.80	6.20
6	789.73	21.84	779.52	1591.09	9.15	5.85	6.15
10	983.97	26.89	968.04	1978.90	9.10	5.90	6.10

I Fig.5.4 shows the variation in Lambda/marginal price (λ) at all buses with 10MW solar power generation at bus no.5,
when the capacity of solar power increase at the bus then the subsidy can be gradually decrease.
II. Fig.5.5 shows the variation of marginal price (λ) with variation of 10MW solar power generation at bus no.5, variation in marginal price can be decrease when in the capacity of solar power increase at the bus.
III. Fig.5.6 shows the variation of reduction in subsidy with variation in 10MW solar power Generation added at bus no.5, in this case approximately half subsidy will be provide from real subsidy because solar generation approximately more to half generation.

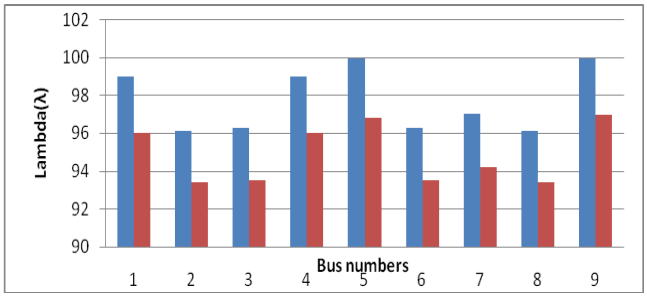

Fig.5.4. 10MW PV plant added to bus no. 5

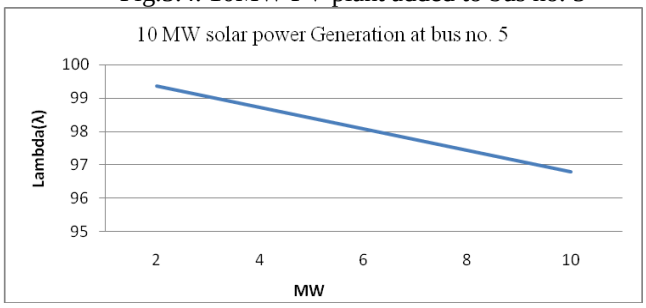

Fig.5.5. 10MW solar plant added at bus no. 5 then variation in Marginal Price (λ)

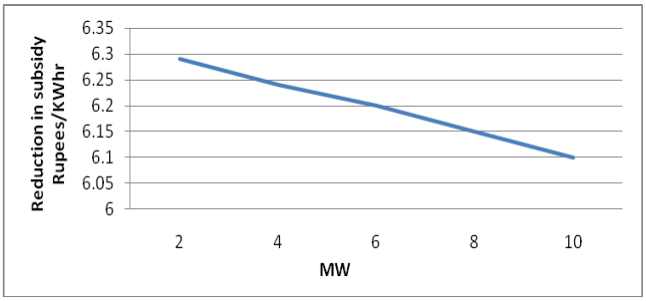

Fig.5.6. 10MW solar plants added at bus no. 5 then variation of reduction in Subsidy

In this case the similarly to above 5 bus case the value of marginal price (λ) can be decrease at all buses and also decrease at 5 different cases when 2MW to 10 MW solar power added to bus no.5. When 2MW to 10MW solar power added at same bus then the reduction in subsidy are 5-6 Rs/KWhr and approximately 40-50% subsidy in 9 bus system case.

5.2.3 When 5 MW solar Power added at bus no. 9

TABLE 5.3

When 5 MW solar PV Generation added at bus no. 9

Solar power (MW)	Saving conventional energy I ($/hr)	Saving losses (Losses ×λ at ref. bus) in ($/hr)	Amount Receive by solar from load (capacity×λ at bus) in ($/hr)	Net contribution of solar Generation in ($/hr)	Net contribution of solar Generation in (Rs/KWhr)	Reduction in subsidy(16-contribution of solar)in (Rs./KWhr)	Net Reduction in Govt. subsidy (12-SG)/KWhr
1	99.84	2.96	99.679	202.48	9.31	5.69	6.31
2	199.36	5.80	199.4	404.56	9.30	5.70	6.30
3	298.57	8.54	297.15	604.16	9.26	5.74	6.26
4	397.46	11.35	394.95	803.76	9.24	5.76	6.24
5	496.04	14.04	492.12	1002.2	9.22	5.78	6.22

I. Fig.5.7 shows the variation in Lambda/marginal price (λ) at all buses with 5MW solar power generation at bus no.9, when the capacity of solar power increase at the bus then the subsidy can be gradually decrease.
II. Fig.5.8 shows the variation of marginal price (λ) with variation of 5MW solar power generation at bus no.9, variation in marginal price can be decrease when in the capacity of solar power increase at the bus.
III. Fig.5.9 shows the variation of reduction in subsidy with variation in 5 MW solar power Generation added at bus no.9, in this case approximately half subsidy will be provide from real subsidy because solar generation approximately more to half generation.

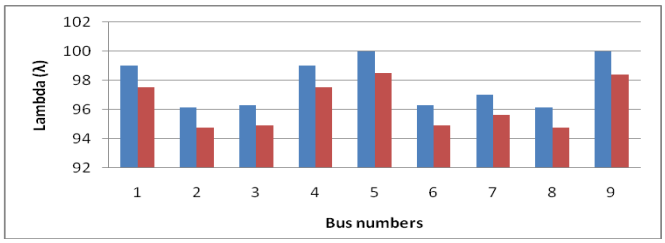

Fig.5.7. 5 MW PV plant added to bus no. 9

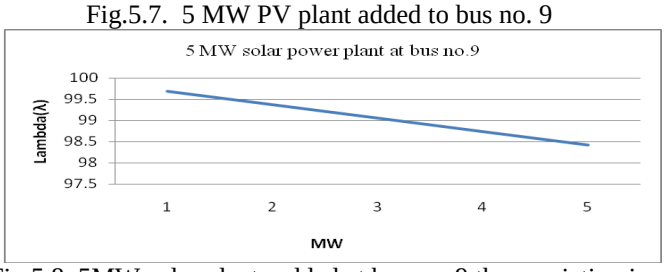

Fig.5.8. 5MW solar plants added at bus no. 9 then variation in Marginal Price (λ)

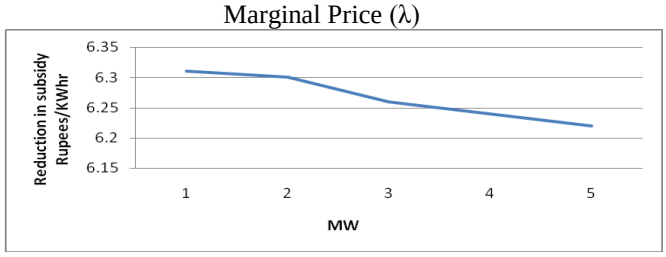

Fig.5.9. 5MW solar plants added at bus no. 9 then variation of reduction in subsidy

In this case the value of marginal price (λ) can be decrease at all buses and also decrease at 5 different cases when 1MW to 5MW solar power added to bus no.9. When 1MW to 5MW solar power added at same bus then the reduction in subsidy are 5.5-6.5 Rs/KWhr and approximately 45-55% subsidy in 9 bus system case.

5.2.4 When 10MW solar Power added at bus no. 9

TABLE 5.4

When 10 MW solar PV Generation added at bus no. 9

SOLAR POWER (MW)	SAVING CONVENTIONAL ENERGY I ($/HR)	SAVING LOSSES (LOSSES× λ AT REF. BUS) IN ($/HR)	AMOUNT RECEIVE BY SOLAR FROM LOAD (CAPACITY×λ AT BUS) IN ($/HR)	NET CONTRIBUTION OF SOLAR GENERATION IN ($/HR)	NET CONTRIBUTION OF SOLAR GENERATION IN (RS/KWHR)	REDUCTION IN SUBSIDY(16-CONTRIBUTION OF SOLAR) IN (RS./KWHR)	NET REDUCTION IN GOVT. SUBSIDY(12-SG)/KWHR
2	199.36	5.81	18.73	403.90	9.29	5.71	6.29
4	397.46	11.35	394.95	803.76	9.24	5.76	6.24
6	594.31	16.72	588.65	1199.68	9.20	5.80	6.20
8	789.90	22.02	779.86	1591.78	9.15	5.85	6.15
10	984.24	27.07	968.57	1979.88	9.10	5.90	6.10

I. Fig.5.10 shows the variation in Lambda/marginal price (λ) at all buses with 10MW solar power generation at bus no.9, when the capacity of solar power increase at the bus then the subsidy can be gradually decrease.

II. Fig.5.11 shows the variation of marginal price (λ) with variation of 10MW solar power generation at bus no.9, variation in marginal price can be decrease when in the capacity of solar power increase at the bus.

III. Fig.5.12 shows the variation of reduction in subsidy with variation in 10 MW solar power Generation added at bus no.9, in this case approximately half subsidy will be provide from real subsidy because solar generation approximately more to half generation.

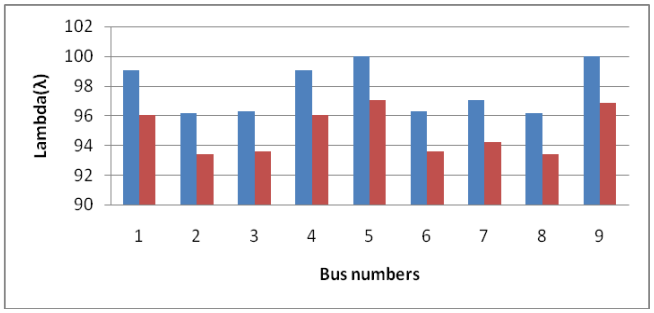

Fig.5.10. 10MW PV plant added to bus no. 9

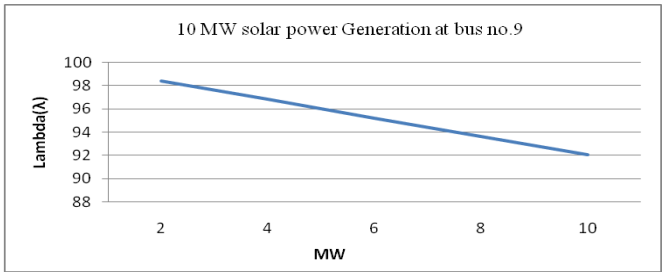

Fig.5.11. 10MW solar plants added at bus no. 9 then variation in Marginal Price (λ)

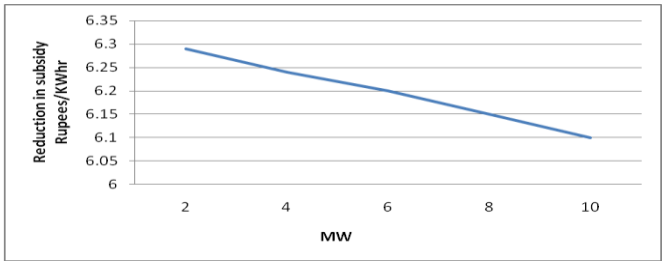

Fig.5.12. 10MW solar plants added at bus no. 9 then variation of reduction in Subsidy

In this case similarly to above 9 bus case the value of marginal price (λ) can be decrease on all buses and also decrease at 5 different cases when 2MW to 10MW solar power added to bus no.9. When 2MW to 10MW solar power added at same bus then the reduction in subsidy are 5.5-6.5 Rs/KWhr and approximately 45-55% subsidy in 9 bus system case.

5.3 Test problem 2 for IEEE 14 bus system

5.3.1 When 5MW solar Power added at bus no. 2

TABLE 5.5

When 5 MW solar PV Generation added at bus no. 2

Solar power (MW)	Saving conventional energy I ($/hr)	Saving losses (Losses ×λ at ref. bus) in ($/hr)	Amount Receive by solar from load (capacity×λ at bus) in ($/hr)	Net contribution of solar Generation in ($/hr)	Net contribution of solar Generation in (Rs/KWhr)	Reduction in subsidy(16-contribution of solar)in (Rs./KWhr)	Net Reduction in Govt. subsidy (12-SG)/KWhr
1	153.41	-4.84	153.36	301.935	13.89	1.11	10.89
2	306.73	-9.687	306.58	603.623	13.88	1.12	10.88
3	460.00	-14.52	456.65	902.13	13.83	1.17	10.87
4	631.17	-19.36	612.57	1224.38	14.00	0.92	11.08
5	766.27	24.19	765.35	1507.43	13.86	1.14	10.86

I. Fig.7.13 shows the variation in Lambda/marginal price (λ) at all buses with 5MW solar power generation at bus no.2, when the

capacity of solar power increase at the bus then the subsidy can be gradually decrease.

II. Fig.7.14 shows the variation of marginal price (λ) with variation of 5MW solar power generation at bus no.2, variation in marginal price can be decrease when in the capacity of solar power increase at the bus.

III. Fig.7.15 show the variation of reduction in subsidy with variation in 5 MW solar power Generation added at bus no.2 in this case very less subsidy will be provide because contribution of solar power approximately equal to actual solar generation.

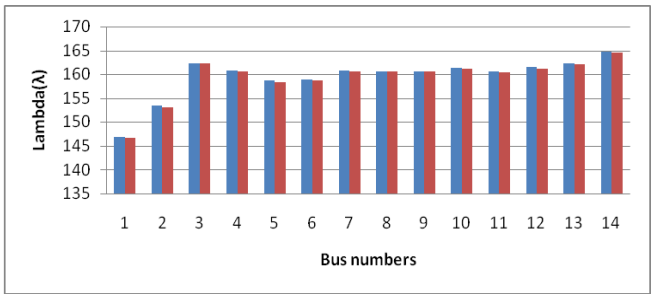

Fig.5.13. 5MW PV plant added to bus no. 2

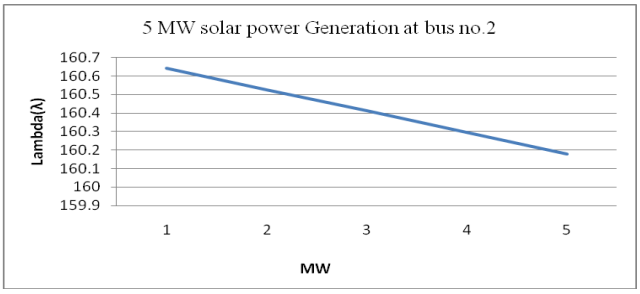

Fig.5.14, 5MW solar plants added at bus no. 2 then variation in Marginal Price (λ)

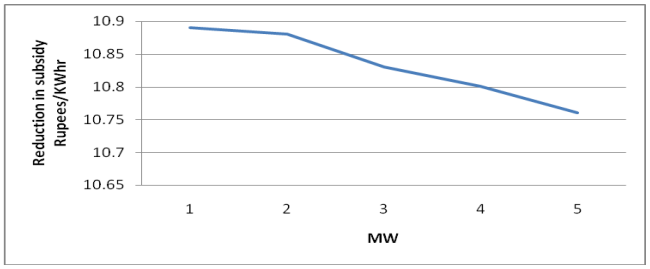

Fig.5.15, 5MW solar plants added at bus no. 2 then variation of reduction in Subsidy

In this case the value of marginal price (λ) can be decrease at all buses and also decrease in large amount compare to 9 bus system on all buses and also decrease at 5 different case when 1MW to 5MW solar power added to bus no.2. When 1MW to 5MW solar power added at same bus then the reduction in subsidy are 9-10 Rs/KWhr and approximately 75-85% subsidy in 14 bus system case.

5.3.2 When 5MW solar Power added at bus no. 3

TABLE 5.6

When 5 MW solar PV Generation added at bus no. 3

Solar power (MW)	Saving conventional energy I ($/hr)	Saving losses (Losses ×λ at ref. bus) in ($/hr)	Amount Receive by solar from load (capacity×λ at bus) in ($/hr)	Net contribution of solar Generation in ($/hr)	Net contribution of solar Generation in (Rs/KWhr)	Reduction in subsidy (16-contribution of solar)in (Rs./KWhr)	Net Reduction in Govt. subsidy (12-SG)/KWhr
1	162.28	1.32	162.244	325.84	14.99	0.01	11.99
2	324.49	2.64	324.3	651.43	14.98	0.02	11.98
3	486.65	4.11	486.40	977.16	14.98	0.02	11.98
4	648.76	5.43	648.31	1302.50	14.97	0.03	11.97
5	810.81	6.75	810.10	1624.66	14.94	0.06	11.94

I. Fig.5.16 shows the variation in Lambda/marginal price (λ) at all buses with 5MW solar power generation at bus no.3, when the capacity of solar power increase at the bus then the subsidy can be gradually decrease.

II. Fig.5.17 shows the variation of marginal price (λ) with variation of 5MW solar power generation at bus no.3, variation in marginal price can be decrease when in the capacity of solar power increase at the bus.

III. Fig.5.18 shows the variation of reduction in subsidy with variation in 5 MW solar power Generation added at bus no.3, in this case very less subsidy will be provide because contribution of solar power approximately equal to actual solar generation.

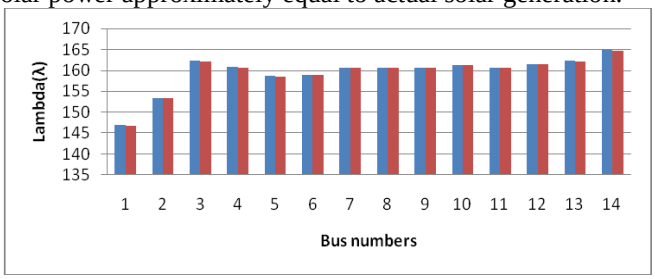

Fig.5.16. 5MW PV plant added to bus no. 3

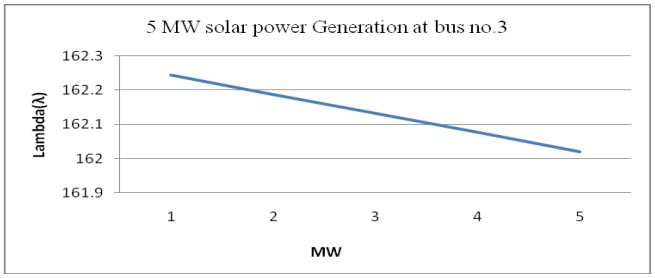

Fig.5.17. 5MW solar plants added at bus no. 3 then variation in Marginal Price (λ)

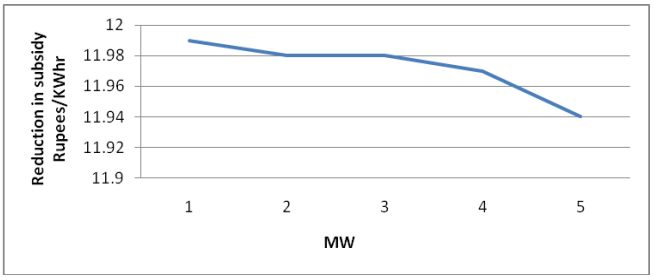

Fig.5.18. 5MW solar plants added at bus no. 3 then variation of reduction in Subsidy

In this case similarly to above 2 bus case the value of marginal price (λ) can be decrease in large amount compare to 9 bus system on all buses and also decrease at 5 different case when 1MW to 5MW solar power added to bus no.3. When 1MW to 5MW solar power added at same bus then the reduction in subsidy are 10-11 Rs/KWhr and approximately 80-90% subsidy in 14 bus system case.

5.3.3 When 5MW solar Power added at bus no. 4

TABLE 5.7

When 5 MW solar PV Generation added at bus no. 4

Solar power (MW)	Saving conventional energy I ($/hr)	Saving losses (Losses× λ at ref. bus) in ($/hr)	Amount Receive by solar from load (capacity× λ at bus) in ($/hr)	Net contribution of solar Generation in ($/hr)	Net contribution of solar Generation in (Rs/KWhr)	Reduction in subsidy (16-contribution of solar)in (Rs./KWhr)	Net Reduction in Govt. subsidy (12-SG)/KWhr
1	160.74	1.03	160.702	322.47	14.83	0.17	11.83
2	321.41	2.05	321.29	644.75	14.83	0.17	11.83
3	482.02	3.08	481.76	966.86	14.82	0.18	11.82
4	642.58	4.10	642.10	1288.78	14.82	0.18	11.82
5	803.08	5.14	802.345	1610.56	14.81	0.19	11.81

I. Fig.5.19 shows the variation in Lambda/marginal price (λ) at all buses with 5MW solar power generation at bus no.4, when the capacity of solar power increase at the bus then the subsidy can be gradually decrease.

II. Fig.5.20 shows the variation of marginal price (λ) with variation of 5MW solar power generation at bus no.4, variation in marginal price can be decrease when in the capacity of solar power increase at the bus.

III. Fig.5.21 shows the variation of reduction in subsidy with variation in 5 MW solar power Generation added at bus no.4, in this case very less subsidy will be provide because contribution of solar power approximately equal to actual solar generation.

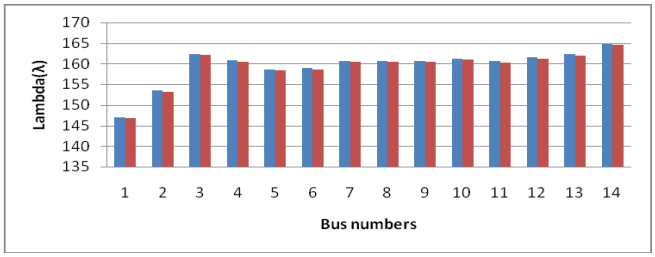

Fig.5.19. 5MW PV plant added to bus no. 4

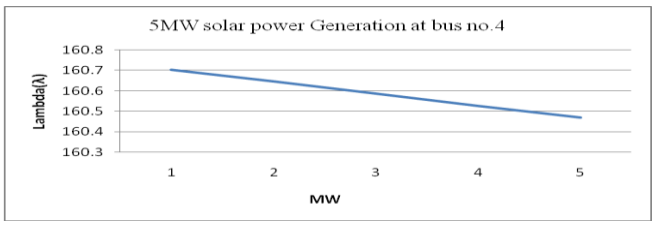

Fig.5.20. 5MW solar plants added at bus no. 4 then variation in Marginal Price (λ)

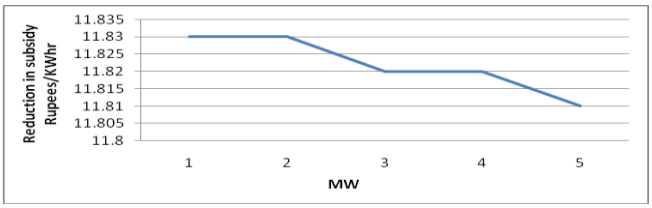

Fig.5.21. 5MW solar plants added at bus no. 4 then variation of reduction in Subsidy

In this case similarly to above 3 bus case the value of marginal price (λ) can be decrease in large amount compare to 9 bus system on all buses and also decrease at 5 different case when 1MW to 5MW solar power added to bus no.4. When 1MW to 5MW solar power added at same bus then the reduction in subsidy are 10-11 Rs/KWhr and approximately 80-90% subsidy in 14 bus system case.

VI. CONCLUSION & FUTURE SCOPE OF WORK

This thesis presents current status, major achievements and important aspects of solar energy in India and implementing solar for the future is also been presented. Solar energy is expected to play a very significant role in the future especially in developing countries, but it has also potential prospects for developed countries.

This dissertation consists of an effective Study for the Solar cell, Solar Photovoltaic Technology, Grid connected Photovoltaic plant, solar power Status in India & Global, Solar energy Tariff & Policy and find the Marginal price (λ) using optimal power plow programming with the help of MATLAB. This research work deals with, work on reduction in subsidy for solar power plant in deferent IEEE bus system (IEEE9, IEEE14,) using optimal power flow program. Solar power plant added at load bus then calculate the outcome of reduction in subsidy. The studies had been carried out reduction in subsidy in order to improve the solar generation, minimize the loss in the system.

The subsidy provide by government is gradually decrease when the solar power added to different buses in IEEE9, IEEE14, bus system.

When solar power added at bus no.5 in IEEE 9 bus system then the reduction in subsidy can be decrease approximately 40% and the similar process has follow to IEEE 14 bus system then the reduction in subsidy approximately 70%. But these process applying for IEEE 30 bus system then the reducing in subsidy is very small approximately 10% of total subsidy given by the Government. When the comparing of subsidy of these three IEEE bus then the outcome is that the reduction in subsidy can be more when solar power generation added the IEEE14 bus system.

In future, when efficiency of the solar cell and Generation of solar power can be increase then the cost of solar power generation gradually decrease. In other way the solar power generation added at different IEEE bus system them we can measure the reduction in cost from solar power generation and reduction in subsidy for solar power generation in future.

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Validating a Document using XML Languages

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***Abstract*-** Validation of a document plays a very important role and also solves a number of important issues when working with XML and XML related technologies. Validation allow to work with modules and performing multiple validations in one actions. During the last few years a number of different XML schema languages have appeared as suggested replacements for the ageing Document Type Definition (DTD). Schematron [Schematron] is an XML schema language designed and implemented by Rick Jelliffe at the Academia Sinica Computing Centre, Taiwan. It combines powerful validation capabilities with a simple syntax and implementation framework. In this paper authors explain how a document can be validated through XML Schema and how a rule based validation can be implemented with Schematron. But when several validations is in computing process, performance of Schematron is degraded. To cope this degradation **RELAX**-NG is useful for validating a document.

***Index Terms*-** XMLDTD, XML Schema, Schematron, RELAX-NG.

I. Introduction to XML Validation

XML files are developed for people to be easily read and edit. They are also useful for data exchange among different systems and different applications.

Validation confirms that XML data follows a specific predefined format so that an application can receive it in a predictable way. This format can be provide in a number of different ways including DTD and XML Schemas. A document that has been checked against a DTD or schema in this way is considered a "valid" document.XML validation also confirms that a XML document is well-formed and valid for specific format. A well-formed document can forms to the rules of XML.All elements have start and end tags, all attributes are enclosed in quotes ,all elements are nested correctly. If a document is not well-formed It can't be parsed.

A valid XML documents are always well-formed, but well-formed documents may not be valid. Validity plays important role to specifies that the document is syntactically and structurally correct.Validity must be ensured whenever the document is updated.

XMl not allowed these type of elements…

```
<vehicle>
   <twowheeler>
     ---------
     ---------
   </vehicle>
</twowheeler>
```

Each tag should be closed in proper manner. Nesting rules for tag must be obeyed.

A document can be validated in ORACLE by using schemavalidate() procedure and isschemavalidate() function as below--

```
declare
    xmldoc xmltype;
 begin
  --  validate against XML schema
 xmldoc.schemavalidate();
   If xmldoc.isschemavalidated () = 1 then
        dbms_output.put_line ('Data is valid');
    else
        dbms_output.put_line('Data is invalid');
    end if;
end;
```

isschemavalidate() is a Boolean function that returns 1 or zero for valid or invalid.

This introduction to XML presents the Extensible Markup Language at a reasonably technical level for anyone interested in learning more about structured documents.

XML documents contain elements and attributes. They provide a flexible and powerful way to exchange data between applications and organizations. To specify the allowable structure and content of an XML document, you can write a DTD, an XDR schema, or an XSD schema.

In the creation of a database, using a data model in conjunction with integrity constraints can ensure that the structure and content of the data meet the requirements. But it is very difficult to ensure, using XML, when your data is just text in hand-editable files. Fortunately,validating files and documents can make sure that data fits constraints.This is possible by using Document Type Definition (DTD) or an XML Schema document and also some other languages like Schematron and **RELAX**-NG.

1.1 Features of DTDs:-

XML validation is a crucial part of predictable and efficient processing of XML instances. Knowing the structure of an XML document saves the developer from writing unnecessary conditional application logic. Once a document is identified as belonging to a class of documents, many assumptions about its structure can be made.

A Document Type Definition (DTD) is an optional part of an XML document that defines the document's exact layout and structure. There are two main reasons for an XML author to write a DTD for their document. The first of these is documentation. A developer can look at a document with a DTD and immediately understand the structure of the data. A DTD can formally state

that, for example, a product number contains a manufacturer's code, followed by a batch number, followed by a part number, followed by an optional colour code. The second reason to use a DTD is to enable what is known as validation. The process of document validation involves passing an XML document through a processor which reads the DTD, then examines the XML data to ensure that elements appear in the right order, that mandatory elements and attributes are in place, that no other elements or attributes have been inserted where they shouldn't have been, and so on. Working with validated data makes life much easier for a developer. If data is known to be valid, it is completely predictable. For the product number example given above, a developer can write code to read each of the first 3 pieces of data from a validated document, then do a check to see if the optional color code has been provided before attempting to read that. An XML document can be viewed abstractly as a tree of nested elements. The basic mechanism for specifying the type of XML documents is provided by Document Type Definitions (DTDs) [W3C 1998]. DTDs can be abstracted as extended context-free grammars (CFGs).for example

```
<!DOCTYPE car [
<!ELEMENT car (make, model, year)>
...
...
]>
```

This line says that the car element must contain – and can only contain – a make
element, followed by a model element, followed by a year element, like this:

```
<car>
<make>
...
</make>
<model>
...
</model>
<year>
...
</year>
</car>
```

The make, model and year elements must all appear (i.e. none are optional) and they must appear in that order. No other elements are allowed. To make an element optional, follow it with a question mark in the DTD:

```
<! DOCTYPE car [
<! ELEMENT car (make, model, year?)>
...
]>
```

The next two elements of our DTD might look like this:

```
<!DOCTYPE car[
<!ELEMENT car (make, model, year?)>
<!ELEMENT make (#PCDATA)
<!ELEMENT model (#PCDATA)
...
]>
```

It doesn't matter which order you declare your elements in inside a DTD. The make and model elements have been declared as containing #PCDATA which means parsed character data – in other words, free text. The name parsed character data means just that: the characters will be parsed by the XML parser.

DTDs are the first XML validation mechanism[14] and for all practical purposes and they use a non-XML syntax.DTDs are not written in XML syntax and rely post-processing for validation.DTDs are sufficient for simple XML schemas.

1.2 Limitations [2] of DTDs:-

In spite of their several advantages, DTDs suffer from a number of limitations-

- DTDs has Non-XML syntax. They have angled bracket syntax like(<!element-- >) this is quite different from the XML syntax.DTD does not have the standard <?xml version---- ?> tag etc.
- Each XML document can have only one DTD.Multiple DTDs cannot be used to validate one XML documents.
- DTDs does not support for namespaces.
- DTD have basic data types. In real-life application, it is not applicable and not sufficient also for specific data types.
- There is no inheritance in DTD.But DTD is not object-oriented. They do not allow the designer to create data type and extended them as desired.
- Its very hard to read and maintain large DTDs.
- There are no default values for elements and attribute defaults must be specified when they are declared.
- DTDs have limited set of rules and constraints.

2.1 Features of XMLSchema:-

As we know that a DTD is used for validating the contents of an XML document. A DTD is an important feature of the XML technology. But there are a no of areas in which DTDs are not fit. The main problem is that their syntax is not like that of XML document. Therefore W3C introduces a schema that is an alternate to DTD.

An XML Schema[4] is a document which describes another XML document. XML Schemas are used to validate XML documents. An XML schema itself is an XML document which contains the rules to be validated against a given XML instance document.

There are two forms of word 'Schema',in capital form and in lowercase form.The lowercase form is a generic term and may refer to any type of schema, including DTD, XML Schema (aka XSD), RELAX NG, or others, and should always be written using lowercase except when appearing at the start of a sentence. The form "Schema" (capitalized) in common use in the XML community always refers to W3C XML Schema[15].

DTDs were inherited from XML's origins as SGML[5] (Standard Generalized Markup Language) and, as such, are limited in their expressiveness. DTDs are for expressing a text document's structure, so all entities are assumed to be text. Schemas provide the ability to define an element's type (string, integer, etc.) and much finer constraints (a positive integer, a string starting with an uppercase letter, etc.). DTDs enforce a strict ordering of elements; Schemas have a more flexible range

of options (elements can be optional as a group, in any order, in strict sequence, etc.). Finally schemas are written in XML, whereas DTDs have their own syntax.

II. When need an XML Schema?

When sending data from a sender to a receiver, it is essential that both parts have the same "expectations" about the content. There should be a format to understand for both receiver and sender.With XML Schemas, the sender can describe the data in a way that the receiver will understand.One more need for XML Schema that it can be reused in other schemas.

Assume a function/method for an application that manages employee data. The function is expecting the employee information in the following XML structure:

```
<Student>
  <Name>
    <First>Jacob</First>
    <Middle>V</Middle>
    <Last>Sebastian</Last>
  </Name>
  <!-- Deleted other information for brevity -->
</Student>
```

The function needs to make sure that the caller passes correct XML data. An XML Schema which describes and validates the above XML document is given below.

```
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">

  <xs:element name="Student">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="Name">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="First" type=”xs:string”/>
              <xs:element name="Middle" type=”xs:string”/>
              <xs:element name="Last" type=”xs:string”/>
            </xs:sequence>
          </xs:complexType>
        </xs:element>
        </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

Example. Consider this simple instance document:

```
<?xml version="1.0"?>
<Doc xmlns="http://www.demo.org"
     xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
     xsi:schemaLocation="http://www.demo.org doc.xsd">
    <X>10</X>
    <Y>20</Y>
</Doc>
```

With XML Schemas we can check the following constraints:

- the Doc (root) element contains a sequence of elements, X followed by Y
- the X element contains an integer
- the Y element contains an integer

In fact, here's an XML Schema which expresses these constraints:

```
<?xml version="1.0"?>
<xsd:schema
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
          targetNamespace="http://www.demo.org"
          xmlns="http://www.demo.org"
          elementFormDefault="qualified">
    <xsd:element name="Doc">
      <xsd:complexType>
        <xsd:sequence>
          <xsd:element name="X" type="xsd:integer"/>
          <xsd:element name="Y" type="xsd:integer"/>
        </xsd:sequence>
      </xsd:complexType>
    </xsd:element>
</xsd:schema>
```

XML Schemas does **not** give us the capability to express the following constraint:

- the value of X must be lower than the value of Y

So should be there to check this constraint?
There are many other schema languages besides XML Schemas:

- Schematron
- TREX
- **RELAX**
- SOX
- XDR
- HOOK
- DSD
- Assertion Grammars
- Xlinkit

Thus, the first option is to use one (or more) of these schema languages to express the additional constraints.

2.2 Limitation of XMLSchema:

1. W3C XML Schema is complex and hard to learn, although that's partially because it tries to do more than mere validation.
2. There is a problem with XML Schema that it is not supported by all parsers.
3. XML Schema also not supported to entities.
4. W3C XML Schema does not implement most of the DTD ability to provide data elements to a document. While technically a comparative deficiency, it also does not have the problems that this ability can create as well, which makes it strength.

3.1 Features of Schematron:-

Schematron is a rule-based validation language.It is used for making assertions about the presence or absence of patterns in XML trees. Schematron is a structural schema language expressed in XML using a small number of elements and XPath.It differs in basic concept from other schema languages in that it *not based on grammars* but on finding *tree patterns* in the parsed document. XML Schema and DTD is not capable of expressing constraints but Schematron can express constraints in a better way. Schematron can also specify required relationships between multiple XML files.

Schematron is useful for conditional expression. And it is free and open source implementations available.The Schematron is trivially simple to implement on top of XSLT and to customize. A Schematron schema and an XML instance document are sent into a Schematron validator, which validates the instance document against the Schematron schema in figure 1..

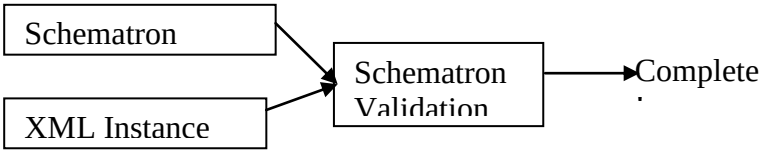

Figure 1

The Schematron can be used to develop and mix two kinds of schemas:

- ***Report*** elements allow you to diagnose which variant of a language you are dealing with.
- ***Assert*** elements allow you to confirm that the document conforms to a particular schema.

It is based on a simple action:

- First, *find* a context nodes in the document (typically an element) based on XPath path criteria;
- Then, *check* to see if some other XPath expressions are true, for each of those nodes.

The Schematron can be useful *in conjunction* with many grammar-based structure-validation languages: DTDs, **XML Schemas**, **RELAX**, **TREX**, etc. Indeed, Schematron is part of an ISO standard (DSDL: Document Schema Description Languages) designed to allow multiple, well-focussed XML validation languages to work together.

For example, using Schematron you can embed the additional constraints within the XSD document (within <appinfo> elements). The XSD document shown earlier has been enhanced (below) with Schematron directives:

```
<?xml version="1.0"?>
<xsd:schema
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
      targetNamespace="http://www.demo.org"
      xmlns="http://www.demo.org"
      xmlns:sch="http://www.ascc.net/xml/schematron"
      elementFormDefault="qualified">
   <xsd:annotation>
      <xsd:appinfo>
         <sch:title>Schematron validation</sch:title>
         <sch:ns prefix="d" uri="http://www.demo.org"/>
      </xsd:appinfo>
   </xsd:annotation>
   <xsd:element name="Doc">
      <xsd:annotation>
         <xsd:appinfo>
            <sch:pattern name="Check X greater than Y">
               <sch:rule context="d:Doc">
                  <sch:assert test="d:X >d:Y"
                        diagnostics="lessThan">
                     X should be greater than Y.
                  </sch:assert>
               </sch:rule>
            </sch:pattern>
            <sch:diagnostics>
               <sch:diagnostic id="lessThan">
                  Error! X is less than Y
                  X = <sch:value-of select="d:X"/>
                  Y = <sch:value-of select="d:Y"/>
               </sch:diagnostic>
            </sch:diagnostics>
         </xsd:appinfo>
      </xsd:annotation>
      <xsd:complexType>
         <xsd:sequence>
            <xsd:element name="X" type="xsd:integer"/>
            <xsd:element name="Y" type="xsd:integer"/>
         </xsd:sequence>
      </xsd:complexType>
   </xsd:element>
</xsd:schema>
```

Schematron will extract the directives out of the XSD document to create a Schematron schema. Schematron will then validate the instance document against the Schematron schema. Schematron is used for the following checking[11]—

1. **Co-constraint checking**
   Co-constraints are constraints that exist between data (element-to-element co-constraints, element-to-attribute, attribute-attribute). Co-constraints may be "within" an XML document, or "across" XML documents (intra- and inter-document co-constraints).Schematron is very well-suited to expressing co-constraints.

2. **Cardinality checking**

Cardinality constraints are constraints on the occurrence of data. The cardinality constraints may apply over the entire document, or to just portions of the document.Schematron is very well-suited to expressing cardinality checks.Cardinality checking encompasses uniqueness checking.Existence checking is a special case of cardinality checking.The following example will be used to characterize the next category of Schematron usage:

```
<?xml version="1.0"?>
```

```
<ExamResults>
   <ByPercentage>
      <Candidate name="John">61</Candidate>
      <Candidate name="Sara">54</Candidate>
      <Candidate name="Bill">55</Candidate>
   </ByPercentage>
</ElectionResults>
```

3. Algorithmic checking

In the above example the algorithmic constraint is: "the exam results must add up to 100%" (i.e., 61 + 54 + 55 = 100). In general, validity of data in an XML instance document is determined not by student's examination or comparison of the data, but requires performing an algorithm on the data. Schematron is very well-suited to expressing algorithmic checks.

3.2 Limitations of Schematron [12]:-

1. There may be running many validation at a time in Schematron so performance can be degrade and also may be more expensive.

2. It may be difficult to swapping out the particular grammar language that is currently being used and replacing it with a different grammar language.

3. Constraint checking is a big-bang event. All constraints grammar, co-constraints, cardinality, algorithmic are checked at once.

5. Schematron was difficult to place on the graph. Schematron can express content dependent rules across elements and attributes that none of the other methods can. On the other hand, Schematron is not as well suited to basic content model restrictions as the others are.

6. Schematron is best used as supplemental power to the other validation methods.

4.1 Features of RELAX-NG:--

RELAX NG (**REgular LAnguage for XML Next Generation**) is a schema[7] language for XML - a **RELAX**-NG schema define a pattern for the structure and content of an XML document. A **RELAX**-NG schema is itself an XML document but **RELAX**-NG also offers a popular compact, non-XML syntax. Compared to other XML schema languages **RELAX**-NG is considered relatively simple.

It was defined by a committee specification of the OASIS **RELAX** NG technical committee in 2001 and 2002, based on Murata Makoto's **RELAX** and James Clark's TREX and also by part two of the international standard ISO/IEC 19757: Document Schema Definition Languages (DSDL).

RELAX NG is a schema language for XML. The key features of **RELAX** NG are that it:

- is simple.
- is easy to learn.
- has both an XML syntax and a compact non-XML syntax.
- does not change the information set of an XML document.
- supports XML namespaces.
- treats attributes uniformly with elements so far as possible.
- has unrestricted support for unordered content.
- has unrestricted support for mixed content.
- has a solid theoretical basis.
- can partner with a separate data typing language.

Consider a simple XML representation of an email Book Store:

```
<bookstore>
  <name>Mike's Store</name>
  <topic>
    <name>XML</name>
    <book isbn="123-456-789">
      <title>Mike's Guide To DTD's and XML Schemas<</title>
      <author>Mike Jervis</author>
    </book>
  </topic>
</bookstore>
```

The DTD would be as follows:

```
<!DOCTYPE bookstore [
  <!ELEMENT bookstore (topic+)>
  <!ELEMENT topic (name,book*)>
  <!ELEMENT name (#PCDATA)>
  <!ELEMENT book (title,author)>
  <!ELEMENT title (#CDATA)>
  <!ELEMENT author (#CDATA)>
  <!ELEMENT isbn (#PCDATA)>
  <!ATTLIST book isbn CDATA "0">
  ]>
```

A **RELAX** NG pattern for this could be written as follows:

```
<element name="bookstore"
xmlns="http://RELAXng.org/ns/structure/1.0">
  <ZeroOrMore>
    <element name="topic">
      <element name="name">
        <text/>
      </element>
      <element name="book">
        <element name="title">
        <element name="author">
        <text/>
      </element>
    </element>
  </zeroOrMore>
</element>
```

If the bookstore is required to be non-empty, then we can use oneOrMore instead of zeroOrMore:

```
<element name="bookstore"
xmlns="http://RELAXng.org/ns/structure/1.0">
  <oneOrMore>
    <element name="topic">
```

```
    <element name="name">
      <text/>
    </element>
        <element name="book">
          <element name="title">
          <element name="author">
      <text/>
    </element>
  </element>
 </oneOrMore>
</element>
```

4.2 Limitation of RELAX -NG:

1. **RELAX** - NG[13] really hits a sweet spot for both ease of use and expressive power.
2. **RELAX** NG has no ability to apply default attribute data to an element's list of attributes (i.e., changing the XML info set), while W3C XML Schema does. Again, this design is intentional and is to separate validation and augmentation.

III. Conclusion

XML is a promising standard that will undoubtedly impact positively on the Web community. Although the expressiveness of its data model is limited and it poses scalability issues, its flexibility, its simplicity and its interconnection capabilities make it an excellent candidate as a language for data exchange.

One can create typed XML documents using XSD but still get rich validation of business rules in a declarative manner from the schema language, as well.

Acknowledgement

Thanks to all my friends and collaborators in XML and XML Languages.

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A Comparative Study on Compensating Current Generation Algorithms for Shunt Active Filter under Non-linear Load Conditions

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Abstract- With the rapid use of power electronic converters which are considered as non-linear loads have problems of drawing non-sinusoidal currents and reactive power from source which in turn pollutes the power quality. This paper presents the power quality problems and methods for its correction where two control strategies (p - q instantaneous power theory and d - q synchronous reference frame theory) for extracting reference currents for shunt active power filters (SAPF) have been evaluated and their performances have been compared under distorted supply and non-linear load conditions. These theories are used to implement the control algorithm of a shunt active filter which compensates harmonic currents. This paper implements the three phase three wire shunt active power filter to suppress current harmonics. The SAPF performance is validated using MATLAB/Simulink model showing comparisons for the two algorithms.

Index Terms- Active filters, harmonic compensation, instantaneous power theory, power quality, synchronous reference theory, total harmonic distortion (THD).

I. INTRODUCTION

The recent growth in the use of non-linear loads has resulted in the power quality problems like voltage sag, voltage swell, voltage notch, voltage flicker, current and voltage harmonics, unbalance, excessive neutral current and interference in communication network. These disturbances range from sub cycle duration to long term steady state problems. Voltage and current harmonics causes reduction in the efficiency of the generation, transmission and utilization of electric energy. It causes a sharp increase in the zero sequence current, and therefore, increases the current in the neutral conductor. Harmonic voltages can interfere the controllers used in electronic systems and its effects are classified into two types: instantaneous effects and long term effects. The instantaneous effects are maloperation and performance degradation of electronic equipments. The long term effects are of thermal nature and are related to additional losses. Figure 1 presents a power system with sinusoidal source voltage (Vs) operating with linear and non-linear load. The non-linear load current (i_{L1}) contains harmonic. The harmonics in the line current (i_s) produces non-linear voltage drop (ΔV) in line impedance, which distorts the load voltage (V_L). As the load voltage is distorted, the linear load current (i_{L2}) will also be a non-sinusoidal. The solid state converters draw harmonic and reactive power components of current from AC mains which affect power quality [1].

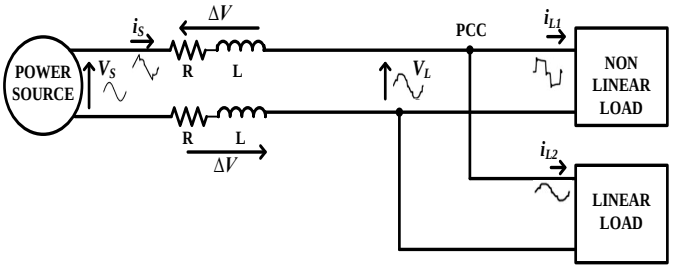


Figure 1: Power System with Linear and Non-linear load

The total harmonic distortion (THD) is the ratio of the RMS value of the sum of all harmonic components and the RMS value of the fundamental component, for both current and voltage.

$$THD\ (\%) = \sqrt{\sum_{h=2}^{\infty}\left(\frac{I_h}{I_1}\right)^2} * 100 \qquad (1)$$

where, h is the order of harmonic.

To overcome these problems SAPF is used which satisfies the need of the dynamic and adjustable solution requirement to the power quality problems. In order to compensate the distorted currents, SAPF injects currents equal but opposite with the harmonic components, thus only the fundamental components flows in the point of common coupling (PCC).

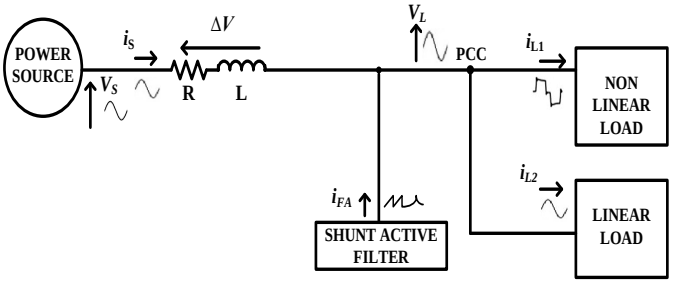


Figure 2: Power System with load and shunt active filter

The SAPF connected in parallel to the disturbing loads, unbalanced and non linear, as seen in Figure 2, causes the supply currents to be near sinusoidal and balanced. SAPF can compensate current harmonics and perform power factor correction furthermore; it allows load balancing by eliminating the current in the neutral wire [1]-[2].

This paper presents a comprehensive analysis of SAPF using two (p-q and d-q theory) algorithms for derivation of compensating signals. These compensating signals are then compared in a hysteresis controller for generation of switching signals. In section II, the control strategy of active filters is presented. In section III and IV, basic of p-q theory and its control algorithm are presented. The d-q theory and its control algorithm is presented in section V. A comparative analysis of simulation results is presented in section VI. Finally, section VII concludes the results.

II. Procedural Steps to Control Active Filters

The control strategy of active filters is a complex process which supposes observing certain prerequisites. It may be looked upon as a three separate steps: signal monitoring, getting compensating signals and generating gating signals.

1. *Signal monitoring*

For the purpose of implementation of the control algorithm, instantaneous voltage and current signals are required which are also useful to monitor total harmonic distortion (THD), power factor, active and reactive power. These signals, sensed by using potential transformer (PT) and current transformer (CT) respectively are then compared with compensating signals to generate gating signals.

2. *Derivation of compensating signals*

The important part of SAPF control is the development of compensating signals in terms of voltages or currents. The control methods used to generate compensating commands are based on frequency or time domain techniques. The compensation in frequency domain is based on Fourier analysis of distorted voltage or current signals to extract compensating commands but it results in large response time. The compensation in time domain are based on instantaneous derivation of compensating commands in terms of voltage or current signals from distorted voltage or current signals. This uses simple algebraic calculations and transformations. There are many control methods in time domain, few of them are:

- Instantaneous power (p-q) theory
- Synchronous reference (d-q) method
- Frize-Buchholz-Depenbrock (FBD) method.

3. *Generation of gating signals*

The gating signals to control solid state devices of SAPF are generated by using pulse width modulation (PWM), hysteresis, sliding mode or Fuzzy logic based control techniques.

A. *The P-Q Theory*

The p-q theory proposed in 1983 by *Akagi et al* [7] to control active filter (AF) is based on the time domain. It is valid for both steady-state and transient operation as well as for generic voltage and current waveforms, allowing the control of the active filters in real-time. Since only algebraic calculations are required the additional advantage of simplicity is achieved by using this method. It consists of an algebraic transformation (Clarke transformation) of three phase voltages and currents in the a-b-c coordinate to α-β-0 coordinate. The main advantage of using Clarke transformation is separation of zero sequence components [2]-[6]. The calculation of the instantaneous power p-q theory components is given by

$$\begin{bmatrix} V_0 \\ V_\alpha \\ V_\beta \end{bmatrix} = \sqrt{\frac{2}{3}} \begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ 1 & -\frac{1}{2} & -\frac{1}{2} \\ 0 & \frac{\sqrt{3}}{2} & -\frac{\sqrt{3}}{2} \end{bmatrix} \begin{bmatrix} V_a \\ V_b \\ V_c \end{bmatrix} \quad (2)$$

$$\begin{bmatrix} i_0 \\ i_\alpha \\ i_\beta \end{bmatrix} = \sqrt{\frac{2}{3}} \begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ 1 & -\frac{1}{2} & -\frac{1}{2} \\ 0 & \frac{\sqrt{3}}{2} & -\frac{\sqrt{3}}{2} \end{bmatrix} \begin{bmatrix} i_a \\ i_b \\ i_c \end{bmatrix} \quad (3)$$

The instantaneous zero sequence power is given by

$$p_o = v_0 * i_0 \quad (4)$$

The instantaneous real power is given by

$$p = v_\alpha i_\alpha + v_\beta i_\beta \quad (5)$$

and, the instantaneous imaginary power is given by

$$q = v_\alpha i_\beta - v_\beta i_\alpha \quad (6)$$

so, the power components p and q are given by

$$\begin{bmatrix} p \\ q \end{bmatrix} = \begin{bmatrix} V_\alpha & V_\beta \\ -V_\beta & V_\alpha \end{bmatrix} \begin{bmatrix} i_\alpha \\ i_\beta \end{bmatrix} \quad (7)$$

These quantities are illustrated in Figure 3 for an electrical system represented in a-b-c coordinates and have the following meanings:

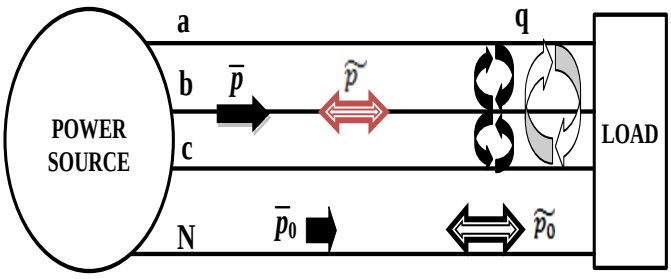


Figure 3: Power components of p-q theory

where,

$\overline{p_0}$ = mean value of instantaneous zero sequence power

$\widetilde{p_0}$ = alternated value of instantaneous zero sequence power

$\overline{p}$ = mean value of instantaneous real power

$\tilde{p}$ = alternated value of instantaneous real power

q = instantaneous imaginary power.

From all the power components of p-q theory, only $\overline{p}$ and $\overline{p_0}$ are desirable. The other quantities can be compensated using a SAPF. From Figure 4 the $\widetilde{p_0}$ can be compensated without the need of any power supply in the SAPF. This quantity is delivered from power supply to the load through active filter in balanced way [1]-[8]. The reactive and harmonic compensation is carried by injecting appropriate currents into the line through compensator i.e. SAPF. The dc link capacitor is required to compensate $\widetilde{p}$ and $\widetilde{p_0}$. The instantaneous imaginary power (q) is compensated without any contribution of capacitor; this means that, the size of the capacitor does not depend on the amount of reactive power to be compensated. The $\overline{p_0}$ can be compensated without any power supply in active filter. This quantity is delivered from the source to the load through SAPF as shown in Figure 4.

To calculate the reference compensation currents, in α-β-0 coordinates (7) is inverted; given by

$$\begin{bmatrix} i^*_{c\alpha} \\ i^*_{c\beta} \end{bmatrix} = \frac{1}{v_\alpha^2 + v_\beta^2} * \begin{bmatrix} V_\alpha & -V_\beta \\ V_\beta & V_\alpha \end{bmatrix} \begin{bmatrix} \tilde{p} - \overline{p_0} \\ q \end{bmatrix} \quad (8)$$

Since, the zero-sequence current must be compensated, the reference compensation current in the '0' coordinate is:

$$i_{c0}^* = i_0 \quad (9)$$

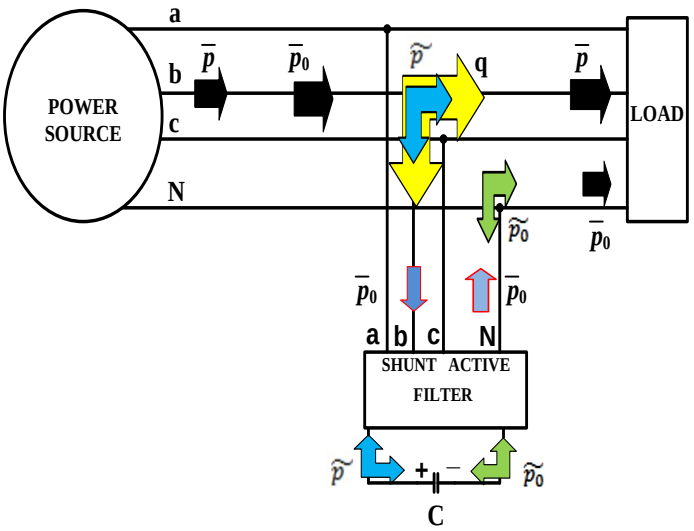


Figure 4: Compensation of power components

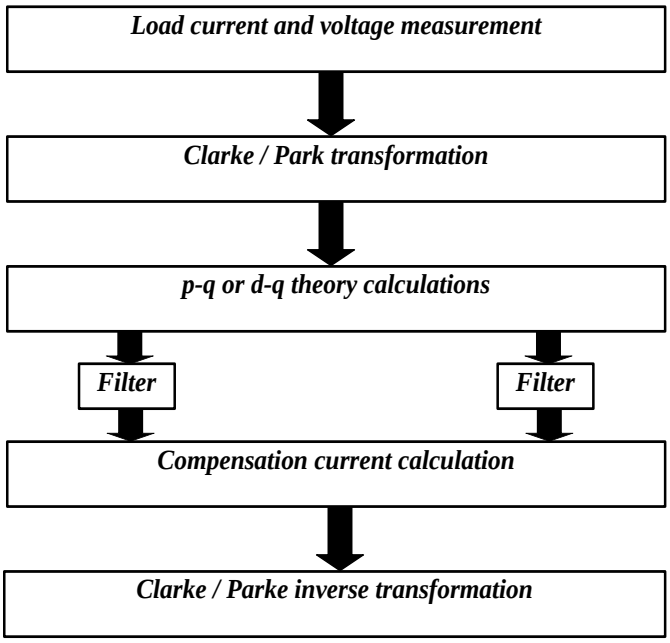


Figure 5: Control algorithm for extraction of compensation currents

To obtain the reference compensation currents in a-b-c coordinates the inverse transformation of (3) is applied which is given by

$$\begin{bmatrix} i^*_{ca} \\ i^*_{cb} \\ i^*_{cc} \end{bmatrix} = \sqrt{\frac{2}{3}} \begin{bmatrix} \frac{1}{\sqrt{2}} & 1 & 0 \\ \frac{1}{\sqrt{2}} & -\frac{1}{2} & \frac{\sqrt{3}}{2} \\ \frac{1}{\sqrt{2}} & -\frac{1}{2} & -\frac{\sqrt{3}}{2} \end{bmatrix} \begin{bmatrix} i^*_{c0} \\ i^*_{c\alpha} \\ i^*_{c\beta} \end{bmatrix} \quad (10)$$

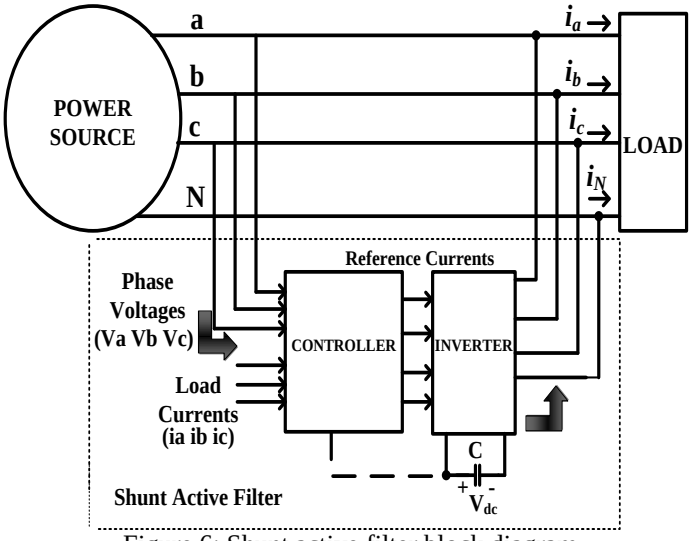


Figure 6: Shunt active filter block diagram

The p-q theory calculations are carried out in the shunt active power filter block shown in Figure 6. From the received values of phase voltages (v_a, v_b, v_c), load currents (i_a, i_b, i_c) and DC

voltage, the controller calculates the reference currents given by (10) based on control algorithm shown in Figure 7. The inverter uses these reference currents to produce the compensation currents which are injected in power system by the inverter.

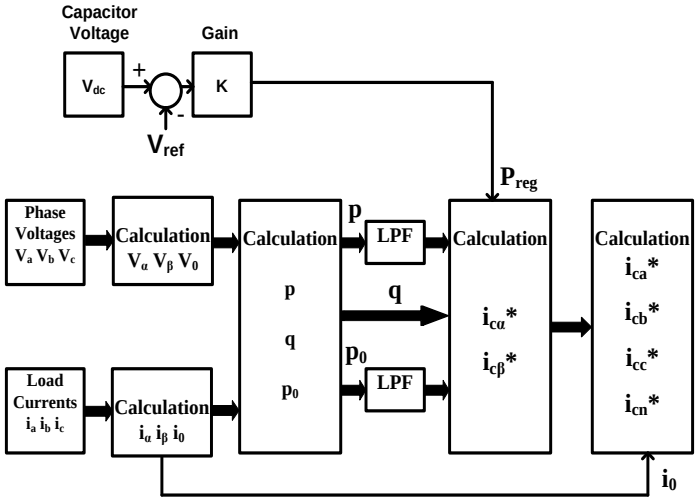


Figure 7: Calculation of p-q theory components

B. Synchronous Reference Frame Theory

The synchronous reference frame theory or d-q theory [8] is based on time domain reference signal estimation techniques. It performs the operation in steady state or transient state as well as for generic voltage and current waveforms. It allows controlling the active power filters in real time system. Another important characteristic of this theory is the simplicity of the calculations, which involves only algebraic calculation. In this strategy, the reference frame d-q-0 is determined by the transformation angle θ with respect to the α-β-0 frame applied in the p-q theory [6]. It is based on the transformation of the stationary reference frame three phase variables (a,b,c) to synchronous reference frame variables (d,q,0) whose direct (d) and quadrature (q) axes rotate in space at the synchronous speed W_e, which is the angular electrical speed of the rotating magnetic field of the three phase supply given by $W_e = 2\pi f_s$, where f_s is the frequency of the supply. If θ is the transformation angle, then the current transformation from a-b-c to d-q-0 frame is calculated as

$$\begin{bmatrix} i_d \\ i_q \\ i_0 \end{bmatrix} = \sqrt{\frac{2}{3}} \begin{bmatrix} \cos\theta & \cos(\theta - \frac{2\pi}{3}) & \cos(\theta + \frac{2\pi}{3}) \\ -\sin\theta & -\sin(\theta - \frac{2\pi}{3}) & -\sin(\theta + \frac{2\pi}{3}) \\ \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{bmatrix} \begin{bmatrix} i_a \\ i_b \\ i_c \end{bmatrix} \quad (11)$$

where, $\theta(t) = \int_0^t W_e(t)dt + \theta_0$ (12)

The sine and cosine functions help to maintain the synchronization with supply voltage and current. The d-q transformation output signals are dependent on the load current (fundamental and harmonic components) and the performance of the Phase Locked Loop (PLL). The PLL circuit provides the rotation speed (rad/sec) of the rotating reference frame, where W (is set as fundamental frequency component and 30 degree phase angle followed by sin and cos for synchronization. The (i_d - i_q) currents are sent through low pass filter (LPF) for filtering the harmonic components of the load current, which allows only the fundamental frequency components [3]. The LPF is second order butterworth filter used for eliminating the higher order harmonics. The PI controller is used to eliminate the steady-state error of the DC component of the d-axis reference signals. The DC side capacitor voltage of inverter is sensed and compared with desired reference voltage for calculating the error voltage. This error voltage is passed through a PI controller whose propagation gain (K_P) and integral gain (K_I) is taken as 0.1 and 1 respectively.

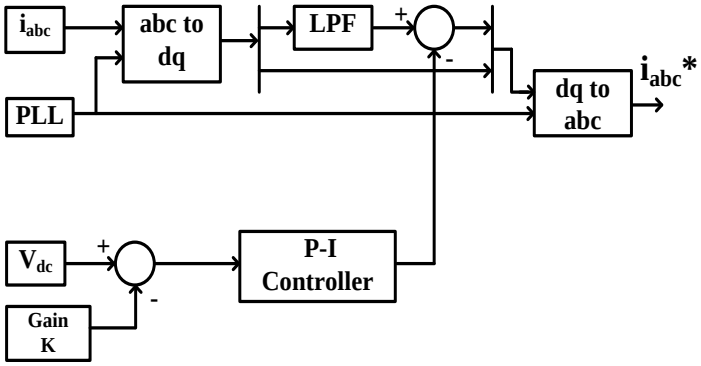
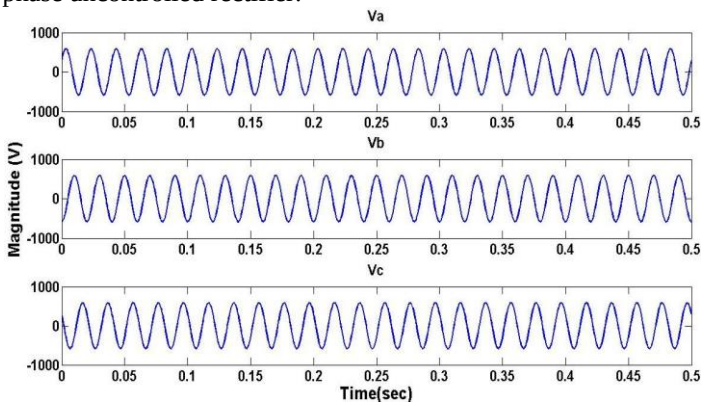


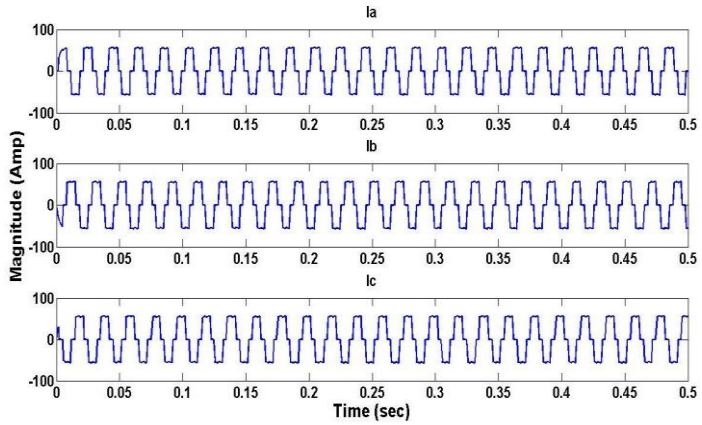
Figure 8: Synchronous reference theory based control algorithm

III. SIMULATION RESULTS

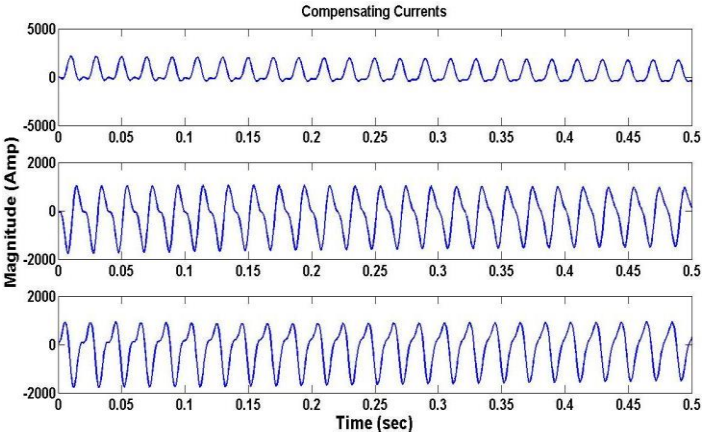
The purpose of the simulation is to show the effectiveness of p-q and d-q methods for maintaining sinusoidal source currents when the source supplying a non-linear load. The MATLAB/Simulink simulation tool is used to develop a model that allowed the simulation of the p-q and d-q theory calculations, which are implemented in the controller of the SAPF (Figure 7 and 8). The load is simulated to include harmonic distortion from a three phase uncontrolled rectifier.



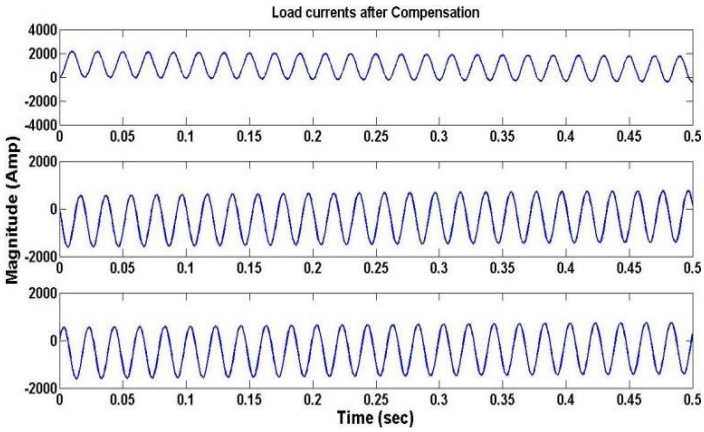
(a) Three phase source voltages



(b) Load currents without SAPF



(c) Three phase compensating currents



(d) Three phase load currents with SAPF

Figure 9: Simulation results for ideal voltage source and thyristor rectifier load

Because of non-linear load the source current contains harmonic components as shown in Figure 9 (b). To make the source current distortion free, SAPF operate to compensate the current harmonics by injecting the current of variable magnitude and phase as shown in Figure 9 (c). The Figure 9 (d) indicates that after compensation the main currents are sinusoidal even when the load is non linear.

TABLE I: Harmonic compensation by p-q theory method

Load Currents	THD without compensation	THD with compensation
I_a	20.25%	1.21%
I_b	21.07%	1.22%
I_c	21.69%	1.28%

TABLE II: Harmonic compensation by d-q theory method

Load Currents	THD without compensation	THD with compensation
I_a	20.25%	1.31%
I_b	21.07%	1.34%
I_c	21.69%	1.37%

From Table I and II, it is seen that without compensation, the THD level of the source current was in between 20-22% which do not comply with the IEEE 519 harmonic standards [9]. After compensation by p-q and d-q theory, the THD level of the source current is reduced considerably for all three phases which comply with the IEEE 519 standards. Comparing these tables it is confirmed that p-q theory gives better performance than the d-q theory method.

IV. Conclusion

In this paper the performance analysis of p-q and d-q methods of compensation current generation for SAPF under distorted supply and non-linear load conditions based on simulation studies is discussed. Comparative study brings that, the p-q theory gives a better approach than synchronous reference frame (d-q) theory for compensation of harmonic currents and takes appropriate corrective measure for the THD in improvement of the power under distorted supply and non-linear load conditions.

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Entrepreneurial Perceptions and Knowledge among Graduates of Nigerian Universities

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Abstract- Perceived desirability and feasibility have increased through participation in entrepreneurship education programmes in Universities. Thus, this study assessed entrepreneurial perceptions and knowledge among graduates of Nigerian Universities. Data were collected using questionnaire and analysed with respect to the 8 research questions using both unvariate and bivariate analyses. It was found that entrepreneurial perceptions and knowledge varied across age groups, gender, courses studied and ethnic groups among the graduates. The study reveals that: graduates aged 29-31 years had the best entrepreneurial knowledge and showed the best interest towards entrepreneurship; graduates of Engineering/Technology and Health Science courses were the most interested in entrepreneurship, while those who studied management science courses were the best performers in entrepreneurial knowledge; male graduates were more interested in starting their own business; and graduates from the South-East made the highest scores of 76% and 70% in entrepreneurial perception and knowledge respectively. The study therefore recommends the establishment of an institution to assist the older graduates with high achievement motivation to start their own business and a reinvention of the centers for entrepreneurship development so as to enhance their capability to groom more entrepreneurial and skillful University graduates.

Index Terms- Entrepreneurship, perceptions, knowledge, university graduates

I. Introduction

The increase in the number of youths in tertiary education is a positive development. However, labour markets in many countries are presently unable to accommodate the expanding pool of the skilled young graduates (ILO, 2007, as cited in Awogbenle and Iwuamdi, 2010). One of such countries is Nigeria, the expanding pool experience is such that 80% of the graduates from Nigerian Universities find it very difficult to get employment every year. This is partly due to the curricula of the Universities and other tertiary institutions, which lay emphasis on training for white-collar jobs. For example, current national or regional policy thrusts like the National Economic Empowerment and Development Strategy (NEEDS) and the New Partnership for Africa's Development (NEPAD) have been sensitizing the youths by emphasing on poverty eradication, employment generation and wealth-creation as well as public-private partnership. Accordingly, a number of initiatives like the National Poverty Eradication Programme (NAPEP) and the establishment of Small and Medium Enterprises Development Agency of Nigeria (SMEDAN) have been introduced (Osibanjo, 2006; Okojie, 2008). However, the situation has not significantly changed to the desired direction.

One of the possible causes of the failure of NEEDS, NAPEP and SMEDAN to bring about the desired change is that this initiatives in Nigeria addresses only the output end of capacity development solving problem. In addressing the input end, therefore, a complimentary approach is required. Besides, even the educational system that addresses the output end either lays more emphasis on content and knowledge acquisition for its sake or just stresses the inquiry-discovery model of teaching and learning. In developed economies or industrializing economies, for example, the education system emphasizes the trail of inquiry-discovery-application in teaching and students to perceive problems (including societal problems) as challenges and opportunities that can be turned into goods and services of commercial value (Giwa, 2000; Adeyemi, 2006, as cited in Adejimola and Olufunmilayo, 2009).

One of such approaches for achieving this in Nigeria is teaching and research in entrepreneurship and innovation centres by Universities and other tertiary institutions and the promoting of Universities-private sector collaboration. This will involve developing the capacity of staff and students in entrepreneurship and innovation, engaging in outreach activities with small and medium enterprises through such interventions as business incubators. Training of entrepreneurs and conducting researches and consultancies by small business development centres in Universities are considered inevitable for patenting entrepreneurial, industrial and economic growth in Nigeria. This is the approach being adopted by the National Universities Commission (NUC) through its directive to all Universities in Nigeria to establish the centre for entrepreneurship development and linkage programmes (Adejimola and Olufunmilayo, 2009).
Tertiary institutions play an important role in developing an entrepreneurial society. They can instill in their students at graduate and post graduate level a sense of understanding of risks and rewards of business creation and its causes of failures. They can also play a role in developing entrepreneurial traits in students and provide the necessary support for entrepreneurs as well as providing legitimacy for their endeavours. As tertiary institutions' culture changes, it will become more important to understand students' entrepreneurial aspirations in order to achieve an institutional "fit" between higher education offerings and the needs of students. The totality of the experience that students gain at higher education is, and will be, influenced by many factors: the prior experiences they have had in education; their personal aspirations for the future; their expectations

concerning their life while at University; and how their experience at the University supports their future aspirations (Collins et al., 2004).

Owing to the fact that perceived desirability and feasibility are increased through participation in entrepreneurship education programmes in Universities (Peterman and Kennedy, 2003) and that centre for entrepreneurship development have been established in Nigerian Universities, the study examined the extent to which entrepreneurial perceptions and knowledge among graduates of Nigerian Universities is influenced by age, gender, course studied and ethnicity. Thus, the following research questions were raised and answered in the study.

1. Are the perceptions of graduates towards entrepreneurship the same across the age groups?
2. Are the perceptions of graduates towards entrepreneurship the same across gender?
3. Are the perceptions of graduates towards entrepreneurship the same across the various courses studied?
4. Are the perceptions of graduates towards entrepreneurship the same across the different ethnic groups?
5. Is knowledge of graduates on entrepreneurship the same across the age groups?
6. Is knowledge of graduates on entrepreneurship the same across gender?
7. Is knowledge of graduates on entrepreneurship the same across the various courses studied?
8. Is knowledge of graduates on entrepreneurship the same across the different ethnic groups?

II. LITERATURE REVIEW

Schiffmann (1990, as cited in Jones and George, 2008) defined perception as the process through which people select, organize and interpret what they see, hear, touch, smell and taste to give meaning and order to the world around them. Also, perception according to Rollinson (2008) is a mental process involving the selection, organization, structuring and interpretation of information in order to make inferences and give meaning to the information. Kruegar and Brazeal (1994, as cited in Brijlal, 2011) asserted that perceptions about entrepreneurship are extremely important and set the foundation for becoming an entrepreneur long before an individual actually makes the decision to become one. The supply of entrepreneurs can be strongly affected by creating a favorable entrepreneurial environment at an early stage that encourages positive and self-enabling perceptions of potential entrepreneurs. It is from this pool that the supply of entrepreneurs will eventually be drawn. Tertiary institutions can thus be seen as an environment that can prepare students by providing the necessary knowledge and skills to become entrepreneurs. Preparation is a key element for creating potential entrepreneurs because opportunities are seized by those who are prepared to seize them.

Education about entrepreneurship and for entrepreneurship according to Friedrich and Visser (2005) will increase students' interest in becoming entrepreneurs at some stage after graduation. Krueger and Brazeal (1994, as cited in Brijlal, 2011) depicted in their model of entrepreneurial potential that education improves the perceived feasibility for entrepreneurship by self-efficacy. It also improves the perceived desirability for entrepreneurship by showing students that this activity is highly regarded and socially accepted by the community and that it can be a personally rewarding work. These perceptions are vital to develop in students who believe that they will become self employed after graduation. Walstad and Kourilsky (1998) stated that students are also introduced to entrepreneurship through education on the grounds of careers. A vital dimension of socialization that contributes to entrepreneurial career is the education and training that the individual receives. Thus, students should be introduced to entrepreneurship as a career option and should be offered alternative perspective to their preconceived career orientation towards more traditional occupations.

Many contemporary studies have shown that the average entrepreneur is slightly more educated than the general population. This is the case in Nigeria and many other countries of the world including the United State of America. Research studies in Nigeria have shown that most entrepreneurs in the organized private sector are holders of any of the post secondary educational certificates (Okia-Anie, 1994; Eze, 1998, as cited in Ottih, 2011). It has also been found that 80% of the entrepreneurs in the manufacturing and wholesale businesses in Nigeria attended the University (Nwachukwu, 1990, as cited in Ottih, 2011).

Business ventures can be started at any age, most studies in Nigeria including that of Okia-Anine (1994), have shown that the modal age range for entrepreneuring is 30-35years. This is supported by studies carried out in the United States of America (Ottih, 2011). Further, literature abounds on studies that examined the relation between gender and perceptions towards starting a business or entrepreneurial behaviours (Walstad and Kourilsky, 1998; Delmar and Davidson, 2000; Brijlal, 2011), several studies have found that males have a higher performance for entrepreneurship behaviour than females (Delmar and Davidson, 2000; Brijlal 2011; Ottih, 2011).

Ethnicity is referred to as the grouping of people based on some shared characteristics such as national origin, language or culture (Jones and George, 2008). Studies have shown that ethnicity influences perceptions towards entrepreneurship (Brijlal, 2011; Ottih, 2011). Vesper (1980, cited in Ottih, 2011) noted that in Columbia, for example, the city of Medellin is noted for greater industry than Bogota, the capital, even though it has no apparent geographical advantages to favour it. In México, it is Monterrey and in Brazil, Sao Paulo, which carry similar industrial excellence. Similarly, Jews in Western industrial countries, Chinese in the pacific Islands, and Ibos in Nigeria have been people noted for exceptional entrepreneurial performance.

The greatest of human endowments are intelligence and entrepreneurship. Hence, today, greater reliance is placed on entrepreneurship all over the world for national development, technological innovations, and expanded employment opportunities, than was the case earlier (Ottih, 2011). Due to the decline in jobs and the rise in the number of youths unemployed (Awogbenle and Iwuamadi, 2010), students are increasingly recognizing that in the current economic climate most jobs are rarely "for life". The world of employment is changing as permanence and longevity are no longer significant features of career paths; traditional paths have disappeared (Fallows and Steven, 2000).

III. RESEARCH METHODOLOGY

The sample size for the study is made up of 307 graduates. These graduates were selected from the population of 1,320 graduates of Nigerian Universities who were in Benue State in February, 2012 for the one year National Youth Service. Purposive sampling technique was used to ensure that the sample obtained has equal number of graduates in each age groups, equal number of male and female graduates, at least equal number per courses studied and ethnic groups. Data for the study were collected using questionnaire. The questionnaire is made up of three sections - the demographics, perceptions towards entrepreneurship and knowledge of entrepreneurship. Of the 307 questionnaire that were sent out, 13 were discarded because of missing data, leaving 294 usable questionnaire for a response rate of 96%.

The age groups (in years) used for the study are; 20-22, 23-25, 26-28 and 29-31. Ethnic affiliation was measured in terms of the six geo-political zones; South-South (SS), South-East (SE), North-Central (NC), North-East (NE), North-West (NW) and South-West (SW), while courses studied were grouped as: Education (EDU), Engineering/Technology (ENG/TECH), Social Sciences (SSC), Management Sciences (MSC), Arts, Law, Health Sciences (HSC), Natural Sciences (NSC) and Environmental Sciences (ESC).

Perceptions was measured using seven statements on an ordinal scale of agree, undecided and disagree. Test of reliability for perceptions toward entrepreneurship by Cronbach's alpha yielded 0.791. Knowledge was measured using nine items in the questionnaire on a norminal scale of multiple choice questions. The test of reliability for the graduates' Knowledge on entrepreneurship reported by Cronbach's alpha is 0.802. The questionnaire was validated by an expert in entrepreneurship studies and a statistician. The data for the study were tested using univariate analysis (frequencies and percentages and bivariate analysis (cross-tabulation).

IV. RESULTS AND DISCUSSION

Graduates' Entrepreneurial Perceptions across Age Groups Gender, Courses Studied and Ethnic Groups

The graduates' perceptions towards entrepreneurship were assessed on the basis of seven statements. Table 1 describes the issues covered by these questions and gives the percentage of the agree responses for each of the statements across the various age groups, gender, courses studied and ethnic groups. Table 1 reveals that the graduates' perception towards entrepreneurship varied in each of the age groups with minority (35%) of the graduate aged 20-22 years and majority (68%) aged 29-31 years. This shows that the desire to be ones own boss increased with increase in age. This result is in line with the findings of previous studies. Ottih (2011) noted that most studies in Nigeria and in the United States of America have found that the modal age range for entrepreneuring is 30-35 years.

Table 1: Entrepreneurial perceptions across age groups

Statements	Age groups (in years)			
	20-22(%)	23-25(%)	26-28(%)	29-31(%)
Can create something different with value	48	66	84	96
Can manage financial, psychological and social risks	38	62	77	93
Wants personal satisfaction/independence that accrues from self employment	34	52	67	95
Have the requisite technical, managerial, leadership and personal entrepreneurial skills	25	38	40	45
Have role model(s) that have started a business(es)	79	89	93	96
Can easily access start-up capital	0	8	12	14
Wants to start a business	18	20	24	35
Mean%	**35**	**48**	**57**	**68**

Table 2 shows that the male graduates indicated more interest in entrepreneurship than their female counterparts. This is revealed through their responses to the 7 items as 62% of the male graduates as against 50% of their female counterparts agreed to the 7 statements. This result is in tandem with previous studies. Ottih (2011) stated that studies in Nigeria and in the United States of America have shown that most entrepreneurs are men. In Nigeria, this is not unconnected to the "house wife"/traditional role of most women, a practice which have made them dependent on their husbands. Thus, only very few women have become successful entrepreneurs.

Table 2: Entrepreneurial perceptions across gender

Statements	Gender	
	Males (%)	Females (%)
Can create something different with value	84	75
Can manage financial, psychological and social risks	74	62

Wants personal satisfaction/independence that accrues from self employment	96	79
Have the requisite technical, managerial, leadership and personal entrepreneurial skills	39	31
Have role model(s) that have started a business(es)	81	74
Can easily access start-up capital	24	10
Wants to start a business	33	22
Mean %	**62**	**50**

The study investigated whether there are differences in entrepreneurial perceptions across the courses studied. Tables 3 shows that graduates who studied Engineering/Technology (ENG/TECH) and Health Sciences (HSC) courses (with each scoring 66%) seems to be the most interested in entrepreneurship, this is followed by graduates who studied ESC (62%), EDU (61%), SSC, Arts and Law (with 59% each), and MSC and NSC (with 58%) courses. Thus, the graduates' entrepreneurial perceptions are not the same across the courses studied. These differences in entrepreneurial perceptions can be attributed to the varying level of skills the courses studied has exposed the graduates to and how well the graduates learnt the skills and the ease/value of the practicality of the skills in the society. This opinion is in line with the assertion of Niyonkuru (2005, as cited in Brijlal, 2011) in the 2004 European Commission Report. Niyonkuru remarked that education is an important means to create a more entrepreneurial mindset among young people. This report underscores that promoting entrepreneurial skill and perceptions provides benefits to the society even beyond their application to new business ventures. It has been documented that most new jobs which arise from entrepreneurial small firms provides huge benefits to the society.

Table 3: Entrepreneurial perceptions across courses studied

	Courses Studied								
Statements	**EDU (%)**	**ENG/ TECH(%)**	**SSC (%)**	**MSC (%)**	**ARTS (%)**	**LAW (%)**	**HSC (%)**	**NSC (%)**	**ESC (%)**
Can create something different with value	74	93	80	73	80	79	89	84	86
Can manage financial, psychological and social risks	77	89	79	89	76	74	88	79	77
Wants personal satisfaction/independence that accrues from self employment	89	93	74	73	77	75	93	82	84
Have the requisite technical, managerial, leadership and personal entrepreneurial skills	22	16	18	19	19	20	16	13	15
Have role model(s) that have started a business(es)	90	95	93	89	93	93	93	90	92
Can easily access start-up capital	18	13	14	12	16	18	22	19	20
Wants to start a business	55	63	52	53	52	53	62	56	57
Mean %	**61**	**66**	**59**	**58**	**59**	**59**	**66**	**58**	**62**

The study further investigated whether there are differences in entrepreneurial perceptions among the graduates with respects to their ethnic groups. Using the six geo-political zones as ethnic groups, Table 4 shows that entrepreneurial interest and willingness is highest (76%) among graduates from the South-East (SE) and lowest (54%) among graduates from the North-Central (NC). This result is in line with the result of previous studies. Brijlal (2011) found that there are significant differences among the different races in South-Africa- African, followed by the Coloured, White and Indians. The greatest difference was among the Africans, followed by the Coloured, Indians and Whites. In addition, Vesper (1980, as cited in Ottih, 2011) affirmed the differences in entrepreneurial perceptions among Nigerians. Vesper asserted that the Ibos of South-Eastern Nigeria have been people noted for exceptional entrepreneurial performance.

Table 4: Entrepreneurial perceptions across ethnic groups

	Ethnic Groups					
Statements	**SS(%)**	**SE(%)**	**SW(%)**	**NW(%)**	**NE(%)**	**NC(%)**
Can create something different with value	85	93	88	68	59	66
Can manage financial, psychological and social risks	86	93	90	79	59	82
Wants personal satisfaction/independence that accrues from self employment	82	90	88	71	79	74

Have the requisite technical, managerial, leadership and personal entrepreneurial skills	45	65	50	30	37	28
Have role model(s) that started a business(es)	92	93	93	81	84	77
Can easily access start-up capital	24	32	28	20	18	10
Wants to start a business	56	63	59	46	51	44
Mean %	**67**	**76**	**71**	**56**	**55**	**54**

Moreso, Tables 1, 2, 3 and 4 further reveals that three statements shows the lowest percentage of frequencies - requisite technical, managerial, leadership and personal entrepreneurial skills, access to start-up capital, and the willingness to start ones own business. This further points to the over theoretical nature of courses in Nigerian Universities, difficulties in accessing bank loans for entrepreneurship and the poverty level which has grossly affected our propensity to save. Hence, even the most skillful graduates find it difficult to start up their own businesses. Ottih (2011) noted that entrepreneurship education has become a reality in our Universities. However, to translate the entrepreneurial perceptions to real businesses, there are basic skills that the budding entrepreneurs must possess so as to successfully start and manage their businesses. Without these skills, the entrepreneur will face great difficulties. These skills are classified into technical skills, business management, leadership skills and personal entrepreneurial skills. The easier to teach skills are the technical, leadership and the business management skills. The personal entrepreneurial oriented skills like imagination, persistence, innovativeness, risk taking, courage and optimism are a lot more difficult to teach but can be acquired with a longer period of training.

Graduates' Entrepreneurial Knowledge across Age Groups, Gender, Courses Studied and Ethnic Groups

The graduates were tested on basic entrepreneurship knowledge. The basic entrepreneurship knowledge was assessed using multiple choice questions. Table 5 describes the topics covered by these questions and gives the percentage – of correct responses for each question across the various age groups, gender, courses studied and ethnic groups. Table 5 shows that there are differences among the age groups with 62% of the graduates aged 20-22 years being the least performer, while 72% of the graduates aged 29-31 years had the best performance. This implies that entrepreneurial knowledge increases with increase in age. There is also difference in entrepreneurship knowledge between the male and female graduates, with the female graduates scoring 57% and the male graduates 56%. More so, the female graduates scored higher than their male counterparts in business opportunities, business plans, financial controls and marketing strategies (Table 6). The consequences of this result has been substantiated by Cohen (1995, as cited in Chell and Baines, 1998). Cohen asserted that women are defined as innovators because they are breaking out of domains traditionally allocated to women and creating new ventures that are using enhanced skills to offer better products/services and by extension revealing excellent performances than some male entrepreneurs.

Table 5: Entrepreneurial knowledge across age groups

	Age groups (in years)			
Entrepreneurial knowledge	**20-22(%)**	**23-25(%)**	**26-28(%)**	**29-31(%)**
Definition	79	71	66	75
Business opportunities	71	66	82	85
Forms of enterprises	66	75	79	82
Sources of finance	25	36	38	37
Business plan	58	62	66	78
Success and failure factors	82	85	79	85
Financial controls	28	36	28	32
Marketing strategies	85	82	89	93
Production activities	66	71	75	79
Mean %	**62**	**65**	**67**	**72**

Table 6: Entrepreneurial knowledge across gender

Entrepreneurial knowledge	**Gender**	
	Males (%)	**Females (%)**
Definition	55	52
Business opportunities	75	79

Forms of enterprises	85	82
Sources of finance	32	28
Business plan	38	44
Success and failure factors	34	34
Financial controls	32	38
Marketing strategies	68	77
Production activities	82	75
Mean %	**56**	**57**

Furthermore, Table 7 shows that graduates who studied MSC courses scored 66%, followed by SSC (61%), ENG/TECH (56%), Arts (55%), Law (52%), EDU (50%), NSC (49%), HSC (48%) and ESC (47%). It can thus be inferred that MSC graduates are the best performers, while those who studied HSC (48%) courses are the least performers. The best performer position of the graduates of MSC courses can be attributed to the fact that aside the compulsory entrepreneurship courses that are anchored by the Centers for Entrepreneurship Development (CED) in the Universities, the graduates of MSC courses offered entrepreneurship as a faculty course, while graduates of Business Administration also offered entrepreneurship as a core departmental course.

Table 7: Entrepreneurial knowledge across courses studied

	Courses Studied								
Entrepreneurial knowledge	**EDU (%)**	**ENG/ TECH(%)**	**SSC (%)**	**MSC (%)**	**ARTS (%)**	**LAW (%)**	**HSC (%)**	**NSC (%)**	**ESC (%)**
Definition	58	60	66	71	63	58	58	55	56`
Business opportunities	55	71	77	79	68	71	55	52	52
Forms of enterprises	55	61	68	77	66	58	60	55	58
Sources of finance	32	46	54	59	54	46	32	28	32
Business plan	48	55	58	66	55	52	48	41	44
Success and failure factors	52	55	66	71	52	55	55	52	49
Financial controls	35	41	40	46	35	28	18	14	32
Marketing strategies	52	38	55	61	48	44	44	44	48
Production activities	66	79	61	67	55	58	58	55	55
Mean %	**50**	**56**	**61**	**66**	**55**	**52**	**48**	**49**	**47**

Table 8: Entrepreneurial knowledge across ethnic groups

	Ethnic Groups					
Statements	**SS(%)**	**SE(%)**	**SW(%)**	**NW(%)**	**NE(%)**	**NC(%)**
Definition	79	82	85	84	75	66
Business opportunities	66	89	79	75	68	68
Forms of enterprises	85	89	85	85	82	82
Sources of finance	36	45	45	41	38	38
Business plan	75	68	75	71	66	66
Success and failure factors	55	82	62	62	55	52
Financial controls	41	41	38	36	32	25
Marketing strategies	66	75	71	68	66	66
Production activities	66	55	71	68	66	66
Mean %	**63**	**70**	**68**	**66**	**61**	**50**

The study assessed entrepreneurial knowledge among the graduates across their ethnic groups. The result in Table 8 reveals that graduates from SE (70%) had the highest scores, followed by graduates from SW (68%), NW (66%), SS (63%), NE (61%) and NC (50%). However, there are significant differences in two questions; the question based on the sources of finance and that based on financial controls. These differences are also observed in entrepreneurial knowledge across age groups (Table 5), gender (Table 6) and courses studied (Table 7). The low scores in financial controls can be attributed to the poor exposure of the graduates to the fundamentals of accounting and finance, while for sources of financial, where borrowing from banks is the most common option, the low scores can be linked to the wide spread poverty in Nigeria. This further connotes that most graduates believe that since they have no savings and no hope of getting financial assistance from friends and family members, bank loans remains the major, if not, the only source of finance. Consequently, with the numerous bottle necks in

accessing bank loans, only very few graduates who are able to secure the loans eventually start new ventures. Similarly, Galloway and Brown (2005) concluded at the end of their study that the most important reasons why the rates of immediate graduate entrepreneurship has remained low are; inability of graduates to secure loans on account of no collateral, lack of industrial experience and other personal priorities.

V. CONCLUSION

The findings of the study reveals that perceptions towards entrepreneurship among graduates of Nigerian Universities varied across age groups, gender, courses studied and ethnic groups. Majority (68%) of the graduates aged 29-31 years showed the best interest towards entrepreneurship. Male graduates were more interested to start their own entrepreneurship than their female counterparts. Graduates who studied Engineering/Technology and Health Sciences courses seems to be more willing to start their own business, while graduates from South-East Nigeria had the highest scores of 76% on entrepreneurial perceptions.

On entrepreneurship knowledge, the results of the study shows that the level of entrepreneurial knowledge across the age groups, gender, courses studied and ethic groups were not the same. This is evident from the fact that the graduates aged 29-31 years had the best entrepreneurial knowledge, female graduates scored the highest in entrepreneurial knowledge, graduates of courses in the management sciences had the best scores in entrepreneurial knowledge, while graduates from the South-East out performed graduates from other ethnic groups. In addition, it was found that there are significant differences in questions on entrepreneurial perceptions and knowledge. These questions are requisite technical, managerial, leadership and personal entrepreneurial skills; ease of accessing start-up capital; and willingness to start a business. Similarly, for entrepreneurial knowledge, there are abysmal scores in sources of finance and financial controls questions.

VI. RECOMMENDATIONS

Based on the findings of the study, the following are recommended:

1. An institutional framework should be put in place to assist older graduates with high entrepreneurial perceptions and knowledge to start their own businesses, while younger graduates with low achievement motivation should be helped to secure jobs in organizations of their choice.

2. The Center of Entrepreneurship Development (CED) in the Nigerian Universities should be reinvented so as to introduce programmes that will ensure that the entrepreneurial perceptions and knowledge gaps between the male and female graduates are bridged. Also, such redesign and assistance will enable the CEDs focus on exposing the undergraduates to more practicals that will enhance the development of high achievement motivation, technical skills, entrepreneurial leadership skills, managerial skills and personal entrepreneurial skills among University graduates.

3. All programmes aimed at helping undergraduates acquire technical skills, managerial skills and personal entrepreneurial skills across the faculties should be integrated. This is to ensure that as far as possible, the graduates are armed with the requisite entrepreneurial skills. Hence, reducing the gap in entrepreneurial perceptions and knowledge across graduates of various courses.

4. To bridge the gap in entrepreneurial perceptions and knowledge between graduates from South-East and other ethnic groups, efforts should be geared towards exposing the students from other ethnic groups to more entrepreneurial trainings from as early as the primary school.

5. Since finance is the life wire of any entrepreneurship, a financial institution that is saddled with the responsibilities of providing loans, managerial and technical supports to budding entrepreneurs should be established so as to increase entrepreneurial motivation and by extension reduce the new venture creation aparthy among University graduates.

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Entrepreneurial Learning: A Social and Experiential Method of Entrepreneurship Development among Indigenous Female Entrepreneurs in Anambra State, Nigeria

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Abstract- The indigenous people of Iboland and Anambra State in particular are known for entrepreneurial learning and success. However, the role of entrepreneurial learning in the development of indigenous female entrepreneurs is still under researched. Thus, this study sought to explore the roles of entrepreneurial learning in the development of indigenous female entrepreneurs in Anambra State. Data for the study was obtained through in-depth interview involving 30 indigenous female entrepreneurs that were selected using purposive and criterion sampling techniques. We found that both positive and negative factors influenced their choice of entrepreneurial career. The respondents recognized opportunities, got information on entrepreneurial network and network providers from neighbours, friends, movies, husbands and through social interaction. Furthermore, the respondents: developed different capabilities in the course of their social and experiential learning period; measured success as business growth, helping themselves and others from the benefits of the business; reported being motivated to learn their chosen vocation for the purpose of gaining practical skills and experience; and identified the challenges of entrepreneurial learning and entrepreneuring as financial constraint, home-front responsibilities and sexual mores of men towards them. Thus, we recommend the establishment of centers for entrepreneurial learning for women and the provision of interest free loans for the graduants.

Index Terms- Anambra State, entrepreneurial learning, social interaction, experiential learning and indigenous female entrepreneurs

I. INTRODUCTION

People are born male or female, grow up to become boy or girl and take up roles as man or woman (Folorunsho, 2009, as cited in Ukonu and Tafamel, 2011). Many girls have been made to believe that their "being" when they eventually become women will be mortgaged to traditional culture, while their "becoming" will be mortgaged to the wishes of their husbands/family members. They are considered as weaker sex and always made to depend on men within and outside their families. Thus, making them the most underutilized resource (Goyal and Parkash, 2011; Kumari, 2012). However, women are beginning to come out of the role traditionally assigned them to show case their creativity and entrepreneurship. More so, many women are becoming more educated and the idea that a women should stay at home, baby sit, cook, go to the market, take care of the children and the home is no longer current (Ukonu and Tafamel, 2011). Entrepreneurship is becoming an increasingly important source of employment for women across countries. Women entrepreneurial activity has been the key contributor to economic growth in a number of countries, especially in emerging markets (Allen et al., 2007; Bosma et al., 2008).

Nigerian women like their counterparts in other parts of the world are natural entrepreneurs and presently they dominate the informal business sector in the country. More than ever before, these women are the driving force behind small businesses and local economies (Nwoye, 2007). Women (female) entrepreneurship is a rapidly growing phenomenon in many developing countries (Parvin et al., 2012). However, as an area of study, it is still under researched (Carter and Marlow, 2007). Entrepreneurial learning is one of such areas. Kumari (2012) noted that the process of becoming an entrepreneur involves learning, unlearning and relearning many things relating to the roles, tasks, functions, responsibilities and problems of entrepreneurs.

Indigenous people or societies are found in every inhabited climatic zone and continent and are embracing entreenurship along with the rest of the world (Peredo et al., 2004, as cited in Frederick and Foley, 2006). The indigenous people of Iboland and Anambra state in particular are known for entrepreneurial learning and by extension entrepreneurial success. Thus, owning to the relative lack of time on the part of indigenous female entrepreneurs occasioned by their workload and multiple roles as noted by Nwoye (2007) and the fact that women entrepreneurial activities have a positive social effect on the women and their social environment (Ukonu and Tafamel, 2011), this study seeks to explore the roles of entrepreneurial learning in the development of indigenous female entrepreneurs and entrepreneurships in Anambra State, Nigeria. The study also examines the challenges faced by the indigenous entrepreneurs in entrepreneurial learning, new venture creation and management.

Objectives of the Study

1. To identify the factors that influenced their choice of entrepreneurial career.

2. To examine the sources of information on entrepreneurial networks and entrepreneurial network providers.
3. To identify the entrepreneurial capabilities of the indigenous female entrepreneurs.
4. To determine how the indigenous female entrepreneurs measure success.
5. To identify the factors that motivated them to go into entrepreneurial learning, and the challenges of entrepreneurial learning and entrepreneuring.

II. LITERATURE REVIEW

Entrepreneurship Development

Entrepreneurship development is the process of actualizing an innovative intention by an individual or group of individuals in either a new or old enterprise through networking to acquire the requisite capabilities that will enhance the success of the venture in the face of environmental uncertainties (Agbim and Oriarewo, 2012). It is evident from the Agbim and Oriarewo definition that entrepreneurship has four dimensions: entrepreneurial intention; entrepreneurial networking; entrepreneurial capabilities; and entrepreneurial success. Also, according to Agbim and Oriarewo (2011) entrepreneurship is comprised of the entrepreneur, entrepreneuring and the enterprise. The entrepreneur is the individual or group of individuals who combine resources based on new ideas so as to add value to a new/existing product and/or add innovation in services rendered. Entrepreneuring is the entrepreneurial process in entrepreneurship development, while the enterprise is the outfit through which the products/services are delivered to the society.

Indigenous female (or women) entrepreneurs are female indigenous of a defined geographical area who owns or who has started and manages a business enterprise or organization within the same geographical area, while indigenous female entrepreneurship is a business venture or organization that is owned or started and managed within a defined geographical area by a female indigene or a group of female indigenes of the same geographical area (Agbim and Oriarewo, 2011).

Entrepreneurial intention is the first step in new business formation (Lee and Wong, 2004); it is typically considered to be formed by a person's attitude toward entrepreneurship, the prevailing social norms attached to entrepreneurship, and the person's level of self-efficacy. Self-efficacy is a person's cognitive estimate of his/her capabilities to mobilize the motivation, cognitive resources and courses of action needed to exercise control over events in his/her life (Bandura, 1986). A person's intention to become an entrepreneur offers the best predictor of the person actually engaging in entrepreneurship in the future (Delmar and Davidsson, 2000). Thus, entrepreneurial intention is a conscious state of mind that directs attention (and therefore experience and action) toward a specific object (goal) or pathway to achieve it (Bird, 1989).

Networking, generally, enables people to get the right information, shrink operational expenditures by permitting the organization of actions and makes possible combined decision-making (Grootaert and Van Bastelaer, 2001). In addition, the would-be or nascent/budding entrepreneur according to Hellman and Puri (2002) is exposed to finance and experienced workforce that ensure entrepreneurship development and sustenance through networking. Entrepreneurial networks therefore create a relationship between the would-be entrepreneurs and the networks of their desired line of business at the start-up (Zhao and Aram, 1995). When the entrepreneurial networks of entrepreneurs begin to contribute to their entrepreneurial goals, these social contacts becomes their social capital (Burt, 1992). It has been established that persons with entrepreneurial intentions and who are exposed to various skills through entrepreneurial networking can gain access to useful information and even finance from the existing sources (Johannisson, 2000) and take measures to develop their entrepreneurial capabilities and by extension their own businesses (Tian, et al., 2009; Hunjra et al., 2011; Agbim and Oriarewo, 2012).

Entrepreneurial capability is developed by means of a specific and identifiable process (Treece et al., 1997). Golden and Powell (2000) described entrepreneurial capability as the flexibility to alterations. Ravichandran and Lertwongsatein (2005) further asserted that flexibility facilitates individuals and companies to swiftly and efficiently use state of the art technologies to constantly maintain existing businesses. Additionally, strategic flexibility is a type of vibrant entrepreneurial capability, which assists a person or a firm identify and grab opportunities (Herreld et al., 2007).

There are four entrepreneurial capabilities that are intertwined with the environment: (1) technological skills. These skills have been viewed in different ways in literature. But, majorly, it has been described by Hisrich (1992) as writing, oral communication, technology, interpersonal, listening, organizing ability, network building, coaching, team work and environmental monitoring skills; (2) Management skills. It connotes planning, organizing, leading and coordination skills (Agbim, 2013); (3) personal entrepreneurial skills. Hisrich (1992) described personal entrepreneurial skills as inner control/discipline, risk taking, innovativeness, change orientation, persistence, imagination, drive, flexibility, competitiveness, optimism and courage; (4) Entrepreneurial leadership skills. These are skills needed to gain competitive advantage through value creation that is based on newly discovered opportunities and strategies (Schulz and Hofer, 1999).

The proper utilization of these opportunities gives rise to entrepreneurial success. Entrepreneurial success implies positively affecting the lives of others and making a living through a well managed innovative product and/or service (Agbim and Oriarewo, 2012). Entrepreneurial success has also been viewed as: starting and achieving some benefits from a business; adding value to employees, customers and the larger community; doing something you love; finding meaning and purpose in work; and helping others (Maxwell, 2003; Kauanui et al., 2009, as cited in Agbim et al., 2013).

Entrepreneurial Learning

Some scholars believe that entrepreneurial learning occurs through experiencing different challenging events such as recognizing the opportunities, coping with problems, and performing different roles of an entrepreneur (Minniti and Bygrave, 2001; Erikson, 2003; Politis, 2005; Cope, 2005; Pittaway and Cope, 2007). In this sense learning is an indispensible reaction to new venture dynamics of change and a

central element of success (or failure) in start-up situation (Fayolle and Gailly, 2008). Rae (2006) explained learning as an integral part of entrepreneurial process in which human and social factors are as important as the economic factors.

Entrepreneurial learning is widely understood as how people acquire knowledge and enact new behaviours in the process of recognizing and acting on opportunities and of organizing and managing ventures (Maples and Webster, 1980; Rae and Carswell, 2000). Most of the learning that takes place within an entrepreneurial context are experiential in nature (Deakins and Freel, 1998; Sullivan, 2000; Minniti and Bygrave, 2001; Sarasvathy, 2001). Entrepreneurial learning has also be defined as a dynamic and constant process of acquiring, assimilating and organizing the new information and knowledge with pre- existing structures (Rae and Carwell, 2000; Minniti and Bygrave, 2001; Cope, 2005; Harrison and Leitch, 2005). Rae (2006) defined entrepreneurial learning as a dynamic process awareness, reflection, association and application that involves transforming experiences and knowledge into functional learning outcomes. It is therefore evident that the commonest feature of the definitions of entrepreneurial learning is experience.

Experiential Learning and Entrepreneurship Development

Many scholars believe that there is no other way to learn entrepreneurship than personal experience (Henry et al., 2005). This is because experience helps one to generate new meaning which consequently leads to change in thinking and behaviour (Fayolle and Gailly, 2008). More so, experience inspires the choice of entrepreneurship as a future career path, and enables one to face the challenges of new venture creation, growth and success (Matlay, 2005; 2006; Smith et al., 2006). Experience also develops ones entrepreneurial self-efficacy, that is, the strong belief and desire to successfully perform the roles and task of an entrepreneur (Peterman and Kennedy, 2003; Zhao et al., 2005).

Additionally, Erikson (2003) highlights experience as an influential factor in developing entrepreneurial self-efficacy. Erikson further noted that entrepreneurial self-efficacy develops through the journey from being completely inexperienced to becoming completely experienced. MacMillan and McGath (2000) asserted that entrepreneurial mindset can be developed through experience rather than the traditional methods of entrepreneurship education. Experiential methods of learning entrepreneurship enhance the acceptance and demands of students for entrepreneurship programs and thus, students can acquire entrepreneurial skills better through experiential methods (Plaschka and Welsch, 1990). Positive and pleasant experiences with entrepreneurship programs increase students' desire to become entrepreneurs as well as to highly engage in entrepreneurial activities which develops their entrepreneurial capacities (Fiet, 2000; Peterman and Kennedy, 2003). Harris and Gibson (2008) argued that high involvement in experiential activities can better enable students to develop entrepreneurial skills, reach their entrepreneurial potentials and achieve entrepreneurial success.

Social Learning and Entrepreneurship Development

Social interaction is crucial in the whole process of entrepreneurial learning. However, little attention has been directed to it as an interactive aspect of entrepreneurship development (Man and Yu, 2007; Pittaway and Cope, 2007). Entrepreneurial learning occurs in a process of personal interaction with the environment (Rae, 2000, 2007; Cope, 2005) aiming at discovering, evaluating and exploiting opportunities (Shook et al., 2003; Corbett, 2005, Heinonen and Poikkijoki, 2006). Social interactions shape and develop the entrepreneurial perceptions, attitude and abilities (Rae and Carswell, 2000) particularly entrepreneurial leadership (Dess et al., 2003; Holt et al., 2007) of the student (or trainee). Social interactions helps students to become aware of their weaknesses, improve their strengths, become mature in networking and communication skills, share and challenge their different insights and reasoning process, discover weak points on their reasoning and the ways to improve them, correct one another, and adjust their understanding on the basis of others' understanding. More importantly, social interactions help the students to apply the acquired knowledge and skills to solve the problems (Fuchs et al., 2008). Social interactive learning enhances creativity and innovativeness which are the core components of the whole entrepreneurship process (Rae, 2006; Ko and Butler, 2007). Thus, by being involved in various entrepreneurial roles and activities, entrepreneurial leaders learn social interactions through the socialization process (Surie and Ashley, 2008).

Entrepreneurship development programmes provide opportunities for: students' (or trainees') social interactions (Peterman and Kennedy, 2003) which develop their entrepreneurial leadership skill (Vecchio, 2003); social interaction with the teachers and peers in groups which is critical for entrepreneurial learning process and improves students' affection on entrepreneurial activities as well as their perceived level of entrepreneurial competencies (Man and Yu, 2007); students (or trainees) to access groups of entrepreneurially minded students and research findings; students to be exposed to other entrepreneurs, investors and lecturers on occasions such as training, club meeting and business dealing where they have the chance to observe and learn from successful models (Zhao et al., 2005; Soutaris et al., 2007); social experience through which students exercise significant responsibilities which affect their desire to step into entrepreneurship (Peterman and Kennedy, 2003). Entrepreneurial learning occurs through social interactions rather than through written word of formal instructions (Collins and Robertson 2003).

III. RESEARCH METHODOLOGY

The study employed a qualitative research design to explore the contributions of the social and experiential learning components of entrepreneurial learning in the development of indigenous female entrepreneurs in Anambra State. One of the defining characteristics of qualitative method is that it is firmly located in the "contest of discovery" rather than the "context of justification" (Guba and Lincoln, 1994; Schowandt, 1994). Also, in contrast to quantitative method, qualitative research is inherently inductive rather than being deductive (Deshpande, 1983).

Interview is one of the main methods used to understand entrepreneur's behaviour (Patton, 1990; Fabowale et al., 1995). Creswell (2003) asserted that researchers mainly resort to interview when so much has not been written about a topic or the

population being studied. Thus, researchers seek to listen to participants so as to build an understanding based on their ideas. Based on the foregoing, interview method was adopted to gain insight into the experience of 30 indigenous female entrepreneurs in Anambra State.

To select the respondents, the study adopted purposive and criterion sampling techniques (Patton, 1990; Asika, 1991). Purposive sampling technique was employed to identify indigenous female entrepreneurs, while criterion sampling technique was employed to select 10 respondents each from Nnewi, Onitsha and Awka towns in Anambra State, Nigeria. The criteria for the selection are: that she learnt the business from a network provider for a period of time; that the establishment of the business was independently done by the respondents or together with another entrepreneur; that she is actively involved in the management of the venture; and that the business must have been in existence for more than five years. The interviews were conducted in English and each interview began with a brief explanation of the objectives of the study. Questions were asked concerning the respondents' profile; career story (before and after creating their ventures); factors that made them choose entrepreneurial learning as a method of entrepreneurship development; sources of entrepreneurial information; entrepreneurial capabilities acquired; their definition of entrepreneurial success; and the challenges of entrepreneurial learning and entrpereneuring. Pseudonyms are used to protect the identity of the entrepreneurs, while the audio-recorded data were transcribed after the interviews.

IV. FINDINGS AND DISCUSSION

Profile of Respondents

Table 1 presents a breakdown of the profile of the respondents. The ages of the respondents ranged from 27 to 56. One of the respondents have no educational qualification, while for those who have, their highest and lowest educational qualifications are master degree and First School Leaving Certificate (FSLC) respectively. Twelve (12) of them are married with children, 8 are married but with only one child, 5 are widows with children and 5 are single. Concerning the type of business they are running, 3 of them are fashion designers, 3 are event managers, 4 are traders, 3 are into sachet water production, one operates a restaurant, 3 own daycare/school, 2 operate dispensary clinic, 3 are artist, 3 operate business centers, one operate a beauty saloon, 2 own a printing and publishing press and 2 run a confectionary business. Eleven of the businesses are copreneurships, while 19 are solepreneurships. The women have entrepreneurial experiences that ranged from 6 to 15 years.

Table 1: Profile of Respondents

S/No	Name	Age (in yrs)	Highest Edu. Qualification	Marital Status	Type of Business	Ownership Structure	Entrepreneurial Experience (in yrs)
1.	Chinwe	34	B.Ed	Married; have children	Fashion designer	Copreneurship	6
2.	Ego	42	MBA	Married; has a child	Event manager	Copreneurship	12
3.	Ify	31	NCE	Single	Retail outlet	Solepreneurship	7
4.	Ngozi	46	SSCE	Widow; have children	Sachet water production	Solepreneurship	8
5.	Chikwado	29	B.Sc.	Single	Retail outlet	Solepreneurship	6
6.	Chika	27	HND	Single	Retail outlet	Solepreneurship	6
7.	Chiugo	53	M.Ed	Married; have children	Daycare/school	Copreneurship	15
8.	Ugonna	45	None	Married; have children	Retail outlet	Solepreneurship	9
9.	Oge	35	NCE	Married; has a child	Fashion designer	Copreneurship	7
10.	Amaka	56	M.Sc.	Married; have children	Dispensary clinic	Copreneurship	10
11.	Ozioma	38	HND	Married; has a child	Artist	Solepreneurship	11
12.	Chinenye	40	SSCE	Widow; have children	Business center	Solepreneurship	9
13.	Oluchi	38	B.Sc.	Married; has a child	Sachet water production	Copreneurship	8
14.	Udoka	34	B.Sc.	Married; has a child	Dispensary clinic	Copreneurship	6
15.	Ujunwa	46	MBA	Married; have children	Event manager	Solepreneurship	12
16.	Ifeoma	30	OND	Single	Business center	Solepreneurship	6
17.	Oby	33	MPA	Married; has a child	Beauty saloon	Solepreneurship	6
18.	Chizoba	52	M.Ed	Widow; have children	Daycare/school	Copreneurship	11
19.	Odinaka	48	HND	Widow; have children	Printing and publishing	Copereneurship	8
20.	Nkiru	42	B.Sc.	Married; have children	Confectionary	Solepreneurship	7
21.	Chinyere	37	OND	Married; have children	Artist	Solepreneurship	8
22.	Nnenne	34	B.Ed.	Married; has a child	Restaurant	Solepreneurship	7
23.	Uche	55	SSCE	Widow; have children	Sachet water production	Copereneurship	12
24.	Ebele	41	MPA	Married; has a child	Daycare/school	Solepreneurship	8
25.	Adaobi	32	MBA	Married; have children	Event manager	Copreneurship	6
26.	Ifunaya	51	FSLC	Married; have children	Fashion designer	Solepreneurship	12
27	Adaeze	29	B.Sc.	Single	Artist	Solepreneurship	6
28.	Nkem	32	NCE	Married; have children	Business center	Solepreneurship	6
29.	Ekene	43	HND	Married; have children	Printing and publishing	Solepreneurship	7
30.	Ihuoma	48	SSCE	Married; have children	Confectionary	Solepreneurship	10

Factors that Influence the Choice of Entrepreneurial Career

Katz (1992) defined employment status choice intentions as the vocational decision process in terms of the person's decision to enter an occupation as a salaried or self-employed person. Kolvereid (1996) asserted that the greater the person's perceived behavioural control, the stronger the person's intention to become elf-employed. The perceived behavioural control which is one of the factors of self-efficacy will in-turn correspond to perceived feasibility. According to Agbim and Oriarewo (2011) the motivating force that drive women to desire to be self-employed can arise from positive or negative conditions. Owing to women's traditional household responsibilities such as provision of food, clothing, education and health care support, women according to GEM (2010) engage in entrepreneurial activities out of the necessity to meet these responsibilities to both dependent immediate and extended family members. This is evident from the comments of the following indigenous entrepreneurs:

Chinenye stated that:

The financial constraint I experienced owing to the sickness and subsequent death of my husband motivated me to search-out a business I could do so as to make some money to take care of myself, my children and other dependants.

Ekene stated that:

By the grace of God I married a well-to-do young man. After our wedding, I pleaded with him to establish a printing press for me and he agreed. Also, naturally I had always desired to be independent. So, my husband's promise to support me stirred up an entrepreneurial consciousness in me.

Adaeze stated that:

I started my artistry work when I could not secure a salaried job in both the public and private organizations.

Chinwe stated that:

My creativity in fashion designing drove me into setting up a fashion designing business with my friend.

Ugonna stated that:

I have no formal education. However, when I discovered that I could still do well in trading, I ventured into retail business.

Sources of Information on Entrepreneurial Networks and Entrepreneurial Network Providers

Researches undertaken on the learning pattern of female entrepreneurs in disciplines like sociology, management, education and psychology have identified female entrepreneurs as self-directed learners (Wells, 1998) who learn from challenges and problem solving (Well, 1998; Coyle, 2003) and frequently focus their learning on an in-the-moment information need (Wells, 1998; Fenwick and Hutton, 2000). These conceptualizations on the learning pattern of female entrepreneurs view female entrepreneurs as adult learners only. However, studies from the field of entrepreneurship focuses female entrepreneurs learning on the entrepreneurial context and the impact of opportunity recognition.

Indeed, entrepreneurial learning is highly associated with opportunity recognition and exploitation (Rae, 2006; Ko and Butler, 2007). Opportunity identification is typically taught through innovative problem-solving and creative-thinking exercises and techniques rather than the traditional classroom activities (Klein and Bullock, 2006). Although several authors have noted that some of the information and knowledge can be learned through education, much of the necessary information on entrepreneurship and for identifying and exploiting opportunities can be learned through social interaction and experience (Rae and Carswell, 2000; Politis, 2005; Heinonen and Poikkikoki, 2006). This is corroborated by the responses of these indigenous female entrepreneurs.

Ujunwa stated that:

I discovered the need for an event manager in my area when my neighbour was preparing for his wedding. He had to travel to a neighbouring town to contract one because none was in existence in our area.

Nkem stated that:

I started this business center owing to the continual demand by students for computer services. As you can see, this house is surrounded by so many private hostels occupied by Unizik students. So, one day a student told me that instead of only selling stationeries that I can as well start computer services, binding and lamination in this shop. When I showed interest, the student introduced me to a business centre operator from whom I learnt the business.

Oby stated that:

The whole idea about hair styling and body care come when I lost my job and after seeing a beauty pageant movie.

Chiugo stated that:

I started this school after I was disengaged as a teacher in a state in the Northern part of the country. My husband encouraged me to go to our town in Anambra State and establish a primary/secondary school together with his sister since only one was in existent then. Today, I thank God because I heeded my husband's advice.

Entrepreneurial Capabilities of Indigenous Female Entrepreneurs

Entrepreneurial capabilities (technical, management and personal entrepreneurial skills, and entrepreneurial leadership skills) constitute the building bricks of any business enterprise (Agbim, 2013). Thus, every entrepreneur needs to learn the requisite skills for his/her chosen vocation. The female entrepreneurs corroborated this view when they explained the entrepreneurial capabilities they have learnt.

Ego explained that:

When I was learning the business of even management, I learnt colour combination skill for the purpose of decoration. I also learnt management skills like how to plan, direct and control events.

Ify explained that:

As a business trainee some years back, I learnt from my madam how to differentiate original jewelleries and other clothing materials from the fake ones. I also learnt from my madam how to handle various changes in the business environment and how to maintain my customers.

Ngozi explained that:

I learnt the practical aspect of this business from a man. During this period I learnt among other things how to threat water, how to maintain my customers and retain my workers.

Chikwado explained that:

I learnt this business for six months. During this period, among other things I learnt from my madam how to keep financial records.

Chika explained that:

My OND programme was full time, while my HND was part time. So I was learning the trade and doing my HND programme at the same time. I learnt from my madam how to differentiate original machine spare parts from the fake, how to save and how to know which parts to stock more and when.

Oge explained that:

Aside polishing my innovative and risk taking skills, I learnt discipline and flexibility in designs both from my madam and my co-trainees.

Amaka explained that:

After my diploma and bachelor programmes in health technology and nursing respectively, I worked in both private and public hospitals to acquire practical experience in drug administration, learn how to manage patients and to gain practical experience in midwifery before setting up this dispensary together with my friend who is also experienced. Those who come here do so mostly because of our experience on the job.

Odinaka explained that:

When I was learning this business, my director taught me that when I establish my own business, I will need more of management skills but as the business grows I will need more of leadership skills and less of management skills. Today, this business has grown. The skills that have helped I and my friend to maintain and stabilize this growth are; ability to predict future problems and crises, ability to influence my workers, emotional intelligence, and ability to understand the needs of my workers.

How the Indigenous Female Entrepreneurs Measure Success

Entrepreneurship is a rugged venture. If it succeeds, the entrepreneur has reason to ride the crest to self-fulfillment and happiness (Ottih, 2011). Thus, when asked to explain how they measure success, the indigenous female entrepreneurs viewed success differently as follows:

Ozioma stated that:

Success in my business is that I started the type of business I love and that it has grown from a small to a big business.

Oluchi stated that:

I see success in my sachet water production business as managing the business well and meeting the water needs of my customers.

Udoka stated that:

I feel successful in this business when I see the business growing, my patients healed, I maintain a cordial relationship with my colleague, and my family members are helped from the benefits of the business.

Ijeoma stated that:

As far as I am concerned, success in this business connotes having more customers, doing a beautiful work for them and helping people around me from what I make from the business.

Chizoba stated that:

I feel successful when we graduate disciplined pupils/students with high academic performance, help family members and neighbours.

Nkiru stated that:

Success is adding value to my customers, workers, myself, my family members and members of the community where the business is located.

Ihuoma stated that:

We feel successful when we give our customers value for their money and help people around us.

Successful women entrepreneurs have unique ways of putting together personal qualities, finance and other resolution by their willingness and ability to seek out an investment opportunity, establish an enterprise based on it and use the opportunities successfully. Successful women in business are ready to spend on capacity building. They have good accounting system, take care of those working for them and they believe that they are adding value to the economy (Ukonu and Tafamel, 2011). They measure success as adding value to employees, customers and the larger community (Kauaniui et al., 2009, as cited in Agbim et al., 2013).

Most women that have made it in their entrepreneurial activities select a career, which gives them intrinsic satisfaction, accepts responsibilities, have focused, achievable and measurable goals. They have internal locus of control, high self-esteem and self-efficacy. They are conscious of the dynamism of their environment. They are innovative and creative to look for people's needs and identify gaps in their immediate environment and try to meet them (Ukonu and Tafamel, 2011). It is therefore obvious that if the right and adequate support is given to them, they can develop further, influence more women to become entrepreneurs and by extension measure up with their male counterparts with time (Agbim and Oriarewo, 2011).

Entrepreneurial Learning and Entrepreneuring: Motivating Factors and Challenges

Women entrepreneurs are persons who accept challenging roles to meet their personal needs and to become economically independent. A strong desire to do something positive is an inbuilt quality of entrepreneurial women (Goyal and Parkash, 2011). The indigenous female entrepreneurs corroborated these assertions when they explained what motivated them to go into entrepreneurial learning and the challenges they encountered in the course of the learning and entrepreneuring activities.

Chinyere stated that:

I enrolled to learn the practical skills in fine and applied arts so as to enable me set up my own art business. My two years as a trainee was challenging, experimental and interactive because I learnt so much from both my master and any co-trainees, I sacrificed my leisure time to care for my home front, I disciplined myself to overcome the sexual harassment from men. And, when I eventually established my own I initially encountered financial, home-front and job challenges. But for now things are much better.

Nnenne stated that:

My biggest motivating factor is that I am a gifted cook. And, my biggest challenge for the 3 months I learnt the practical skills in restaurant business and since I established my own restaurant has been the sexual mores of some men toward me.

Uche stated that:

I went into learning sachet water production for 6 months so as to gather practical experience from the business owner, the workers/trainees and the distributors. My challenge then was taking care of my children, meeting up with my activities as a trainee and financial constraint because I was not a salaried staff. However, since I established my own production outfit together with my friend, our challenge has been high cost of production occasioned by erratic public electric supply.

Ebele stated that:

I worked with a private school for 3 years to learn how to establish and manage day care/primary and secondary schools. My challenge then was financial constraint due to the poor remuneration. My challenge today is inadequate staff training and inadequate infrastructure.

Adaobi stated that:

My love for good colour combination and order drove me into this business. I learnt the business for 2 years; getting involved in practical activities to learn the skills and to acquire experience. My challenge then was sexual advances from the opposite sex and financial constraint; I did not have the money to buy some materials and equipments to try out some things myself. However, things are a lot better since I started the business with my friend. Our challenge today is always how to meet the demands of our clients.

Ifunanya stated that:

My love for fashion designing drove me into learning the skills and gathering practical experience of the business for 4 years. My challenge then was my inability to speak and write in English language. However, things started changing for the better when I enrolled for adult education. Today, the challenge has been family responsibilities, and meeting my clients' demands and the seasonal chest pains I usually experience.

V. CONCLUSION

The findings of the study showed that financial constraints, support from husbands/family members, joblessness, creativity and lack of formal education influenced the respondents choice of entrepreneurial career. This according to Agbim and Oriarewo (2011) showed that both positive and negative conditions can drive women to desire to be self-employed. The study also found that the respondents recognized opportunities, got information on entrepreneurial networks and network providers from neighbours, friends, movies, husbands and through social interaction. This suggests that the students/trainees should be taught how to derive meaning from different learning opportunities (Rave and Carwell, 2000) and how to learn through the whole process of entrepreneurship development (Corbett, 2005).

The study further revealed that the trainees learnt entrepreneurial capabilities such as; colour combination skills, management skills, skills on how to handle changes in the business environment, skills on how to maintain their customers, technical skills, skills on how to retain their workers, skills on how to keep financial records, skills on how to differentiate fake products from the original, skills on how to save, skills on how and when to maintain certain stock levels, risk taking skills, discipline and flexibility skills, skills on drug administration, skills on how to manage patients, practical skills in midwifery and entrepreneurial leadership skills. It is evident that entrepreneurial capability is developed by means of a specific and identifiable process (Treece et al., 1997). This process entails "learning to learn". Therefore, more emphasis should be placed on "learning to learn" rather than the theoretical aspects of entrepreneurship development (Fiet, 2000; Zhao et al., 2005).

It was also found from the study that the respondents measured success in their business as: starting the business they love; growing their business from a small to a big one; managing the business well and meeting the needs of their customers; maintaining a cordial relationship with their colleagues; helping family members from the benefits of the business; having more customers; helping people around them; adding value to self, family members, customers, workers and community members; and giving customers value for their money. The respondents revealed that the motivating factors for entrepreneurial learning and entrepreneuring are: to gain practical skills/experience; natural gift/ ability and love for their chosen vocation. They further gave the challenges of entrepreneurial learning and enterprenuring as: financial constraint, home front responsibilities, the nature of the job,

sexual mores of men toward women, inadequate staff training, erratic power supply, poor remuneration, how to meet clients'/customers' demands, inability to speak and writer in English language, inadequate infrastructure and the health hazards associated with some of the businesses.

The study has revealed that entrepreneurship development can be better achieved through entrepreneurial learning. This is because entrepreneurial learning develops in the students/trainees: an entrepreneurial intentions; the ability to recognize opportunities and consequently search-out an entrepreneurial network provider from whom to learn the requisite capabilities for the chosen vocation; and the needed commitment that assures entrepreneurial success. Entrepreneurial learning helps the students/trainees to achieve all these through social interaction and experiential learning. To enhance and sustain the development of indigenous female entrepreneurs in Anambra State, centers for entrepreneurial learning through the process of social interaction and experiential learning should be established. This will consequently reduce the challenge of sexual harassment from men and give the women the balance between learning time and the time to attend to their home-front. More so, interest free loans should be made available to the women who have gone through the learning process of their chosen vocation. This is to enable them start their own businesses.

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Entrepreneurial Success, Knowledge Workers Plateauing and Turnover: The Impact of Relatedness

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Abstract- Knowledge workers retention is increasingly being recognized as a source of entrepreneurial success. Thus, we argue that the sustainability of such knowledge-based success depends on the effective and efficient management of knowledge workers plateauing and turnover. This study therefore sought to examine why knowledge workers experience career plateauing and show intention to quit, and the relationship between entrepreneurial success and the type of plateauing/turnover. The data generated were analysed using Z-score and regression analysis. It was found that reduced organizational hierarchies, reduced promotion opportunities, and fewer competitive positions are the factors that influence plateauing, while entrepreneurial success has a negative relationship with the significant types of plateauing. Also, lack of recognition/competitive reward system, inadequate training/development opportunities, and managerial/leadership style are the factors that influence turnover, while a negative relationship was found to exist between entrepreneurial success and the significant types of turnover. It is therefore pertinent for managers to assess and understand the factors influencing plateauing and turnover, and the types of plateauing and turnover that are prevalent in their enterprises. This knowledge will certainly help to minimize the effects of the factors and types of plateauing/ turnover on entrepreneurial success.

Index Terms- Entrepreneurial success, knowledge workers plateauing, knowledge workers turnover, business enterprises.

I. INTRODUCTION

In today's contemporary business world, business enterprises are under great pressure of highly competitive and global markets (Duygulu and Ozeren, 2009). This condition is constantly impinging on the capability of business enterprises to retain employees whose knowledge has high competitive value and by extension enhances the success of their enterprises (Jamrog, 2004; Ready and Conger, 2008; Somaya and Williamson, 2008). Knowledge workers retention has become the major differentiating competitive factor for most enterprises (Samuel and Chipunza, 2009). However, recent studies have shown that retention of knowledge workers is a difficult task for entrepreneurs as this category of employees are being attracted by more than one enterprise/entrepreneur at a time with various kinds of incentives (Samuel and Chipunza, 2009; Chiboiwa et al., 2010).

Thus, the new world of entrepreneurship development has placed the development of entrepreneurs and/or knowledge workers at the centre of entrepreneurial success. One of the most important drivers of productivity and sustainable growth of business enterprises and national economies according to Chiboiwa et al. (2010) is the quality and stability of the knowledge workers. However, prevailing evidence from business enterprises in Nigeria suggests a high rate of knowledge workers plateauing and turnover which has negatively affected the growth and stability of the enterprises.

Additionally, when knowledge workers move, they migrate to competing business enterprises with the knowledge and trade secrets acquired from their former enterprises/entrepreneurs thereby creating a more critical situation for the latter (Abassi and Hollman, 2000). This situation therefore demands that entrepreneurs should identify the reason(s) for this frequent change of employment by workers so as to enable them device strategies for keeping essential knowledge workers for a rather longer tenure. Thus, this study seeks to identify why workers experience career plateauing and intention to quit, and the types of plateauing/turnover that have significant effect on entrepreneurial success.

II. LITERATURE REVIEW

Knowledge and Knowledge Workers

Knowledge is a comprehensive concept with profound meanings (Nonaka, 1994). Nonaka and Takeuchi (1995, cited in Rollinson, 2008) identified two types of knowledge, tacit and explicit. Tacit knowledge is part of a person's experience, know-how, intuition and insight even when not explicitly specified. Furthermore, explicit knowledge is in the form of rules, guidelines and principles that are easily communicated, codified and expressed, and are available to anyone within a particular context. According to Sanchez et al. (1996) both tacit and explicit knowledge are needed for a business enterprise to succeed. However, combing tacit and explicit knowledge could be a complex task and in some circumstances may not be possible. In other words, reconciling what is in employees' mind with what is stored in data bases requires extensive research and needs a high level knowledge-based technology (Soliman and Spooner, 2000). This near impossibility in combing tacit and explicit knowledge and the dynamic nature of the environment has further necessitated the categorization of knowledge as general-purpose and firm-specific (Spender, 1996; Dyer and Singh, 1998; Becker, 1992, cited in Andreu et al., 2008). General-purpose knowledge is useful not only inside a particular firm but also externally in the environment. Its market value is approximately equal to its value within a firm.

Conversely, firm-specific knowledge: (1) plays the role of a skeleton where new knowledge pieces are attended so as to make global sense to the firm tradition, culture and the way to understand things (Splender, 1996); and (ii) defines the way in which new knowledge will be actually put to work, hence giving it the "idiosyncratic firm's touch" that will differentiate its utilization from that of other firms. Firm-specific knowledge thus plays a fundamental role in the creation and deployment of a new knowledge and is, therefore, a source of dynamic capabilities (Helfat et al., 2007). Knowledge is always embodied in a person; carried by a person; created, augmented or improved by a person; applied by a person; taught and passed on by a person; used or misused by a person. The shift to the knowledge society therefore puts the person in the centre (Drucker, 2001). This person is a knowledge worker. Knowledge workers are: those employees who develop the new knowledge that gives a business enterprise a competitive advantage; the major competitive resources of their enterprise; those who own the means of production and who carry the enterprise's knowledge, information and know-how in their heads (Lagacee, 2007); the workers who capture and apply tacit knowledge (Lubit, 2001; Nissen, 2005) and the workers who create and/or maintain the technical core of the business enterprise.

Knowledge Workers Plateauing and Turnover

Since market demand can certainly drive knowledge worker discontentment and movement, entrepreneurs are feeling an urgent need to preserve as much tacit knowledge as possible from the workers (Cappell, 2000; Droege and Hoobler, 2003), while investment in the workplace is important, spending on such technologies alone has not ultimately helped. Hence, these workers are still being plateaued and are quitting their employment. In addition, the entrepreneurs are experiencing dwindling entrepreneurial success. Entrepreneurial success implies positively affecting the lives of others and making a living through a well managed innovative product and/or service (Agbim and Oriarewo, 2012). Also, entrepreneurial success has also been viewed as starting and achieving some benefits from a business; adding value to employees, customers and the larger community; doing something you love; finding meaning and purpose in work; and helping others (Maxwell, 2003; Kauanui et al., 2009, as cited in Agbim et al., 2013).

Employee plateau is defined as the point where employees likelihood of additional hierarchical promotion is very low (Lee, 2003; Trembbay and Roger, 2004; Yamamoto, 2006). The main causes of employee plateau in organizations are; re-engineering, downsizing and spin-off-activities which makes further advancement within organization become more unlikely (Andreas and Reidi, 2000; Burke and Mikkelsen, 2006). Employee plateau is also caused by: inappropriate abilities and skills, low need for career mobility and slow company growth (Appelbum and Finestone, 1994); lack of job stability, reduced organizational hierarchies and reduction of promotion opportunities (Choy and Savery, 1998); and mergers and takeovers that results to layoffs and fewer competitive positions (Applebum and Santiago, 1997; Yamaoto, 2006). Employee plateau is also caused by competition, age and organizational needs. Competition in the sense that for a given position, the individuals may be seen as less qualified than other candidates, including some presently, outside the organization. Age, management may see older employees as undesirable in their organizational needs, an employee may be seen as valuable in a particular position so much so that he will not be moved to a higher position (Tremblay and Roger, 2004).

The different types of employee plateau or plateauing experienced by knowledge workers in organizations include: (i) organizational plateauing– arises where there is ability to perform well in higher level jobs but unable to do so owing to lack of job openings and/or management belief that knowledge workers do not desire higher level jobs; (ii) professional plateauing– results when knowledge workers find their jobs unchallenging because the jobs provide few opportunities for professional development and future employability (Lee, 2003); (ii) structural plateauing– results from the end of promotions due to the pyramidal structure of organizations; (iv) content plateuing– occurs when the knowledge workers know their jobs too well and become bored; (v) life plateauing– results when committed knowledge workers begin to feel unsuccessful in their work. This spreads feeling of being plateaued and trapped in life (Burke and Mikkelsen, 2006); (iv) contribution plateauing– results when knowledge workers are not learning or developing competencies and when their ability to add value is limited (Patternson et al., 1987). Employee plateauing whether its organizational, professional, structural, content, life or contribution still affect knowledge workers performance because chances of upward movement are limited or doomed. These in the long-run would affect the organization in terms of high rate of labour turnover because the employees may feel that their career advancement in the organization is at stake (Ongori and Angolla, 2009).

Employee turnover is a much studied phenomenon. According to Price (1977) the term "turnover" is the ratio of the number of organizational members who have left during the period being considered divided by the average number of people in that organization during the period. Abassi et al. (2000) stated that employee turnover is the rotation of workers around the labour market; between firms, jobs and occupations; and between the states of employment and unemployment. However, to date, Kaliath and Beck (2001) asserted that there has been little consistency in findings on why employees quit there jobs. This is partly because of the diversity of employees included in such studies.

Existing literature highlight reasons for employee turnover in the organizations; job stress (Firth et al., 2004); insufficient information on how to perform the job (Tor et al., 1997); in capcitation, death, the need to provide care for children and aged relatives (Booth and Hamer, 2007); organizational inefficiency and instability (Zuber, 2001); managerial/leadership style (Magner et al., 1996; Labor, 1997); hiring practices, lack of recognition and competitive compensation system (Griffeth et al., 2000; Abassi and Hollman, 2000); toxic work environment, lack of interesting work, lack of job security, inadequate training and development opportunities (Sherman et al.,2006).

Employee turnover has been classified as; (1) voluntary (that is, beyond the control of management), (2) involuntary (that is, within the control of management) (Booth et al., 2007), (3) functional (that is, bad performers leave, good performers stay), and (4) dysfunctional (that is, good performers leave, bad

performers stay) (Abassi and Hollman, 2000; Stovel and Bontis, 2002). Employee turnover occurs when employees leave their jobs and must be replaced. Replacing existing employees is costly to organizations and destructive to service delivery. It is therefore imperative for entrepreneurs to reduce, to the minimum, the frequency at which employees; particularly knowledge workers quit the organization.

Effects of Knowledge Workers Plateauing/Turnover on Business Enterprises

In the short run, knowledge workers plateauing help the affected workers to master work skills and gather psychic energy in preparation for a transition period (Rita and Lawson, 1998). Lee (2003) further noted that a plateaued worker could sill have high satisfaction as the situation helps him to concentrate on developing new skills with which to seek other career opportunities elsewhere. This will consequently affect the performance of the enterprise and engender high degree of labour turnover.

Turnover is not only destructive to the business enterprise, it is also costly. These costs include; costs associated with replacement (Philips, 1990; John, 2000) and costs such as lost productivity, lost sales and management time (Wasmuth and Davis, 1993; Catherine, 2002). Also, business enterprises suffer customer defection when a knowledge worker quits. The knowledge, skills and contacts that a departing employee takes out of the business enterprise constitutes a huge loss. The attributes are, in most cases, lost to a competitor business enterprise that may use this to gain competitive advantage (Stovel and Bontis, 2002; Sutherland, 2004; Bliss, 2007).

Stovel and Bontis (2002) asserts that functional turnover help to reduce suboptimal organizational performance. However, high turnover can result in the loss of business patronage and relationship, and can even jeopardize the realization of organizational goals. Similarly, Abassi and Hollman (2000) argued that dysfunctional turnover damages the organization through decreased innovation, delayed services, improper implementation of new programmes and reduced productivity. Such activities according to Stovel and Bontis can radically affect the ability of organizations to prosper in today's competitive economy, leaving even the most ambitious entrepreneur unable to attain entrepreneurial success due to their inability to retain their knowledge workers.

III. RESEARCH METHODOLOGY

The sample size for the study is made up of 1,640 respondents. Systematic sampling technique was employed to select the respondents from the membership list of different associations of entrepreneurs within Makurdi town. These associations include sachet water, fashion designers, upholstery, restaurants, hotels, printers and publishers, supermarkets, beauty saloons, welders, automobile mechanics, electronic mechanics, bakeries and confectionaries, and schools.

Data for the study was collected using questionnaire. The questionnaire is made up of four sections – the demographics of the respondents, the factors influencing knowledge workers plateauing/turnover, types of plateauing/turnover and entrepreneurial success. The first section sought to elicit responses on gender, age and duration of service. The second section identified ten factors each that influence knowledge workers plateauing/turnover. The respondents were requested to score (1-4) the factors influencing career plateauing and intention to quit the job. In the third section, the respondents were requested to identify why they are plateaued and why they would want to quit their job from the list that described 6 and 4 types of plateauing and turnover respectively. The fourth section requested respondents to rate the entrepreneurial success of the business enterprise from a list of non-financial items. In both sections three and four, the respondents were requested to rate each type on a 5-point Likert scale. The degree of agreement varied from strongly disagree (1) to strongly agree (5) and accordingly in between. The respondents for the study are made up of production/technical workers, managers, marketers, chefs, fashion designers and beauticians/hair stylists.

The questionnaire was validated by researchers in entrepreneurship development and human resource management, while the reliability test yielded a Cronbach alpha of 0.788. Fifty one out of the 1,640 questionnaire that were sent out where discarded on account of missing data, leaving 1,589 useable questionnaire for a response rate of 97%. Z-score test at 0.05 level of significance was used to rate factors that influence knowledge workers plateauing/turnover, while multiple regression analysis was used to determine the relationship between entrepreneurial success and knowledge workers plateauing on one hand, and between entrepreneurial success and knowledge workers turnover on the other hand.

IV. RESULTS

Among the respondents, 79.8% and 20.2% are males and females respectively, while majority (66.3%) of them have ages ranging from 20-40 years. Concerning educational qualification, 8.7% of the respondents have FSLC, 34.4% have O/L, 34.1% have NCE/OND, 17.7% have HND/B.Sc., and 5.1% have PG degrees. Majority (77.4%) of the respondents have been in their president employment for a period between 1-9 years.

Table 1 depicts that reduced organizational hierarchies (17.96), reduced promotion opportunities (14.39) and fewer competitive positions (9.76) are the significance factors that influence knowledge workers plateauing. Furthermore, table 2 reveals that the three most significant factors that influence knowledge workers turnover are; lack of recognition and competitive reward system (15.38), inadequate training and development opportunities (13.75), and managerial/leadership style (3.83).

TABLE 1: Z-Score Rating of Factors Influencing Knowledge Workers Plateauing

		Educational Level					
S/No.	**Factors**	**FSLC**	**O/L**	**NCE/OND**	**HND/B.Sc.**	**PG**	**Total**
1.	Inappropriate abilities/skills	-0.08	-0.72	-0.91	-0.33	-0.21	-2.25

2.	Reduced promotion opportunities	3.11	2.45	2.64	3.38	2.81	14.39*
3.	Lack of job stability	0.24	0.12	0.18	0.69	0.04	1.27
4.	Slow company growth	-1.63	-1.48	-1.74	-2.01	-2.31	-9.17
5.	Reduced organizational hierarchies	4.84	3.88	2.85	2.91	3.48	17.96*
6.	Fewer competitive positions	0.86	2.09	2.47	1.8	2.46	9.76*
7.	Competition	-1.42	-0.47	-0.82	-1.24	-1.11	-5.06
8.	Age	-1.06	-1.24	-2.40	-2.12	-0.89	-7.71
9.	Organizational needs	-1.46	-1.28	-2.04	-0.48	-0.81	-6.07
10.	Low need for career mobility	0.11	0.21	0.18	0.73	0.44	1.67

Level of significance >1.96 at 0.05
* Significant factors

TABLE 2: Z-Score Rating of Factors Influencing Knowledge Workers Turnover

		Educational Level					
S/No.	**Factors**	**FSLC**	**O/L**	**NCE/OND**	**HND/B.Sc.**	**PG**	**Total**
1.	Lack of interesting job/job stress	-0.02	-0.28	-0.71	-0.39	-0.24	-1.64
2.	Lack of job security	-0.04	-1.27	-1.09	-0.98	-1.08	-5.46
3.	Incapacitation	-0.42	-0.12	-0.22	-0.31	-0.14	-1.21
4.	Need to care for children/aged relatives	-0.29	-1.43	-1.66	-0.32	-0.73	-4.93
5.	Organizational inefficiency	-2.40	-1.91	-1.65	-1.26	-1.34	-8.56
6.	Managerial/leadership style	0.81	0.23	0.94	0.76	1.09	3.83*
7.	Hiring practices	0.15	0.16	0.47	0.48	0.04	1.30
8.	Lack of recognition/competitive reward system	2.86	2.93	3.42	3.36	2.81	15.38*
9.	Toxic work environment	-3.20	-3.66	-3.31	-3.66	-3.41	-17.24
10.	Inadequate training/development opportunities	1.45	2.17	3.49	3.72	2.92	13.75*

Level of significance >1.96 at 0.05
* Significant factors

The six types of knowledge workers plateauing or predictor variables (organizational, professional, structural, content, life and contribution) shown in table 3 explained 60.4% of the variation in entrepreneurial success of business enterprises. The values of the significant predictors indicate that as organizational plateauing increases by one unit entrepreneurial success decreases by 0.875, as professional plateauing increases by one unit entrepreneurial success decreases by 0.730, as life palteauing increases by one unit entrepreneurial success decreases by 0.776, as contribution plateauing increases by one unit entrepreneurial success decreases by 0.608. Thus, there is a negative relationship between entrepreneurial success and the significant types of plateauing.

It can also be deduced from table 4 that the four types of knowledge workers turnover or predictor variables (voluntary, involuntary, functional and dysfunctional) explained 45.8% of the variation in entrepreneurial success of business enterprises. The values of the significant predictor variables (involuntary and dysfunctional plateauing) indicate that as involuntary turnover increases by one unit entrepreneurial success decreases by 0.157, and as dysfunctional turnover increases by one unit entrepreneurial success decreases by 0.185. This implies that there is a negative relationship between entrepreneurial success and the significant types of turnover.

TABLE 3: Coefficients in the Regression Analysis of the types of Knowledge Workers Plateauing and Entrepreneurial Success

Predictor variable	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	4.157	0.875		12.262	0.000
Organizational plateauing	3.942	0.532	-0.875	-13.857	0.000
Professional plateauing	2.218	0.457	-0.730	-8.195	0.000
Structural plateauing	2.645	0.346	0.696	7.440	0.726
Content plateauing	2.915	0.595	0.588	5.580	0.441
Life plateauing	5.431	0.608	-0.776	-9.443	0.000
Contribution plateauing	0.344	0.875	-0.608	-5.877	0.000

Dependent variable: Entrepreneurial success

TABLE 4: Coefficients in the Regression Analysis of the types of Knowledge Workers Turnover and Entrepreneurial Success

Predictor variable	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	2.354	0.216		1.634	0.000

Voluntary turnover	0.433	0.251	0.038	1.726	0.087
Involuntary turnover	0.858	0.198	-0.157	-4.334	0.000
Functional turnovr	0.340	0.306	0.145	1.110	0.269
Dysfunctional turnover	0.518	0.219	-0.185	-2.366	0.000

Dependent variable: Entrepreneurial success

V. DISCUSSION OF RESULTS

Knowledge workers retention is a crucial challenge for today's business enterprises as they face increasing competition with the demands for even more of such workers. Fundamentally, the worrying situation is the rate at which it is becoming increasingly widespread in various business enterprises (Lee, 2003; Yamamoto, 2006). The study found that knowledge workers were plateaued by factors such as reduced organizational hierarchies, reduced promotion opportunities and fewer competitive positions. Owing to the fact that strategies to minimize the effects of these factors were not put in place, these factors gave rise to different types of knowledge workers plateauing. The identified types of knowledge worker plateauing that negatively affects entrepreneurial success of the entrepreneurs/employers are lack of job openings (organizational plateauing), unchallenging jobs occasioned by few opportunities for professional development that enhances future employability (professional plateauing), a feeling of being unsuccessful on the job (life plateauing) and limited opportunities to develop competencies and to add value (contribution plateauing).

Ineffectiveness and inefficiency in the management of knowledge workers plateauing according to Ongori and Angolla (2009) has contributed to knowledge workers turnover in business enterprises. More so, as noted by Chiboiwa et al. (2010), a number of factors have been attributed to the increase in the level of knowledge workers turnover worldwide. The present study found that the knowledge workers are about to quit their present employment because of lack of recognition and competitive reward system, inadequate training and development opportunities, and managerial/leadership style. To this end, William and Werther (1996, cited in Chiboiwa et al., 2010) posits that knowledge workers turnover is accelerated when knowledge workers are dissatisfied with the reward system in an enterprise. This result is similar to that of Chiboiwa et al. (2010) who found that turnover is largely attributed to poor reward system. The present study further reveals that the employers of the respondents are not paying attention to the factors that influence knowledge workers turnover. This consequently gave rise to turnover; which is the manifestation of intention to leave. The types of turnover that are prevalent in the enterprises and which has negatively affected entrepreneurial success in the enterprises are involuntary and dysfunctional turnover. Turnover according to Samuel and Chipunza (2009) is not only destructive but costly to business enterprises. This in the view of Abassi and Hollman (2000) is because most often when knowledge workers move, they migrate to competing business enterprises with the knowledge and trade secrets acquired from their employers thereby creating an even more critical situation for the latter. This situation therefore demands that entrepreneurs/employers of knowledge workers must device strategies that will help in keeping these workers for a longer time.

VI. RECOMMENDATIONS

The following recommendations are proposed based on the results of the study.

1. Given that there is increase in direct and indirect costs of knowledge workers plateauing/turnover, entrepreneurs/managers should assess and understand knowledge workers critically at each stage of their career so as to identify the factors influencing plateauing and the type of plateauing they are experiencing. The outcome of such assessment will help the managers to develop strategies to minimize the effects of the factors and the type of plateauing.

2. Managers should use the flat rather than the tall structure system so as to make lower cadre workers to take more responsibilities thereby reducing the degree of plateauing and turnover. Also, job rotation should be employed as a strategy for broadening workers skills and by extension reducing boredom.

3. Business enterprises should adopt a management/leadership style that creates a more cordial relationship between managers and other workers. This relationship should also create an environment that allows workers to acquire training and develop competencies that will position them for opportunities elsewhere if chances of upward movement are limited in their present business enterprise.

4. According to table 3, the significant predictor variables, namely, organizational, professional, life and contribution plateauing have negative effect on entrepreneurial success. Managers must make conscious effort to reduce the prevalence of these types of knowledge workers plateauing so as to increase their entrepreneurial success. Also, table 4 shows that involuntary and dysfunctional turnover have significant negative effect on entrepreneurial success. This suggests that to increase entrepreneurial success, the business enterprises should device strategies that can reduce these types of turnover.

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An Exploratory Study of the Relationship between Innovation and Change Management

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Abstract- An organization that innovates its products, services and/or processes has introduced change in the organization and this change needs to be managed right from the beginning of the innovation process. To be effective and efficient in managing this change, organizations and their managers need to develop effective and efficient change management strategy for the extreme ends stages in the innovation process – idea generation and implementation. Thus, the study was designed to explore the relationship among the various images of managing, the innovation process and change outcomes. The study adopted a survey research method, while simple random sampling technique was employed to select the employees that completed the questionnaire. The generated data were analysed using linear regression. It was found that coaching, interpreting and nurturing images of managing are significantly related to idea generation, while directing, navigating and caretaking images are related to idea implementation. Also, the directing, navigating and caretaking images are significantly related to intended, partially intended and unintended change outcomes respectively. The study recommends the employment of coaching, interpreting and nurturing images in idea generation, while directing, navigating and caretaking images should be employed by change managers in the management of idea implementation. However, this must be done with recourse to the managerial capabilities of the change manager and the nature of the prevailing business environment.

Index Terms- Change management, change outcome, innovation, turbulent environment

I. INTRODUCTION

Environmental trends such as globalization of markets, technological revolution, government policy somersault and deregulation are rapidly changing the competitive structure of markets in such away that the competitive advantage of organizations is often attenuated (Andreu et al., 2003; Oghojafor et al., 2011). Consequently, organizations are under great pressure so much so that the turbulent environmental condition is constantly impinging on their capacity to be innovative in the eyes of their demanding customers (Karami, 2008; Andreu et al., 2003; Duygulu and Ozeren, 2009).

However, according to Kanter (1995, as cited in Rollinson, 2008), organizations need to change by moving from rigid, bureaucratic structure, which are best suited to coping with stable, relatively unchanging conditions towards organizational forms that are better able to adapt to rapid environmental change. But, organizations according to Jones and George (2008) cannot change or adapt in response to changing environment unless they have effective control over their activities. This implies that there is a need for organizations and their managers to develop effective and efficient change management strategy for the extreme ends stages in the innovation process (idea generation and implementation).

Change management with respect to innovation appears a simple enough term. However, in reality, this is rarely so owing to the varying nature of "managing" (coaching, interpreting, nurturing, directing, navigating and caretaking) (Palmer and Dunford, 2002; Palmer et al., 2006) and "change" (Palmer and Dunford, 2008) and the stages in the innovation process. The study therefore seeks to explore the relationship among the nature of managing, change outcomes (intended, partially intended and unintended) and the innovation process.

II. LITERATURE REVIEW

The Nature of Organizational Change

Change is an effort that consists of actual physical alterations to operations and different emotional stimulation (Berneth, 2004). Applied to organizations, the word "change" has been defined by Ford and Ford (1995, as cited in Rollison, 2008) as a firm's shift from one state to another. Similarly, organizational change is the movement of an organization away from its prevent state and toward some descried future state to increase its efficiency and effectiveness (Jones and George, 2008). More so, in the past, organizational change was usually a matter of making small and gradual adaptations. These days, however, the way that matters were handled in the past is no longer a faithful guide to what is required in the present. Indeed, for organizations to equip themselves for the future, they will not only need to completely transform themselves into something radically different, but they must also understand that their survival (Rollinson, 2008) and desired change outcome depends on their vision (i.e., the picture of the organization's future) and their ability to understand the innovation process.

Change outcomes could take the form of intended change outcomes, partially intended change outcomes and unintended change outcomes. Intended change outcomes refers to situations where it is believed that proposed change outcomes are achievable. Change is treated as the realization of prior intent, achieved through the actions of change managers (Chin and Benne, 1976). Partially intended change outcomes refers to situations where some, but not all change intentions are achievable. Power, procession, interests and different skill levels of managers affect the ability to produce proposed change outcomes. Classic works such as Mintzberg and Waters (1985)

argued that not all features of change outcomes are intended (Harrison and Shirom, 1985). Unintended change outcomes suggests that managers often have great difficulty in achieving proposed change outcomes because a variety of forces lead to unplanned charge outcomes. These forces are more powerful than the influence of individual change managers, thereby swamping change managers and their proposed changes. Occasionally, outcomes and intentions may collide, but this is the result of serendipity rather than the direct influence of change managers. Outcomes are therefore emergent (Mintzberg, 1978; Pascale, et al., 2000).

The Nature of Change Management

Management as control has been dominant throughout the history of management thought. It underlies the classic Fayol (1949) characterization of management as planning, organizing, commanding, coordinating and controlling. In addition, management as control is associated with top-down, hierarchical view of managing. The organization is concerned mechanistically with the manager's role to drive the machine in specific directions. People are allocated resources (in-puts) so that the machine can perform efficiently and produce the expected products or services (out-puts). In comparison, management as shaping sees managing as influencing rather than determining outcomes by edict. The emphasis on shaping anthropomorphizes the organization, giving it the qualities of an organism rather than a machine. The responsibility of management is to produce strong corporate capabilities that provide the organization with a firm platform to respond to and shape or manage external changes (Beer and Nohria, 2000; Palmer and Dunford, 2008).

Change management is the process of directing, navigating, caretaking, coaching, interpreting and nurturing organizational change so as to achieve a desired change outcome, maintain the status quo or adapt to the emergent outcomes. According to French and bell (1995), in coaching, change managers are able to intentionally shape (through influence) an organization's capabilities in particular ways. But rather than dictating the exact direction of change, coaching relies on building the right set of values, skills and drills that are deemed necessary for organizational members to achieve desired organizational outcomes. The essence of coaching therefore is to help members of the organization to develop a better future picture of their units/department and by extension skills that will enhance their ability to generate innovative ideas that will bring about improved product/service quality and efficiency/effectiveness in production/service processes. More so, in interpreting, the change manager creates meaning for other organizational members, helping them to make sense of the various proposed organizational events and actions. Managers as interpreters need to explain to members of the organization why new ideas need to be generated and why the innovations should be introduced. The change managers should interprete why the changes are important by providing meaning and making sense of such events (Balogun et al., 2005). In nurturing, even small changes may have a large impact on organizations (Thietart and Forgues, 1995). Thus, managers should nurture their organizations to facilitate organizational qualities which enable positive organizing to occur (Palmer and Dunford, 2008).

In directing, management is in control and intended change outcomes are achievable. It is therefore up to the change manager to direct the organization in particular ways to produce the required change (Palmer and Dunford, 2008) by implementing the adopted innovation. In navigating, control is still at the heart of management action, but a variety of factors external to managers suggest that while they may achieve some intended change outcomes, others will occur over which they have little control. Outcomes are partly emergent rather than completely planned and result from a variety of influences, competing interests and processes. There is no guarantee that the final destination will be the one initially envisaged (if there is, indeed, a final destination), and there is the ever-prevent likelihood that a variety of other unanticipated destinations might eventually be brought about by the shifting winds and currents underlying the change (Palmer and Dunford, 2008). In caretaking, managers will exercise some control, but the ability to control is severely constrained by a variety of forces, both internal and external, which propel change relatively independent of a manager's intentions. Individual managers have only a limited ability to implement change. Thus, change outcomes are at odds with these forces. At best, change managers are caretakers having little influence over the direction of change (Palmer and Dunford, 2008).

The Innovation Process

Innovation is the adoption of new approaches by an organization (Lee and Yu, 2010). It is an activity intended to develop an idea, carry it out, react to it and modify where necessary (Van de ven, 1986). Put differently, organizational innovation is the adoption of a new idea or behaviour that is new to the organization's industry, market or general environment (Daft, 1982). Thus, an organization that innovates its products, services and/or processes has introduced change in the organization and this change needs to be managed right from the beginning of the innovation process. To be effective and efficient in managing the change that is associated with the introduction of innovation in an organization, Jones and George (2008) asserted that managers must create an organizational setting in which people are encouraged to be innovative.

The innovation process is made up of four stages; idea generation, proposal, adaption and implementation. The idea generation stage is where an idea regarding something new (product, production process, service, system, method, policy) is conceptualized by an individual or a group of persons in the organization. The second stage is the proposal stage; it is where an idea or concept is transformed into a proposal for official acceptance. The third stage is the adoption stage, it is where a proposed innovation is legitimated or becomes officially accepted. This is the stage where the decision for giving the innovation the attention needed in effort, time and money to be fully developed is made. The final stage is the implementation stage; it concerns the actual utilization of the innovation by organizational members as they perform their tasks (Wilson, 1966; Agbim, 2013).

Research Hypotheses

H_{01}: Coaching for the purpose of capacity building is not significantly related to idea generation.

H_{02}: Interpreting for the purpose of "sense making" is not significantly related to idea generation.

H_{03}: Nurturing the organization is not significantly related to idea generation.

H_{04}: Directing the organization is not significantly related to idea implementation.

H_{05}: Navigating the organization is not significantly related to idea implementation.

H_{06}: Caretaking activities in the organization is not significantly related to idea implementation.

H_{07}: Directing the organization is not significantly related to intended charge outcome.

H_{08}: Navigating the organization is not significantly related to partially intended change outcome.

H_{09}: Caretaking activities in the organization is not significantly related to unintended change outcome.

III. RESEARCH METHODOLOGY

The survey research design was employed in this study. The sample size for the study is made up of 258 employees of manufacturing companies in Anambra State, Nigeria. The sample size was selected using the Yaro-Yamen (1980, as cited in Agbim et al., 2013) sample determination method. Simple random sampling technique was used to select the employees who completed the questionnaire. The questionnaire utilized a response set of strongly disagree (1) to strongly agree (5). The internal consistency test showed that all scale exhibited coefficient of alpha that exceeded a minimum threshold of 0.7 as suggested by Nunnally and Bernstein (1994). Out of the 258 questionnaire that were sent out, 12 were discarded on account of missing data. Thus, resulting in a final useable sample size of 246 and a response rate of 95.3%. All the respondents were under the age of 55. The sample is 68.6% male and 31.4% female. To test the proposed hypotheses, data for the study were collected and analysed using simple regression with the aid of SPSS (Version 18.0). All the tests were conducted at 5% level of significance.

IV. RESULTS AND DISCUSSION

H_{01}: Coaching for the purpose of capacity building is not significantly related to idea generation.

Table 1 showed the result of the H_{01} test with coaching as the predicator variable and idea generation as the dependent variable. It is evident from Table 1 that the beta value (0.310) is significant at $P<0.05$. Thus, H_{01} is rejected, that is, coaching for the purpose of capacity building is significantly related to idea generation.

Table 1: Coefficients in the Regression Analysis of Coaching and Idea Generation

Predictor variable	B	Std. Error	Beta	T	Sig.
(Constant)	52.041	1.603		24.605	0.000
Coaching	0.186	0.025	0.310	6.822	0.002

Dependent Variable; Idea generation

In coaching, ideas are generated though consultation with members of the organization. The proposed innovation that will occasion change is formulated from the ideas generated. Even though wide-ranging consultation takes place throughout the organization during the idea generation, according to Haapaniemi (1996), resistance needs to be recognized and expected since the proposed innovation will take members of the organization out of their comfort zone. Therefore, to help members of the organization cope with the change environment, change managers according to Palmer and Dunford (2008) should help the employees by means of enhanced personal capacity development.

H_{02}: Interpreting for the purpose of "sense making" is not significantly related to idea generation.

To test H_{02}, interpreting was chosen as the predictor variable, while idea generation was the dependent variable. The result in Table 2 showed that the beta value of 0.296 is significant ($P<0.05$). Therefore, H_{02} is rejected. This implies that interpreting for the purpose of "sense making" is significantly related to idea generation.

Table 2: Coefficients in the Regression Analysis of Interpreting and Idea Generation

Predictor variable	B	Std. Error	Beta	T	Sig.
(Constant)	48.216	1.582		30.241	0.000
Interpreting	0.146	0.042	0.296	4.620	0.004

Dependent variable: Idea generation

For interpreting, resistance is viewed as a likely outcome where employees lack understanding of "what is going on" and lack understanding of the personal impact of the change. The most reliable predictor of how people will interpret the implication of change is their experience of past organizational changes (Gioia and Chittipeddi, 1991). Hence, the need for change manager to begin change initiatives with a systematic inquiry into organizational members memories of past organizational changes (Palmer and Dunford, 2008). More so, change managers should focus on sense making about a proposed change and sensegiving to different groups through persuasive account of the change to ensure that as many people as possible inside and outside the organization share a common understanding that will inspire them to generate ideas for the proposed change.

H_{03}: Nurturing the organization is not significantly related to idea generation.

A single variable regression was employed to test the relationship between nurturing (predictor variable) and idea generation (dependent variable). The result in Table 3 revealed that the beta value (0.325) is significant (P<0.05). Thus, H_{03} is rejected. This implies that nurturing the organization is significantly related to idea generation.

Table 3: Coefficients in the Regression Analysis of Nurturing and Idea Generation

Predictor variable	B	Std. Error	Beta	T	Sig.
(Constant)	57.606	1.468		38.640	0.000
Nurturing	0.208	0.083	0.325	4.898	0.000

Dependent variable: Idea generation

Shaw (1995) argued that where organizational structures and management processes require fundamental change, current ways of organizing may inhibit the availability of information, such as customer expectations and market competition, which are necessary to generate the ideas. Thus, change managers must nurture the organization so that employees will see and realize new possibilities that may have been previously unanticipated. This can be done by fostering the conditions for change and communicating the need to be ready to engage in change as the situation emerges, often in unpredictable ways (Wolvin and Coakley, 1996; Palmer and Dunford, 2008). Consequently, according to Palmer and Dunford (2008), it becomes difficult to determine whether the call for idea generation will be resisted due to the absence of the chaotic forces from which resistance emerges.

H_{04}: Directing the organization is not significantly related to idea implementation.

To test H_{04}, a regression analysis was performed with directing and idea implementation as the predictor and dependent variables respectively. The result in Table 4 showed that the beta value (0.286) is significant (P<0.05). Thus, H_{04} is rejected. Hence, directing the organization is significantly related to idea implementation.

Table 4: Coefficients in the Regression Analysis of Directing and Idea Implementation

Predictor variable	B	Std. Error	Beta	T	Sig.
(Constant)	46.385	1.390		30.642	0.000
Directing	0.184	0.064	0.286	5.462	0.003

Dependent variable: Idea implementation

Directing according to Palmer and Dunford (2008) views resistance as something that must be overcome in order to move forward in the implementation of the adopted idea or innovation. Thus, management must highlight the change value-agenda (Guaspani, 1996) and send clear, unambiguous messages about the need to implement the innovation in accordance with laid down rules. When situational factors are assessed as unfavourable to idea implementation, managers may use a range of interventions to alter the situation. For example, directing may involve creating dissatisfaction with the status quo, a sense of distress and a desire for change among followers (Shamir and Howell, 1999).

H_{05}: Navigating the organization is not significantly related to idea implementation

A simple variable regression was employed to test the relationship between navigating (predictor variable) and idea implementation (dependent variable). The result in Table 5 revealed that the beta value (0.360) is significant (P<0.05). Thus, H_{05} is rejected. This implies that navigating the organization is significantly related to idea implementation.

Table 5: Coefficients in the Regression Analysis of Navigating and Idea Implementation

Predictor variable	B	Std. Error	Beta	T	Sig.
(Constant)	52.106	1.304		36.130	0.000
Navigating	0.172	0.056	0.360	8.364	0.000

Dependent variable: Idea implementation

Navigating suggest that managers cannot necessarily impose a vision as there are competing stakeholders who may hold differing views on what change is desired or whether change is desired (Kanter et al., 1992). The navigator should pay attention to differing interests and stakeholders to persuade them of the appropriateness of the implementation of the innovation or the change or if necessary to modify the change to produce the best change outcome in the given situation. Thus, change management involves navigating these tensions. Navigating suggests that vision occurs through debates amongst different groupings within and across the organization and that there may be vision "collision" (Kanter et al.); multiple or conflicting visions. This may occur when the vision is crafted by organizational strategists who are convinced about the need for change, but the need is not shared by change/innovation implementers or change recipients. It may also occur when there is a gap between management's strategic vision and stakeholders' vision of the company (Hatch and Schultz, 2001). To win people over to idea implementation, critical listening, message evaluation and negotiation are needed by the change navigator (Hearit, 1994; Wolvin and Coakley, 1996; Palmer and Dunford, 2008).

H_{06}: Caretaking activities in the organization is not significantly related to idea implementation.

Table 6 revealed the result of the H_{06} test with caretaking as predictor variable and idea implementation as the dependent variable. It is evident from Table 6 that the beta value (0.314) is significant at P<0.05. Thus, H_{06} is rejected, that is, caretaking activities in the organization is significantly related to idea implementation.

Table 6: Coefficient in the Regression Analysis of Caretaking and Idea Implementation

Predictor variable	B	Std. Error	Beta	T	Sig.
(Constant)	43.621	1.482		27.341	0.000
Cartaking	0.285	0.037	0.314	4.826	0.006

Dependent variable: Idea implementation

People's reaction to idea implementation follow a predictable series of psychological stages such as; stock (manifest as in mobilization), defensive retreat (anger), acknowledgement (mourning), adaptation and change (acceptance). Thus, a viable approach to managing such resistance which the caretaker can employ is to let nature take its course or minimize intervention (as a coping mechanism) as resistance is a natural phase (Palmer and Dunford, 2008). More so, caretaking which is aligned to reactive strategy uses "identify" and "reply" approach (Clampitt et al., 2000). Forces for change are "identified" and staff requests for knowledge of the change are "replied" to by explaining the inevitability of the change due to external forces. This explains why in caretaking, visions (i.e., the picture of the future the introduced innovation is expected to lead the organization to) are likely to have limited impact unless they are consistent with events unfolding outside of the organization as the pressure for change is due less to vision and more to the impact of external forces (Palmer and Dunford, 2008).

H_{07}: Directing the organization is not significantly related to intended charge outcome.

A single variable regression was employed to test the relationship between directing (predictor variable) and intended change outcome (dependent variable). The result in Table 7 revealed that the beta value (0.312) is significant and positive (P<0.05). Thus, H_{07} is rejected. We conclude that directing the organization is significantly related to intended change outcome.

Table 7: Coefficients in the Regression Analysis of Directing and Intended Change Outcome

Predictor variable	B	Std. Error	Beta	T	Sig.
(Constant)	56.341	1.811		33.146	0.000
Directing	0.283	0.042	0.312	5.785	0.002

Dependent variable: Intended change outcome

Though we all rationally recognize that the introduction of innovation in an organization brings about change, however not all change is as a result of innovation. When areas where innovation is needed in an organization is identified, ideas concerning the innovation needs to be generated by members of the organization. During this period of idea generation, management influences the employees. However, in order to achieve the intended change outcome during the idea implementation, management need to control and by extension direct the employees to ensure compliance with laid down rules and regulations. Balogun and Johnson (2005) illustrated that individuals in organizations are "sensemakers" not just "sensetakers" and are integrally involved in determining the outcomes of strategic change initiatives.

H_{08}: Navigating the organization is not significantly related to partially intended change outcome.

To test H_{08}, navigating was chosen as the predictor variable, while partially intended change outcome was the dependent variable. The result in Table 8 showed that the beta value (0.278) is significant (P<0.05). Thus, H_{08} is rejected. This implies that navigating the organization is significantly related to partially intended change outcome.

Table 8: Coefficients in the Regression Analysis of Navigating and Partially Intended Change Outcome

Predictor variable	B	Std. Error	Beta	T	Sig.
(Constant)	46.628	1.530		22.631	0.000
Navigating	0.213	0.029	0.278	3.040	0.000

Dependent variable: Partially Intended Change Outcome

In navigating the organization during change management, Palmer and Dunford (2008) noted that a few of the forces in the external environment of the organization suggest some of the intended change outcomes are achievable, while many of the external forces over which management has no control will point to the fact that outcomes are partly emergent rather than completely planned. Similarly, Pendlebury et al. (1998) asserted that change management is only partially controllable owing to a variety of influences, competing interests and processes. Change managers who are navigating towards a desired outcome will achieve outcomes that all the features are not intentional. More so, Palmer and Dunford further noted that there is no guarantee that the achieved change outcome will be the one initially envisaged and there will be the ever-present likelihood that a variety of unanticipated change outcome might eventually be brought about by the shifting winds and currents underlying the change.

H_{09}: Caretaking activities in the organization is not significantly related to unintended change outcome.

Table 9 revealed the result of the H_{09} test with caretaking as the predictor variable and unintended change outcome as the dependent variable. The result in Table 9 showed that the beta value of 0.308 is significant ($P<0.05$). Thus, H_{09} is rejected. We conclude that caretaking activities in the organization is significantly related to unintended change outcome.

Table 9: Coefficients in the Regression Analysis of Caretaking and Unintended Change Outcome

Predictor variable	B	Std. Error	Beta	T	Sig.
(Constant)	50.231	1.604		28.093	0.000
Caretaking	0.189	0.029	0.308	6.573	0.000

Dependent variable: Unintended change outcome

The ability of change managers as caretakers to manage change is constrained by a variety of internal and external forces. Palmer and Dunford (2008) asserted that there are inexorable external forces that shape organizational change. These forces limit managers' ability to implement change. Consequently, these forces propel change relatively independent of a manager's intentions. Hence, the change outcomes are unintended.

V. CONCLUSION

This study has related the different images of managing change - coaching, interpreting, nurturing, directing, navigating and caretaking (Palmer and Dunford, 2002; Palmer et al., 2006; Palmer and Dunford, 2008) to the innovation process (idea generation, proposal, adoption and implementation) (Wilson, 1966; Agbim, 2013) and the change outcomes (intended, partially intended and unintended) (Palmer and Dunford, 2002; Palmer et al., 2006; Palmer and Dunford, 2008). Consequently, for an organization to move from the status quo (or the present state) to another (future) state, ideas have to be generated about the future state. For the members of the organizations to generate these ideas, management has to adopt a shaping (or influencing) function that entails coaching, interpreting and nurturing activities. When the ideas which necessitates the type of innovation are generated, they are presented to management as proposal for adoption before actual implementation. This is to reduce resistance by members of the organization and other stakeholders.

During idea implementation, management plays a control role so as to ensure that implementers comply with laid down rules and regulations. If management exercises a directing authority, the change outcome of implementing the innovation is intended. The directing function is suitable when the business environment is stable. When management plays a navigating role, the change outcome is partially intended. The partially intended change outcome is the resultant effect of the power, processes, interests and the different skill levels employed by managers during implementation. When the business environment is turbulent, change managers have limited ability to implement change owing to the uncertainties in the environment. Hence, the change outcome is unintended. The study recommends the employment of coaching, interpreting and nurturing images in idea generation, while directing, navigating and caretaking images should be employed by change managers to manage idea implementation. This must be done with recourse to the managerial capabilities of the change managers and the nature of the prevailing business environment. The unintended change outcome suggests that the prevalent environmental forces have negated all the managerial skills and strategies deployed by the management of the organization. The relationship among images of managing change, the innovation process and change outcomes are depicted in the innovation/change management model in Fig. 1.

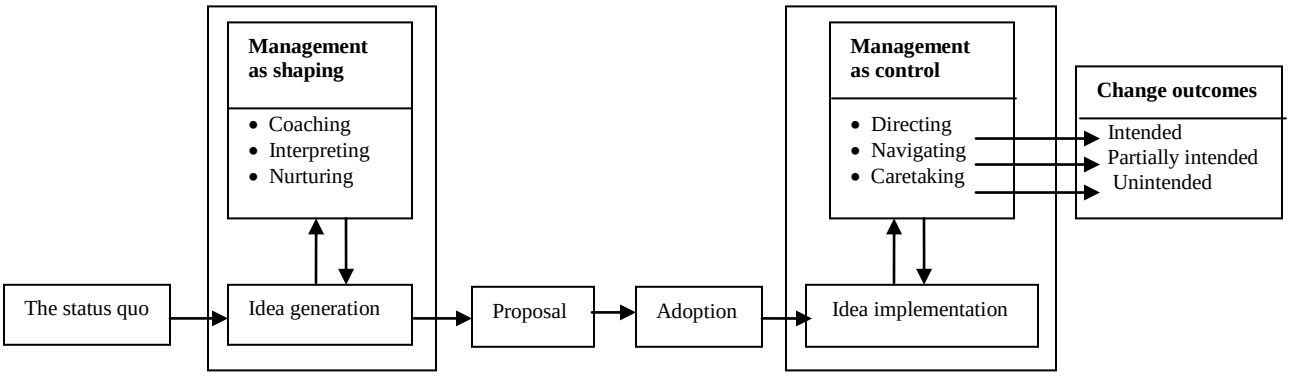

Fig 1: Innovation/Change Management Model

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Face Recognition under Severe Shadow Effects Using Gradient Field Transformation

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Abstract- In order to detect and eliminate illumination effect, a tensor-based face recognition method is proposed in this paper. In this work, the effect of illuminations is effectively reduced by edge suppression method and gradient field transformation. The use of gradient is taken into account in calculating the direction of the shadows.. In the recognition phase, Principal component analysis is used for feature extraction. The K-nearest-neighbour rule is applied for classification. Experiments are carried out upon the real time as well as standard databases, and the results reveal that the proposed method achieves satisfactory recognition rates under varying illumination conditions.

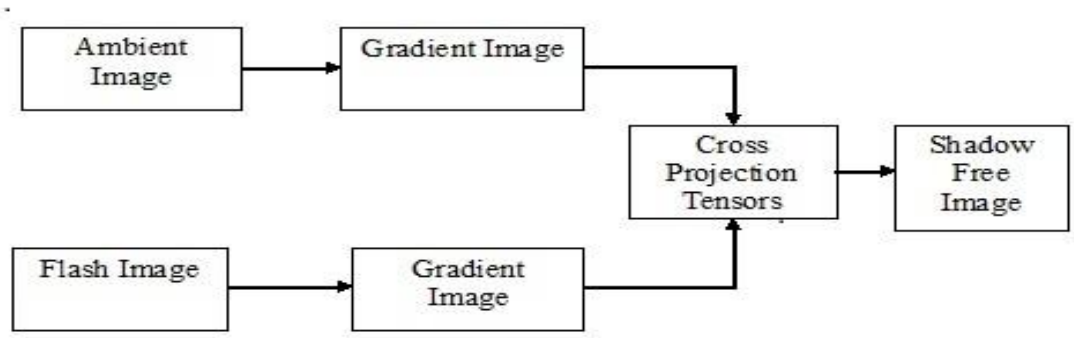
I. INTRODUCTION

The term digital image processing refers to processing of a two dimensional picture by a digital computer. In a broader context, it implies digital processing of any two dimensional data. A digital image is an array of real or complex numbers represented by a finite number of bits. An image given in the form of a transparency, slide, photograph or an x-ray is first digitized and stored as a matrix of binary digits in computer memory.

Amit Agrawal [1] showed a way in removing the artifacts in an image. In this the colour intensity of the image and some intensity details may be lost. The edges of the image are suppressed using cross projection tensors [3] to reduce the intensity of the darker regions in the image. In [2] the advantage of the assumption on the chromaticity consistency is taken into account. The ambient light chromaticity is approximately the same as the chromaticity of the diffused light. Magnitude of the difference between chromaticity values of shadow and non-shadow region for difference hue values or different for RGB and HSV colour space show both spaces are used in conjunction by setting threshold on these differences. In [4] the facial regions are taken into account. Each facial region is taken and classified.

In this paper, we propose a new method for manipulating image gradient fields based on affine transformation using projection tensors. Our approach provides a principled way of removing scene texture edges from images as compared to thresholding. We make no assumptions on ambient lighting, smoothness of the reflectance or the illumination map and do not use explicit shadow masks. To remove shadow from the ambient image, we need a reflected image, also called as flash image. The gradient of the two images are derived in both x and y directions. The cross projection tensors are derived from the flash image. These tensor values are applied on the ambient image. This will result in shadow free image.

Figure 1: Block diagram for removing shadows from the ambient image using flash image



II. PROPOSED METHODOLOGY

All images are a combination of primary colors like red, blue, green. These two RGB images are converted into YUV images. This will reduce the number of colour components for processing. These images are converted into gradient images in x-axis component and y-axis component to predict the direction of the shadow in the image. Then cross projection tensors are applied on flash images. This will analyze the scalar and vector components of the two images i.e. flash image and the ambient image. The output is given to the affine transform which is used to rotating, scaling etc. The result of all the above process will result in shadow free image. The shadow free image is let to compare with database image. For this the principle component analysis is used. The principle features are extracted. Eigen vectors and Eigen values are calculated. Now the KNN classifier compares the two images and produces the result. Figure 1 shows the basic block diagram for removing shadow free image.

A. Computing the gradients

We will begin by showing how to compute the gradient at an image location. Then we'll show that the thing that we compute actually does encode the gradient direction and magnitude. We form the gradient vector by combining the partial derivative of the image in the x direction and the y direction.

$$\Delta \mathbf{I} = (\partial \mathbf{I}/\partial \mathbf{x}, \partial \mathbf{I}/\partial \mathbf{y}) \quad \ldots(1)$$

For a continuous function, I(x, y) we could write this as:

$$(\partial \mathbf{I}(\mathbf{x},\mathbf{y})/\partial \mathbf{x}) = \lim_{\Delta \mathbf{x} \to 0}(\mathbf{I}(\mathbf{x}+\Delta \mathbf{x},\mathbf{y})-\mathbf{I}(\mathbf{x},\mathbf{y}))/\Delta \mathbf{x} \quad \ldots(2)$$

In the discrete case, we can only take differences at one pixel intervals. So we can take the difference between I(x,y) and the pixel before it, or the pixel after it. Using correlation we can treat the pixels before and after I(x,y) symmetrically, and compute:

$$(\partial I(x,y)/\partial x) = (\, I(x+1,y) - I(x-1,y))/2 \quad \ldots(3)$$

B. Affine transformation on gradient

Let I(x,y) be an intensity image and $\nabla I = \begin{pmatrix} g_x \\ g_y \end{pmatrix}$ denote the gradient vector of I at each pixel. The smoothed structure tensor Gσ is defined as

$$\mathbf{G}_\sigma = (\nabla I \nabla I^T) * K_\sigma = \begin{bmatrix} g_x^2 & g_x g_y \\ g_x g_y & g_y^2 \end{bmatrix} * K_\sigma$$

where $*$ denotes convolution and Kσ is a normalized 2D Gaussian kernel of variance σ. The matrix Gσ can be de-composed as

$$\mathbf{G}_\sigma = V \Sigma V^T = \begin{bmatrix} \mathbf{v}_1 & \mathbf{v}_2 \end{bmatrix} \begin{bmatrix} \lambda_1 & 0 \\ 0 & \lambda_2 \end{bmatrix} \begin{bmatrix} \mathbf{v}_1^T \\ \mathbf{v}_2^T \end{bmatrix},$$

where v1, v2 denote the eigen-vectors corresponding to the eigen-values λ1, λ2 respectively and $\lambda 2 \leq \lambda 1$. The eigen-values and eigen-vectors of Gσ give information about the local intensity structures in the image [2]. For homogeneous regions, $\lambda 1 = \lambda 2 = 0$. If $\lambda 2 = 0$ and $\lambda 1 > 0$, it signifies the presence of an intensity edge. The eigen-vector v1 (cor-responding to the higher eigen-value λ1) corresponds to thedirection of the edge.

C. Tensors

$$D^{self} = \begin{bmatrix} \mathbf{v}_1 & \mathbf{v}_2 \end{bmatrix} \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} \mathbf{v}_1^T \\ \mathbf{v}_2^T \end{bmatrix}$$

$$D^{self}\mathbf{v}_1 = \begin{bmatrix} \mathbf{v}_1 & \mathbf{v}_2 \end{bmatrix} \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} \mathbf{v}_1^T \\ \mathbf{v}_2^T \end{bmatrix} \mathbf{v}_1$$

$$= \begin{bmatrix} \mathbf{v}_1 & \mathbf{v}_2 \end{bmatrix} \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

Tensors are geometric objects that describe linear relations between vectors, scalars, and other tensors. Elementary examples of such relations include the dot product, cross product, and linear map vectors and scalars themselves are also tensors. A tensor can be represented as a multi-dimensional array of numerical values.

D. Self projection tensors

We first discuss how to remove edges from a single image by estimating projection tensors from the image itself. The idea is to project the image gradient vector onto its own orthogonal direction and hence the name self-projection tensors. This analysis will lead us to our main idea of cross projection tensors is to estimate these tensors from a second image and apply them to the given image to suppress edges. In [1], Agrawal proposed the technique of gradient projection to remove artifacts from flash image using a no-flash ambient image. They project the flash image gradient onto the direction of the ambient image gradient to remove spurious edges from flash image due to glass reflections. They use the idea that the direction of the image gradient remains stable under illumination changes. We first show that taking a projection can also be defined by an affine transformation of the gradient field. The Eigen-vector v1 of the structure tensor matrix G correspond to the direction of the edge. Suppose by

an affine transformation of the gradient field. The Eigen Vector v1 of the structure tensor matrix G correspond to the direction of the edge. Suppose we define the self-projection tensor D^{self} as $u_1=v_1$ $u_2=v_2$ $\mu_1=0$ $\mu_2=1$. It is easy to see that an affine transformation of the image gradient using D^{self} will remove the local edge.

E. Cross projection tensors

We now show how to remove the scene texture edges from an image by transforming its gradient field using cross projection tensors obtained from a second image of the same scene. The final image is obtained by a 2D integration. If A is also homogeneous ($\lambda_A^1 = 0$), set $\mu_1 = \mu_2 = 0$. These results in If A is also homogeneous ($\lambda_A^1 = 0$), set $\mu_1 = \mu_2 = 0$. These results in

$$D(x,y) = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

If A is not homogeneous ($\lambda_A^1 > 0$), set $\mu_1 = \mu_2 = 1$. This results in

$$D(x,y) = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

and edges which are in A but not in B can be retained. Else, if there is an edge in B ($\lambda_B^1 > 0$), remove that edge by setting $\mu_1 = 0$, $\mu_2 = 1$.

F..Feature extraction

Feature extraction process can be defined as the procedure of extracting relevant information from a face image. This information must be valuable to the later step of identifying the subject with an acceptable error rate. The feature extraction process must be efficient in terms of computing time and memory usage. The output should also be optimized for the classification.

G. Principle component analysis

PCA is mathematically defined as an orthogonal linear transformation that transforms the data to a new coordinate system such that the greatest variance by any projection of the data comes to lie on the first coordinate, the second greatest variance on the second coordinate, and so on. The main idea of using PCA for face recognition is to express the large 1-D vector of pixels constructed from 2-D facial image into the compact principal components of the feature space. Principal component analysis (PCA) has been called one of the most valuable results from applied linear algebra. PCA is used abundantly in all forms of analysis from neuroscience to computer graphics because it is a simple, non-parametric method of extracting relevant information from confusing data sets. With minimal additional effort

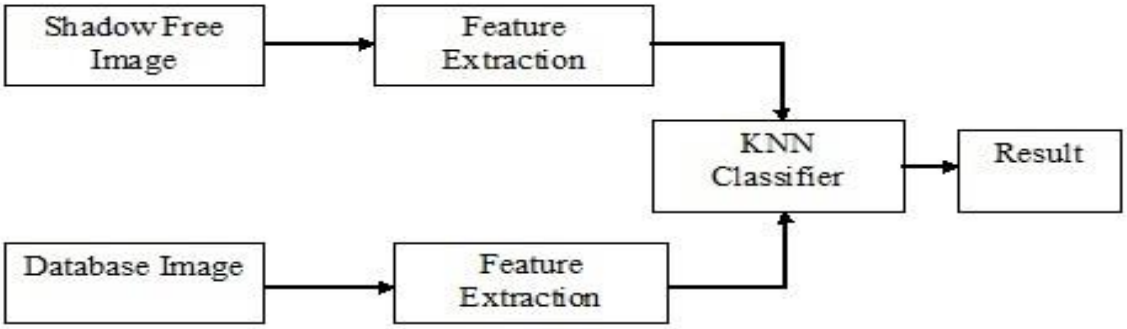


Figure 2: Block diagram of classification of images by KNN classifier

PCA provides a road map for how to reduce a complex data set to a lower dimension to reveal the sometimes hidden, simplified structure that often underlie it.

H. Classification

Classification is a process of grouping up of similar things. In this we are going to classify the test images with the already present database images. For this, we use KNN classifier.

I.K-NN Classifier

An instance based learning method called the K-Nearest Neighbor or K-NN algorithm has been used in many applications in areas such as data mining, statistical pattern recognition, image processing. Suppose each sample in our data set has n attributes which we combine to form an n-dimensional vector: x = (x1, x2, . . . , xn). These n attributes are considered to be the independent variables. Each sample also has another attribute, denoted by y (the dependent variable), whose value depends on the other n attributes x. We assume that y is a categorical variable, and there is a scalar function, f, which assigns a class, y

= f(x) to every such vectors. A set of T vectors are given together with their corresponding classes: x(i), y(i) for i = 1, 2, . . . , T. This set is referred to as the training set. The problem we want to solve is the following. Supposed we are given a new sample where x = u. We want to find the class that this sample belongs. If we knew the function f , we would simply compute ,v = f(u) to know how to classify this new sample, but of course we do not know anything about f except that it is sufficiently smooth. The idea in K -Nearest Neighbor methods is to identify k samples in the training set whose independent variables x are similar to u, and to use these k samples to classify this new sample into a class, v. If all we are prepared to assume is that f is a smooth function, a reasonable idea is to look for samples in our training data that are near it and then to compute v from the values of y for these samples. The result of KNN classifier is shown

III. RESULTS

We use a flash image F of the scene to remove shadows from the ambient (no-flash) image A. The flash and the ambient images were captured in quick succession using the remote capture utility with the camera mounted on a tripod. We obtain the cross projection tensor D^F using F and trans-form the gradient field ∇A using it. Figure 1 shows an ex-ample on a highly textured book. Notice that the recovered shadow free image A'' has no color artifacts and the recovered illumination map A' is free of strong texture edges on the face of the book. Figure 6 shows a challenging scenario where the hat on the mannequin casts shadows on the given ambient image. Usually, the ambient and flash images have different color tone due to ambient lighting being yellow-reddish and flash illumination being bluish. Our algorithm requires no pre-processing or color calibration and has no color artifacts as compared to the result using gradient projection. One might think that the ratio image A^F could give the illumination map of the scene. However, the ratio image (shown in Figure 6) does not represent the illumination map due to the effects of flash shadows (at depth discontinuities) and lighting variations (on top of the hat) due to the flash. The illumination map obtained by our approach better represents the diffuse ambient illumination.

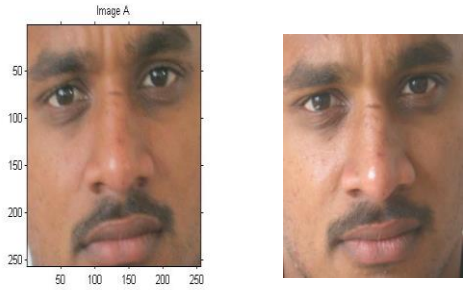


Figure.3 (a) Ambient Image (b) Flash Image

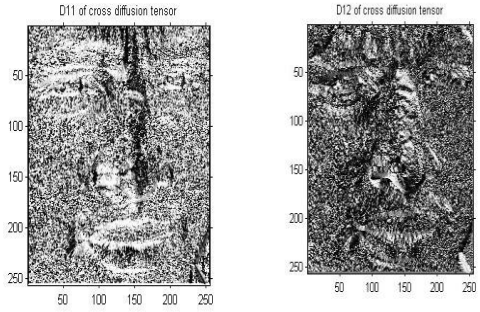


Figure.4. D11 and D12 of cross diffusion tensor

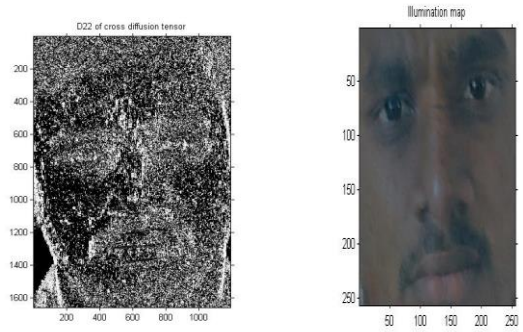


Figure.5. (a)D22 cross diffusion tensor (b)Recovered Illumination map

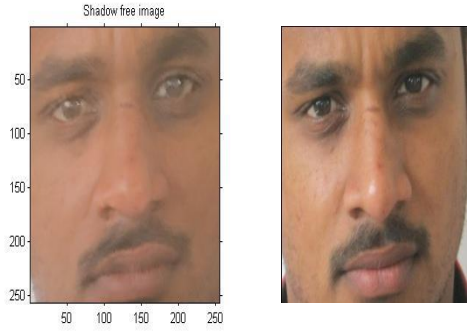


Figure 6. Shadow free image

The figures 3,4,5 and 6 shows how the shadows are removed using the ambient and flash image. Removing cast shadows. (Top row) Ambient and flash images. The hat casts shadows on the mannequin's face and neck in the ambient image A. The flash image F is taken with a short exposure time.

(Second row) Recovered shadow free image A" and the illumination map A' . (Last row) Result using gradient projection has visible color artifacts. One cannot obtain the illumination map by taking the ratio A/F (shown on right) which is confounded by shadows due to flash and uneven lighting on the hat. Notice that the white balance in the flash and ambient images is different. Our result does not have any color artifacts.
After getting the shadow free image , we can go for classification process. The input query image has been given. The feature extraction using principal component analysis has been processed. The K-NN classifer now compares the query image features with the features which are already stored in the databases. The output is shown in figure.7.

IV. CONCLUSION

We have presented an approach for edge-suppressing operations on an image, based on affine transformation of gradient fields using cross projection tensor derived from another image. The shadow in the ambient image can be removed by this. Though the orientation of the faces, facial reactions are not considered, this project will be useful in many applications. In addition, we have extracted the principle features from two images and compared it with KNN classifier. This can be used in authentication purpose, verification etc. Our approach is simple and easy to handle.

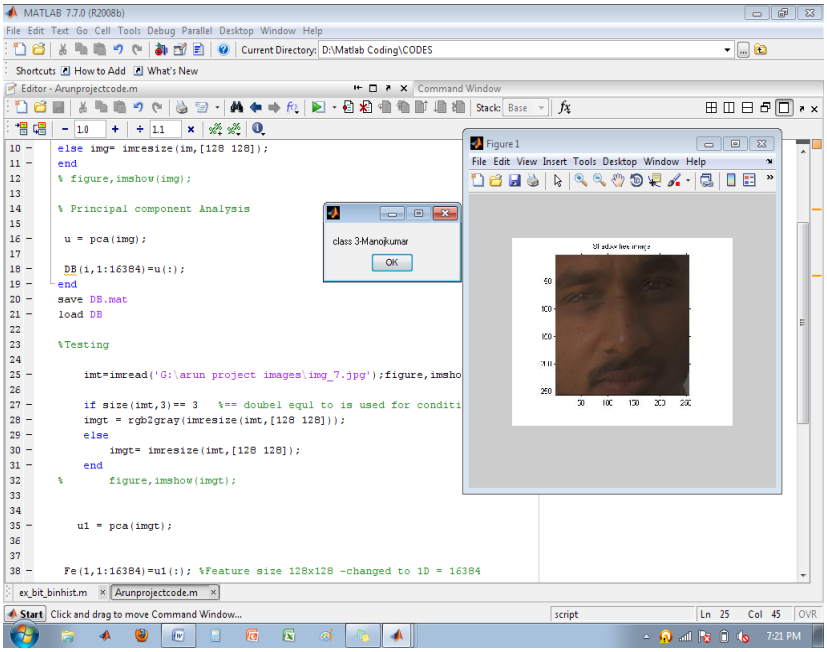


Figure.7. Classifier output

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A Study on Anxiety, Depression and Mental Health Status among Old Age People

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Abstract- The purpose of the study was to explore the relationships between anxiety, depression and mental health status among old age people. The sample consists of 50 participants within range of 60 to 70 years. Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI) and Mithila Mental Health Status Inventory were administered to all the respondents. The data was analysed by using descriptive statistics i.e. mean and SD, Pearson product moment correlation and step wise multiple regression. The result revealed that anxiety was significantly correlated with depression and alienation and negatively correlated with expression (sub-component of mental health status). Depression was found to have significant positive relationship with egocentrism, alienation, emotional un-stability and social non-conformity, and negative relationship with expression. The step wise regression analysis found emotional unstability and alienation to be predictors of depression.

Index Terms- Anxiety, depression and mental health status, old age

I. INTRODUCTION

A healthy person has a healthy mind and is able to think clearly, solve problems in life, work productively, enjoy good relationships with others, feel spiritually at ease, and make a contribution to the society. These aspects of functioning can be considered as mental health. World Health Organization (WHO) defined Mental health as, 'a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community'. Mental health is vital for individuals, family and community, and is more than just the absence of mental disorder. Mental health problem can have a serious impact on an older person' ability to carry out many of the basic activities of daily living (from getting up, washing and dressing, to shopping and cooking, getting adequate exercise and managing financial affairs). The impact on their quality of life, even from minor symptoms, can be huge. Kim, Byeon, Kim, Endo, Akahoshi and Ogasawara (2009) found that perception of general health was significant predictor of depression.

Anxiety is an unpleasant state of mind, which includes excessive fear, nervousness and worry. Anxiety is a mental disorder that is more severe and longer lasting than everyday worries. It interferes with a person's ability to carry out his/ her work or have satisfying personal relationships. Mental disorder is characterised as any illness that affects people's emotions, thoughts or behaviour, which is out of keeping with their cultural beliefs and personality, and is producing a negative effect on their lives or the lives of their families.

Symptoms of anxiety include unrealistic or excessive fear, worry and following: irritability, worrying about things a lot, feeling that something terrible is going to happen, feeling scared and avoiding certain situations e.g. social events, disturbed sleep, muscle tension, restlessness, physical symptoms like rapid heartbeat and trembling. There are many types of anxiety disorders ranging from mild uneasiness to panic attacks. For many elderly, anxiety and stress seem to be part of the aging process.

Kessler et al. (2005) conducted a study involving interviews with nearly 6000 people nationwide & reported a lifetime rate of 15.3% for DSM-VI diagnosed anxiety disorders in respondents over the age of 60. Study of Ritchie, et al. (2004) revealed 14.2% prevalence for current anxiety disorder among aged 65 and older in French community sample. Levy et al. (2003) compared anxiety symptoms in older adults and younger adults and found that older adults tend to minimize and underreport their anxiety symptoms. In a study Krasucki, Howard and Mann (1999) found that, in primary care settings 30 % of older adults were present with generalized anxiety symptoms.

Depression reflects a range of biological and social factors and it may be difficult to diagnose in older people as compared to younger people. Older people tend to under report depressive symptoms and may not acknowledge being sad, or depressed. This could be due to age, shame and lack of understanding for the disorder or a belief in not talking about depression. Common symptoms of depression are loss of interest in life, lack of enjoyment in normal activities, apprehension, poor sleep, and persistent thought of death, chronic unexplained pain, dementia or poor health. Physical symptoms include dizziness, chronic aches and pains, constipation, weight loss and insomnia.

Beck and Averill (2004) reported that anxiety in older adults has been found to often co-occur with depression. Hopko, Bourland and Stanley (2000) reported that presence of depression has been associated with higher severity of Generalized Anxiety Disorder (GAD) among older adults. Lenze, Mulsant and Shear (2000) revealed that presence of GAD symptoms among depressed older adults has been associated with greater suicidality. Abramowitz, Franklin and Street (2000) indicated that anxiety disorder treatment has been found to be less effective when major depressive episodes are present. Ettner and Hermann (1997) found that older adults with anxiety disorder are

less likely than older adults with depression, dementia, or any other mental disorder to receive treatment from a mental health professional. Naomi, Marlyne and Patricia (1991) conducted a study with a sample size of 1007 young adults by using the National Institute of Mental Health Diagnostic Interview Schedule. They concluded that persons with nicotine dependence had higher rates of major depression and anxiety disorders. The purpose of the present study was to explore the relationship between anxiety and depression with the mental health status among old people. It was hypothesized that anxiety shows positive relation with depression and will be positively correlated with emotional un-stability **(**Mental Health Status). It was further hypothesized that depression would have negative relationship with expression **(**Mental Health Status).

II. METHOD

Sample

The sample consisted of 50 participants, who were selected from urban population of NCR. It was sample of convenience selected by approaching the participants at their house. Participants were selected in the range of 60-70 years old and all the participants were free of any severe medical illness, were able to communicate well and understand instructions. An informed consent was taken from all the participants and confidentiality was ensured.

Procedure

The appropriate instructions were directly administered on target sample for obtaining the data. It was ensured that the participants had understood the method of responding for the tests. Thereafter scoring was done according to the manual. The scores were statistically analyzed in the light of 'descriptive statistics', correlation and regression analyses.

Measures

The following psychometric tools were used for the collection of data in the present study.

Beck Anxiety Inventory (BAI; Beck & Steer, 1990): The BAI is a 21-item self report questionnaire that lists symptoms of the anxiety. The respondent is asked to rate how much each symptom has bothered him/her in the past week. The symptoms are rated on a four –point scale, ranging from ''not at all'' (0) to ''severely'' (3). The instrument has excellent internal consistency (alpha= .92) and high test-rest reliability = .75 (Beck & Steer, 1990).

Beck Depression Inventory (BDI; Beck 1991): The Beck Depression Inventory is a 21item self report scale measuring depression. The internal consistency of the BDI ranges from .73 to .92, with a mean of .86. The BDI demonstrates high internal consistency, with alpha coefficient of .86 and .81 for psychiatric and no psychiatric patients. The BDI has split-half reliability coefficient of .93.

Mithila Mental Health Status Inventory (MMHSI; Anand Kumar and Giridhar P. Thakur 1984): The MMHST Inventory is a 50 item self-report scale measuring the mental health status of the people. The responses were to be obtained on a five point response format. This inventory has five sub-scales viz, Egocentrism, Alienation, Expression, Emotional Unstability and Social non-conformity. Reliability co-efficient of the MMHSI scales ranged from .74 to .88 with reference to internal consistency and .73 to .89 in test re-test stability.

III. RESULTS AND DISCUSSION

The present study was conducted on anxiety, depression and mental health status among old age people. The obtained data were analysed by applying descriptive statistics i.e. mean and SD, and Pearson's Product Moment method of correlation. Regression analysis was conducted with mental health status as the predictor variable and depression as the outcome variable.

Table 1: Correlation Matrix of Mental Health Status with Depression and Anxiety

	Anxiety	**Depression**	**Egocentrism**	**Alienation**	**Expression**	**Emotional un-stability**	**Social Non-conformity**
Anxiety	**1**	.42**	**.23**	**.37****	-.49**	**.37****	**.05**
Depression		**1**	**.49****	**.69****	-.57**	.72**	**.34***
Egocentrism			**1**	**.41****	**-.42****	**.46****	**.37****
Alienation				**1**	**-.73****	**.76****	**.49****
Expression					**1**	**-.71****	**-.24**
Emotional un-stability						**1**	**.26**
Social Non-conformity							**1**
Mean	25.70	22.74	28.62	25.92	22.76	35.70	27.22
S D	9.28	6.50	4.12	4.00	5.31	5.00	4.05

***Significant at .05 level and ** Significant at .01 level**

Table 1 represents correlation matrix of anxiety, depression and mental health status variables. It shows that there is positive meaningful correlation between anxiety and depression with correlation coefficient of .42 which is significant at .01 level. It means that people with high anxiety have high level of depression. Anxiety is found to be positively correlated with alienation (.37) and emotional un-stability (.37) which are significant at .01 levels. The correlation between anxiety and expression is found to be negative with a correlation coefficient of -.49 which is significant at .01 levels. It reflects that highly anxious people would have low level of expression. Further, anxiety was found to be non-significant with egocentrism and social non-conformity.

Depression is found to be positively correlated with egocentrism (.49), alienation (.69) and emotional un-stability (.72) which is significant at .01 level. The relationship between depression and social non conformity is found to be positively correlated (.34) at .05 level. On the other hand negative association is found in depression and expression with a correlation coefficient of -.57 which is significant at .01 levels. It indicates that depressive people lack in expression.

Table 2 Step wise Regression Analysis: Dependent variable (Depression)

Variable	R	R^2	R^2 Change	F	p
Emotional Un-stability	.72	.52	.52	53.18	.001
Alienation	.75	.57	.05	5.17	.001

Table 2 shows the stepwise regression analysis. The predictor measure of emotional un- stability accounts for 52 % variance in depression. (R =.72, R^2 =.53) F value is equal to 53.18 which is significant at .001 level. It may be interpreted that emotional unstablity appropriately predicts depression. The second predicator measure of alienation accounts only 5% variance in depression (R =.75, R^2 =.57) F value is equal to 5.17 which is significant at .001 level. It indicated that alienation is predictor of depression.

The study explores an important area pertaining to mental health status of the elderly residing in urban area. Anxiety is a warning sign for depression in elderly and depression is the most common mental health problem in older people. The relationship between anxiety and depression is found to be positive in the present study. Byrne and Pachana (2010) have also reported that there is a positive relationship between depression and anxiety among old people. They also found that depression leads to cognitive decline and dementia. Schultz, Moser, Bishop and Ellingrod (2005) demonstrated that older adults (age 55 and older) with clinically significant anxiety show poorer cognitive functioning as measured by the RBANS, a measure of general cognitive function.

On mental health status's subscale, anxiety was found to be non significant with egocentrism and social non conformity. People high on egocentrism have difficulty in identifying or sympathizing with other people in family and society. In old age stage, people start thinking that the society has changed so much and feel a distance from the social system. On the other hand a positive association was found between anxiety and alienation and emotional un-stability. It indicates that high anxiety old people have high level of alienation and emotional unstability. Results shows that people high depression have high level of alienation. The correlation between anxiety and expression is found to be negative. It indicates that depressive people do not open with others and found less expressive. Basic behavioral, psychophysiological, and neuroimaging research in emotion processing suggests that emotion expression changes with aging. Lawton and Kleban (1993) found distinctly different factor structures for self-reported affect in young, middle aged and older individuals.

The correlation between depression and expression is found negative and reveals that depressive old age people are less expressive and do not share thoughts and feelings with others. The result indicates that the person high in depression shows high alienation, high emotional stability and high egocentrism. Alienation and emotional unstability are found to be predictors of depression in the present study.

This study, while valuable, has some limitations. First, this study was conducted on small sample size and data was collected from limited area. Thus the results may not generalize to other sample with different characteristic. Another limitation is that study has not emphasised on gender difference which is considered an important variable. An additional limitation is some of the participants were retired and some were working which may effect the mental health of a person. Future studies might be focused on larger sample size with respect to the old age population especially in gender difference and socio-cultural context.

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Cytogenetic Exploration of *Plantago lagopus* Linn. – Hare's-foot Plantain

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Abstract- The genus Plantago of family Plantaginaceae includes about 483 species. These are small, annual or perennial herbaceous plants with various medicinal properties. The word Plantago is taken from the "planta" which means "sole of the foot". The *Plantago lagopus* is a wild plant.

The meiotic studies of *Plantago lagopus* plants revealed 12 chromosomes. The various stages of meiosis viz; Pachytene, Diplotene, Diakinesis, Metaphase and Anaphase were observed. The number of Rod Bivalents was 06, absence of Ring Bivalents & Nucleolar Chromosomes were 02 in *P.lagopus.* The Chiasmata Frequency was calculated at Metaphase-I (/PMC=02, /II=1.0) and at Diakinesis was (/PMC=12, /II=02). The other parameters studied included Recombination Index and Terminalization Coefficient. The Recombination Index at Diakinesis of *P. lagopus* was 18 and at Metaphase was 08 respectively. The Terminalization Coefficient was 0.5 in *P.lagopus.* The Anaphase-I was irregular in some of the PMCs. The number of late separating bivalents was 01.

Index Terms- Plantago lagopus, Meiosis, Recombination Index, Terminalization Coefficient, Chromosomes

I. INTRODUCTION

The genus Plantago of family Plantaginaceae comprises about about 483 species [1]. The genus is the prevalent of the three genera on which family Plantaginaceae is based. Although the centre of diversity of plantagos is deemed to be positioned somewhere in central Asia, some species have now become widespread far and wide with utmost concentration in temperate regions [2]. A few species proliferate even in tropical zones where they either grow wild or are cultivated. The Plantagos are small, annual and perennial herbs of warm temperate, sandy provinces and are widely allocated.

The *Plantago lagopus* is an annual, small, stemless herb, up to 50 cm tall. Leaves are rosettes, decumbent to ascendent, membranous to papery, flexible, broad lanceolate, 12-15 (-18) cm long, 0.6-2 (-3) cm broad, tapering at both ends, acute, with base attenuated into narrow petioles, nerves 3-5, pilose to glabrous. The Scapes are ± flexuose, arcuate, ascendent, 10-20 (-45) cm long. The Spikes of this herb are dense, ovoid, later becoming short cylindrical, 1.5-3 (-4) cm long. The Bracts are lanceolate to ovate-lanceolate, 3-4 mm long, hirsute-pilose, carinate. The Anterior sepals are connate. The Corolla is bilobed, lobes 02 mm long, acuminate. The Capsules are 2.25-2.5 mm long, ellipsoid with two oblong Seeds. The Flowering period starts from April to June. The Habitat of the plant is Sandy soils, road edges, fields and uncultivated places. The plant is distributed all over the Mediterranean region to Aegean and Mediterranean part of Turkey Afghanistan and Pakistan. [3], [4], [5]. According to P. K. Sharma [6], [7] *Plantago lagopus* is a Mediterranean species with 2n=12. Previous cytological knowledge of *Plantago* L. has revealed that this genus has three different basic chromosome numbers of x=4, 5 and 6. The basic number of x= 6 is the original number from which x= 5 & x= 4 have been derived. The *Plantago lagopus* L. is considered a refreshing form of food besides it has huge ethno botanic medicinal usage in diverse countries [8], [9], [10] .Beforehand, nutrient composition of *P. lagopus* was shown in addition to the occurrence of iridoid and phenyethanoid glycosides [11]. Based on the ethnobotanical value of *P. lagopus*, DPPH radical scavenging and cytotoxic activities of this plant against MCF-7 cell line were also determined previously [12], [13]. The cytotoxic and radical scavenging activities of *P. lagopus* many be effective against diseases for instance, inflammation, cancer, ischemic disorders and dementia [14].

II. MATERIALS & METHODS

MEIOTIC STUDIES:

The seeds of *P. lagopus* were sown and maintained in pots in the Department of Biotechnology, University of Jammu, Jammu. For studying meiosis in anthers of male plant, young spikes were fixed at early morning at RT for 24 hours in a mixture of 4 parts chloroform, 3 parts ethyl alcohol, and 1 part acetic acid and a pinch of ferric chloride. Thereafter, they were washed in tap water and stored in 70% ethyl alcohol inside refrigerator at 4º C. The meiotic details in pollen mother cells were studied by squashing anthers in 1% acetocarmine and observations were made under the light microscope.

During meiotic studies, Chiasmata frequency & Recombination index was calculated at Diakinesis and Metaphase- I. The Terminalization coefficient was also calculated.

These were calculated by applying the following formulae:

Recombination index= n+Chiasmata frequency/cell,
Where n is the number of bivalents.

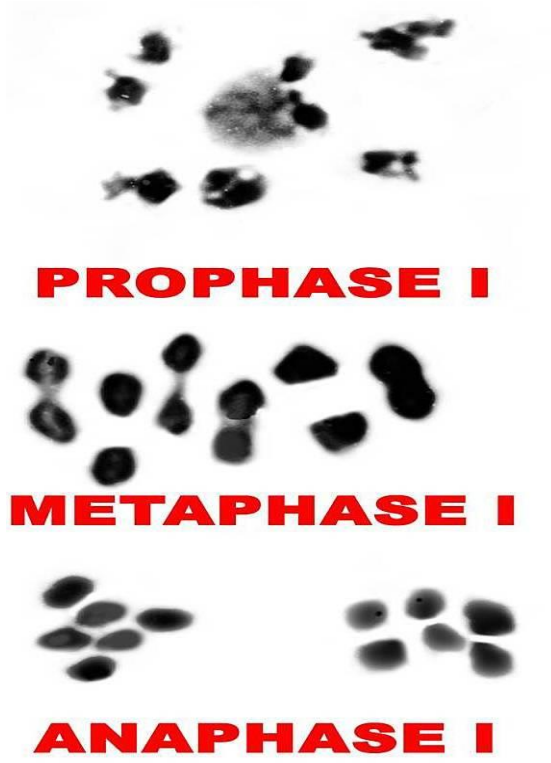
Terminalization coefficient=

Average number of terminalized chiasmata per PMC
Average number of total chiasmata per PMC

All the cytological observations were made from temporary mounts and observations were noted down.

III. RESULTS & DISCUSSION

This wild herb has a relatively wide distribution in



Europe, Mediterranean regions of Turkey, Iran, Caucasus, Siberia, Afghanistan, Pakistan, Palestine, Iraq, Syria and northern Africa [15]. The meiotic chromosomes of these plants revealed 12 chromosomes. This chromosome count of 2n=12 agrees with the counts reported by McCullagh [16] and Badr [17]. McCullagh [16], Zohary [18] Briggs [19], Badr & El-Kholy [20], Mastuo & Noguchi [21], Badr [17] Bassett & Crompton [22], and Fujiwara [23], [24] who gave the chromosome numbers of P. lagopus L. as 2n=12. An evaluation between preceding reports and current results revealed that the chromosome numbers for this plant is similar.

The cytological data is of great significance for the understanding of relationship and evolution in angiosperms. The various stages of meiosis viz; Pachytene, Diplotene, Diakinesis, Metaphase and Anaphase were observed. The number of Rod Bivalents was 06, absence of Ring Bivalents & Nucleolar Chromosomes were 02 in P.lagopus. The Chiasmata Frequency was calculated at Metaphase-I as 02/PMC & 01/Bivalent and at Diakinesis was 12/PMC & 02/Bivalent. The other parameters studied included Recombination Index and Terminalization Coefficient.

TABLE1. DETAILS OF PMC MEIOSIS IN PLANTAGO LAGOPUS

GAMETIC NUMBER OF CHROMOSOMES			06
NUMBER OF NUCLEOLAR CHROMOSOMES			02
NUMBER OF RING BIVALENTS			00
NUMBER OF ROD BIVALENTS			06
DIAKINESIS	NUMBER OF CHIASMATA	PER PMC	12
		PER BIVALENT	02
		RECOMBINATION INDEX	18
METAPHASE- I	NUMBER OF CHIASMATA	PER PMC	02
		PER BIVALENT	01
		RECOMBINATION INDEX	08
		TERMINALIZATION COEFFICIENT	0.5
ANAPHASE -I	REGULAR/IRREGULAR		REGULAR/ SOMETIMES IRREGULAR
	NUMBER OF LATE SEPARATING BIVALENTS		01

The Recombination Index at Diakinesis of *P. lagopus* was 18 and at Metaphase was 08. The Terminalization Coefficient was 0.5 in *P.lagopus.* The Anaphase-I was irregular in some of the PMCs. The number of late separating bivalents was 01. The genus Plantago is tribasic; X=4,5 and 6 [25] with X=06 as the primary base number and others as the secondary derivatives of it. The conclusion of current research work is identical with the results reported by the earlier workers from time to time with minor differences [26], [27], [28], [29].

IV. CONCLUSION

The *Plantago lagopus* is very important plant with strong cytotoxic and radical scavenging activities protect cells against free radical injuries in addition to inhibition of cancer cells proliferation due to presence of pro-oxidant effect of phenolics in higher concentrations. The cytological and genomic investigations of this wild plant will throw more light on its important properties. Consequently, the investigation of chromosome evolution might provide auxiliary knowledge in order to ascertain the evolutionary location of a species within a genus and for an enhanced understanding of the interspecific relationships in a family.

ACKNOWLEDGEMENT

The author is thankful to Prof. M.K. Dhar, Director School of Biotechnology, University of Jammu, Jammu for his encouragement & the Council of Scientific & Industrial Research, India for financial assistance in the form of Junior Research Fellowship & Senior Research Fellowship for execution of this part of Research work.

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Performance Comparison of Conventional, Genetic Algorithm and Particle Swarm Optimization for optimal design of Transformer with respect to its Total Owning Cost

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Abstract- Evaluation of Transformer Owning Cost (TOC) plays an important role during the selection of a transformer by an industrial customer. The dependency and the relationship between the transformer design and the TOC is used to obtain a cost optimal design for the test case. The TOC evaluation by conventional method is compared with those of results obtained after optimizing design variables using Genetic Algorithm (GA) and Particle Swarm Optimization (PSO), out of which the latter has provided a much minimized solution than the other two methods. Thus a minimized total owning cost is obtained using design variables optimized by particle swarm optimization technique.

Index Terms- Optimisation,Genetic Algorithm(GA), Particle Swarm Optimisation(PSO), Total Owning Cost(TOC)

I. INTRODUCTION

The quality of transformers depends on good design. Generating plants, generating the bulk of AC power at high voltage are concentrated in few favorably situated stations. The power so generated is then transmitted at appreciably high voltage to reduce the amount of conducting material and to increase the transmission efficiency. However the distribution of power should be carried out at low voltage. Hence generated power is transformed twice, thrice or even four times before it is utilized. A transformer is a static device by means of which electric power in one circuit is transformed into electric power of the same frequency in another circuit. Building electrical equipment as economically as possible to meet the performance expectations of the intended application is of paramount importance for the manufacturers of electrical apparatus. The aim of design is to obtain completely the dimensions of all the parts of the machine to furnish data to manufacturers. While designing a transformer much emphasis should be placed on lowering its cost by saving the materials and reducing to a minimum labour consuming operation in its manufacture. The design should be satisfactory with respect to electrical strength, mechanical ruggedness, dynamic and thermal resistance of winding in the event of short circuit. Thus only the joint efforts of the designer and production engineer can develop new design of transformer satisfying closely the technical requirements with good reliability in service and with minimum cost.

This paper presents the design for rectifier transformer coil using Genetic algorithm[2]. The optimization data show that the improved genetic algorithm which can produce performance improvements in execution time and accuracy for a given coil optimization design is effective for practical use. [4] minimized the cost of power transformer using Chaos genetic algorithm.

[1] proposed optimal design of power transformer using particle swarm optimization and minimized ratio and phase displacement errors and construction cost. [3] proposed the idea of using Particle swarm optimization in design of Rectifier transformer.

II. CONVENTIONAL DESIGN OF TRANSFORMERS

TABLE I: TEST CASE

LV	440 V
HV	6600V
Maximum Flux Density	1.35Wb/mm^2
Frequency	50 Hz
Rated Output	300 kVA
Resistivity Of Copper	0.021Ω-m
Maximum Temperature rise	50
Type Of Cooling	Oil Natural Air Natural

A. IRON LOSS CALCULATION

When voltage is applied to the exciting or primary winding of the transformer, a magnetizing current flows in the primary winding. This current produces the flux in the core. The flow of flux in magnetic circuits is analogous to the flow of current in electrical circuits. When flux flows in the steel core, losses occur in the steel. This loss is constant throughout the operation of the transformer irrespective of its loading.

Volume of core = No. of limbsxCore areaxHeight of Core
Weight of core = Volume of core X Specific weight of iron
Volume of yoke = 2 X Area of yoke X Length of yoke
Weight of yoke = Volume of yoke X Specific weight of iron
Core loss = Weight of core X Specific loss in Core
Yoke loss = Weight of yoke X Specific loss in Yoke
Total iron loss = Core loss + Yoke loss

B. COPPER LOSS CALCULATION

Copper weight calculation involves calculation of both HV and LV windings together.

LV side:

Volume of copper in LV = No. of limbs X Area of LV X LV Turns X mean length of LV turns

Weight of copper=Volume of copper in LV X specific gravity of copper

HV side:

Volume of copper in HV= No. of limbs X area of HV X HV turns X mean length of HV turns

Weight of copper= Volume of copper in HV X specific gravity of copper

HV copper loss =(Phase current in HV) ^{2} X Resistance of HV Winding

TOTAL COPPER LOSS =LV COPPER LOSS+ HV COPPER LOSS

LV copper loss= (Phase current in LV) ^{2} X Resistance of LV Winding

Weight of copper = Volume of copper in LV X Specific gravity of Copper

Total Owning Cost TOC = Cost of materials + Cost of No load loss + Cost of Load loss

Cost of Core loss = A X No load loss in Watts
Cost of Load loss = B X Load loss in Watts
Where,

A = Avg. power cost X Avg. no-load running time during life period

B = Avg. load rate during life period X Load running time during life period X Avg. power cost

C. LOAD PROFILE

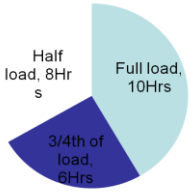

Fig I: Load profile

TABLE II. LOAD PROFILE

No. Of Hours(kW)	Load in KVA	Power factor	Load
10	300	0.95	285
6	225	0.95	213.75
8	150	0.95	142.5

Total Cu loss for a day ie, 24 hrs = (10* 3.6032) + (6* 2.0268) + (8* 0.9008) = 55.3986 kWhr
Cu loss at full load ie, 285 kW = 3.6032 kW
Cu loss at 3/4th of load ie, 213.75 kW = 2.0268 kW
Cu loss at 1/2th load ie, 142.5 kW = 0.9008 kW

CONVENTIONAL COST OF MATERIALS

TABLE III. COST OF MATERIALS

PART	MATERIAL	COST
CORE	Hot rolled steel	31 Rs/kg
COIL	Copper	445 Rs/kg
TANK	Mild Steel	50 Rs/kg
OIL	Refined mineral oil	15 Rs/litre
TUBE	Mild steel	50 Rs/kg

weight of core = 719.3606 kg
weight of copper = 228.1570 kg
weight of tank = 177.5301 kg
total volume of oil = 571.6786 litres
weight of tube = 246.7143 kg

Total Material Cost = (31*weight of core)+ (445*weight of copper)+ (total volume of oil*15)+ (weight of tank*50)+ (weight of tube*50) = (31*719.3606)+(445*228.1570)+ (571.6786*15)+ (177.5301*50)+(246.7143*50) **= 1,53,595 Rs**

CONVENTIONAL TOTAL COST AND EFFICIENCY

Energy transformed:
300 kVA * 0.95 * 8,760 = 2,496.6 MWh / year
Efficiency
η = (kva*power factor)/((kva*powerfactor)+total losses))*100= (300*0.95)/((300*0.95)+5354.2)*100 = **98.156 %** **Lifetime cost:**

Transformer:	1,53,595 Rs
Iron loss:	8,05,330 Rs
Copper loss:	10,61,575 Rs
Total	**20,20,500 Rs**

III. ESTIMATION OF TOC USING GENETIC ALGORITHM

A. PROCEDURE

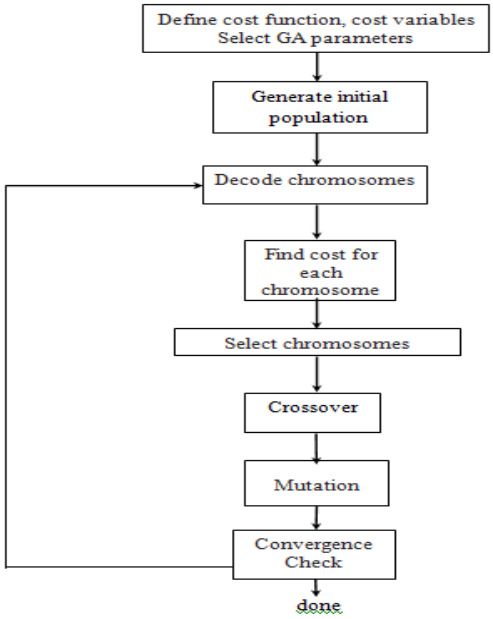

Fig II: Flowchart of Genetic algorithm

B. PROBLEM FORMULATION

Step 1: Objective Function definition

$$Min\{C_{Fe}XG_{Fe} + C_{Cu}XG_{Cu} + C_{tu}(G_{tu}+G_{tk}) + C_{ol}XG_{ol}+c_e(h_oXP_o + kXh_r XP_r)\}$$

c_{Fe} , unit price of iron, (Rs/kg)
c_{Cu} , unit price of copper conductor, (Rs/kg)
c_e , average power cost
h_o , average no-load running time during life period
k , average load rate during life period
h_r , load running time during life period
G_{Fe} , weight of iron
G_{Cu} , weight of copper conductor
P_o , no-load running loss of transformer
P_r , rated load loss of transformer
C_{tu} , Cost of tube material (Rs/kg)
G_{tu} , Weight of tube
G_{tk} , Weight of tank
C_{ol} , Cost of oil (Rs/litre)
G_{ol} , Volume of oil

Step 2: Basic design variables

There are six design variables:
1.Maximum flux density, B_m
2.Current Density, δ in LV winding
3.Current Density , δ in HV winding
4.Window space factor, k_w
5.Yoke area in terms of core area,%
6.K factor

Step 3: The Constraints considered are,

Weight of the Iron <Conventional results
Weight of the Copper <Conventional results
No-Load loss in a transformer < Rated no load loss
Load loss in a transformer < Rated load loss
Impedance percentage <Specified impedance percentage

Step 4: Set,

Population size = 100
Crossover probability = 0.8
Generations = 50
Stall generations = 50

Step 5: After 7 to 10 GA runs, the global optimum is reached for the problem.

Thus, the design variables are optimized in such a way that a minimized Total Owning Cost is obtained.

IV. ESTIMATION OF TOC USING PARTICLE SWARM OPTIMISATION(PSO)

Particle swarm optimization (PSO) is a population based stochastic optimization technique inspired by social behavior of bird flocking or fish schooling.PSO shares many similarities with evolutionary computation techniques such as Genetic Algorithms (GA). The system is initialized with a population of random solutions and searches for optima by updating generations. However, unlike GA, PSO has no evolution operators such as crossover and mutation. In PSO, the potential solutions, called particles, fly through the problem space by following the current optimum particles.Each particle keeps track of its coordinates in the problem space which are associated with the best solution (fitness) it has achieved so far. This value is called pbest. Another "best" value that is tracked by the particle swarm optimizer is the best value, obtained so far by any particle in the neighbors of the particle. This location is called lbest. When a particle takes all the population as its topological neighbors, the best value is a global best and is called gbest. After finding the two best values, the particle updates its velocity and positions with following equation (a) and(b).

v[]=[]+c1*rand()*(pbest[]-present[])+c2*rand()*(gbest[]-present[]) -- (a)present[]=present[]+v[] --(b)

v[] is the particle velocity present[] is the current particle (solution). pbest[] and gbest[] are defined as stated before. rand () is a random number between (0,1). c1, c2 are learning factors. usually c1 = c2 = 2.

The particle swarm optimization concept consists of, at each time step, changing the velocity of (accelerating) each particle toward its p*best* and *lbest* locations (local version of PSO). Acceleration is weighted by a random term, with separate random numbers being generated for acceleration toward *pbest* and *lbest* locations.

A. PROBLEM FORMULATION

The problem formulation for PSO and GA remains the same but care should be taken while setting up the population size, generations, stall generations, since, both the optimization techniques output should be weighted on the same scale.

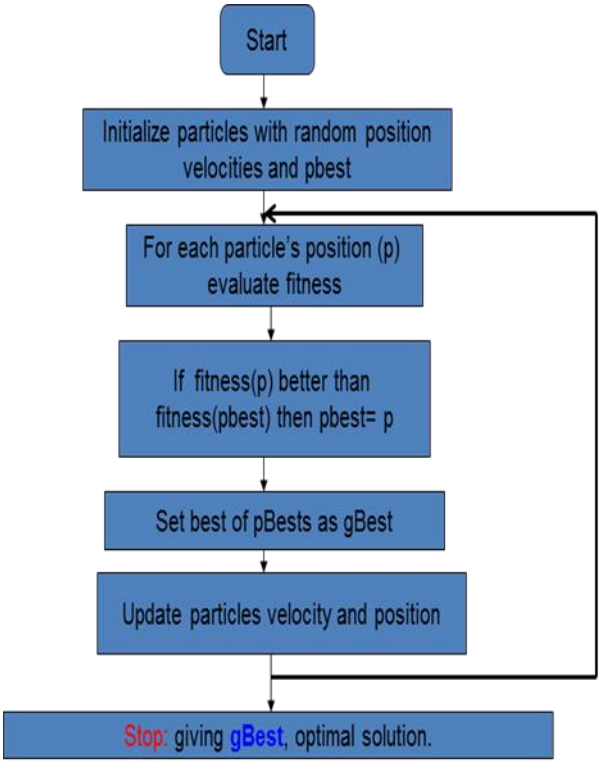

Fig III. Flowchart of PSO

V. RESULT ANALYSIS

TABLE IV. RESULT ANALYSIS

PARAMETERS	CONVENTIONAL	GA	PSO
Cost	20,20,500 Rs	18,32,354 Rs	18,32,294 Rs
Maximum efficiency	98.2677%	98.4419%	98.4420%
Efficiency	98.1560%	98.3757%	98.3757%
No. of tubes	40	32	32
No load loss	1.7511 kW	1.6825 kW	1.6825 kW
Impedance %	2.06%	2.4434 %	2.4439%
Weight of copper	228.1571 kg	249.9899 kg	250 kg
Load loss	3.6032 kW	3.0230 kW	3.0231 kW
Width of tank	41.0093 cm	42.9644 cm	42.9650 cm
Length of tank	107.0093 cm	108.9644 cm	108.9650 cm
Height of tank	138.0976 cm	128.2037 cm	128.2037 cm
Weight of iron	719.3696 kg	703.6916 cm	703.6907 kg
Area of yoke	299.0778 cm^2	316.12 03 cm^2	316.0740 cm^2
Thickness of yoke	18.7374 cm	19.6962 cm	19.6954 cm
Window length	55.6628 cm	43.8126 cm	43.8129 cm
Diameter of circumscribing circle	20.8194 cm	21.8846 cm	21.8838 cm
Height of transformer	93.0976 cm	83.2049 cm	83.2037 cm
Width of Transformer	86.7374 cm	87.6962 cm	87.6954 cm
Window Width	13.1806 cm	12.1154 cm	12.1162 cm
Area of window	733.1432 cm^2	530.8061 cm^2	530.8468 cm^2
Area of core	260.0667 cm^2	287.3620 cm^2	287.34cm^2
HV turns	830	754	754
LV turns	32	30	30
EMF per turn	7.7942 V	8.6122 V	8.6116 V
Area of LV winding	1.7116 cm^2	1.6985 cm^2	1.6814 cm^2
Area of HV winding	0.0547 cm^2	0.0686 cm^2	0.0692 cm^2

TABLE V. COMPARISON OF GA AND PSO

VALUE	GA	PSO
Minimum	18,32,354.2851	18,32,294.1086
Mean	18,32,624.6595	18,32,624.4115
Maximum	18,42,820.0192	18,42,581.6441

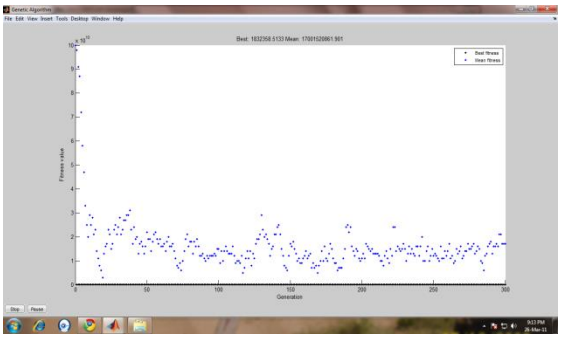

Fig IV: Plot for GA

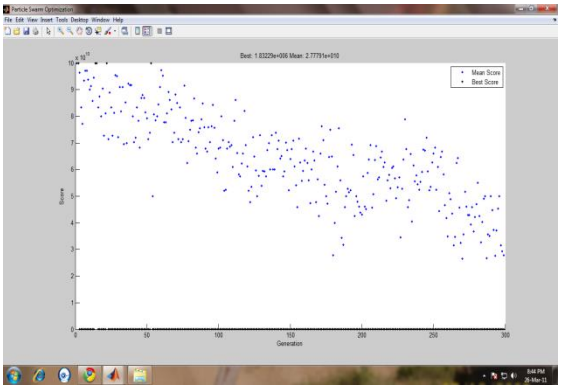

Fig V. Plot for PSO

VI. CONCLUSION

In this paper, the Total owning cost of transformer is minimized using Genetic Algorithm and Particle Swarm Optimization. This objective was achieved through the above mentioned algorithms using Matlab. By using the above mentioned method, both iron losses and load losses have been minimized, thereby increasing the efficiency of the transformer. New enhanced transformer design variables were obtained subsequently which results in overall reduction of transformer owning cost for a period of 15 years and improvement in the efficiency of transformer. Hence it can be inferred that minimization using PSO shows better results when compared with GA. The result shows that both PSO and GA works well and is helpful for optimal design of transformer.

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Utilization of Spintronics

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Abstract- Spintronics refers commonly to phenomena in which the spin of electrons in a solid state environment plays the determining role. In a narrow sense Spintronics refers to spin based electronics i.e. spin-polarized transport in metals and semiconductors. The goal of this applied Spintronics is to find effective ways of controlling electronic properties, such as the current or accumulated charge, by spin or magnetic field, as well as of controlling spin or magnetic properties by electric currents or gate voltages. The ultimate goal is to make practical device schemes that would enhance functionalities of the current charge based electronics. Spintronics devices are based on a spin control of electronics, or on an electrical and optical control of spin or magnetism. Most semiconductor device systems are still theoretical concepts, waiting for experimental demonstrations.

Index Terms- Giant Magnetoresistance, Magnetism, Magnetoresistance, Spintronics, Tunneling Magnetoresistance.

I. INTRODUCTION

In the information era, a new promising science has been strongly addressed called Spintronics, the contracted form of spin based electronics. The 2007 Nobel Prize for physics, with whom A. Fert and P. A. Grunberg have been awarded, is another clear signal that the importance of Spintronics for society is worldwide understood. In the far 1933 the physicist F. Mott published his innovative concept of spin dependent conduction. Only forty years later experimental evidence of current spin polarization was reported by P. Tedrow and R. Meservey, carrying out experiments of tunneling between ferromagnetic metals and superconductors. In 1975 experiments on a Fe/GeO/Co junction led to the discovery of tunneling magnetoresistance (TMR) by M. Julliere, only verified in 1995 by T. Miyazaki and N. Tezuka and J. S. Moodera. In1988 experiments on layered thin films of FMs alternated to a non-magnetic metal (NM) led to the simultaneous and independent discovery of the giant magnetoresistance (GMR) by A. Fert and P. A. Grunberg. Nowadays the principal application of Spintronics devices is the magnetic data storage with an information density growth rate faster than the corresponding Moore law.

In a narrow sense spintronics refers to spin electronics, the phenomena of spin-polarized transport in metals and semiconductors. In a broad sense spintronics is a study of spin phenomena in solids, in particular metals and semiconductors and semiconductor hetero-structures. Such studies characterize electrical, optical, and magnetic properties of solids due to the presence of equilibrium and non-equilibrium spin populations, as well as spin dynamics.An example is a spin field-effect transistor, which would change its logic state from ON to OFF by flipping the orientation of a magnetic field [1].

II. SILSBEE-JOHNSON SPIN-CHARGE COUPLING FOR SPIN DETECTION

In electrical spin injection we drive spin-polarized electronsfrom a ferromagnet into a nonmagnetic conductor. As aresult, non-equilibrium spin accumulates in the nonmagnetic conductor. The opposite is also true: If a spin accumulation is generated in a nonmagnetic conductor that is in proximity of a ferromagnet, a current flows in a closed circuit, or an electromotive force (emf) appears in an open circuit. This inverse effect is called the Silsbee-Johnson spin-charge coupling. This coupling was first proposed by Silsbee (1980) and experimentally demonstrated by Johnson and Silsbee (1985) in the first electrical spin injection experiment.

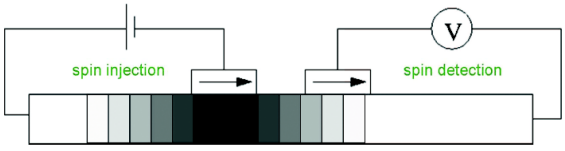

Figure 1: The Johnson-Silsbee non-local spin injection and detection scheme.

Physical system is shown in Fig. 1. Spin is injected bythe left ferromagnetic electrode, and detected by the rightone,making it a non-local measurement. The injected spindiffuses in all directions (here left and right), unlike forthe charge current. The non-equilibrium spin at the rightferromagnetic electrode is picked-up by the Silsbee Johnson spin-charge coupling, producing a measurable emf in the right circuit. Consider an F/N junction with a special boundary condition: a non-equilibrium spin is maintained, by whatever means, at the far right boundary of the nonmagnetic conductor:

$$\mu_{sN}(\infty) \neq 0. \quad (1)$$

At the far left boundary of the ferromagnetic region, the spin is assumed to be in equilibrium:

$$\mu_{sF}(-\infty) = 0. \quad (2)$$

Induced electromotive force, defined by,

$$emf = \mu_{sN}(\infty) - \mu_{sF}(-\infty). \quad (3)$$

The emf can be detected as a voltage drop. The drop of thequasi-chemical potential across the contact is due to the spinfiltering effect of the contact. If the contact conductance were spin-independent, the chemical potential would be continuous.The electrostatic potential drop across the contact is due tothe spin polarization of the ferromagnet as well as due tothe spin filtering effects of the contact. There is an emf developed if equilibriumspins in electrical contact with a nonequilibrium spin. This effect allows detection of non-equilibrium spin, by putting a ferromagnetic electrode over the region of spin accumulation. By measuring the emf across this junction, we obtain information about the spin in the nonmagnetic conductor.

III. SPINTRONICS DEVICES

In a narrow sense, spintronics refers to spin control of electronics. Say, flip a spin or turn on magnetic field and the current stops flowing, ideally. Similarly, we would like a device which would orient spin by passing a current or applying a gate voltage. In this way the spin would be fully integrated with electronics and we could write, store and manipulate, as well as read the information based on spin.

The goal is to make useful electronic devices that would enhance functionalities of the existing semiconductor technology. Thus far this goal has been elusive, although the field has gone through immense progress keeping us optimistic about its potential. The case at hand is metal spintronics, which has already revolutionized computer industrywith a device based on giant magnetoresistance.

A. GMR

The discovery of the giant magnetoresistance effect allowed increasing the density of the information stored in hard disks, leading to more than a hundredfold increase in their capacity. The idea is to increase the sensitivity of the electrical current due to magnetization changes. The GMR effect occurs in ferromagnetic layered nanostructures. Two ferromagnetic layers sandwich over a nonmagnetic conductor. If the magnetizations of the two layers are parallel, the resistance is small, if they are antiparallel, the resistance is large. The relative change of the resistance is called giant magnetoresistance. At room temperature the changes are typically about 10-50%, with the upper values obtained in multilayer systems (Grunberg, 2001). Why is the resistance different for the different relative orientations of magnetization? Take parallel magnetizations. The spacer layer between the ferromagnets is a few nanometers thick. Electrons injected there from one layer keep their spin orientation and can relatively easily continue to the second ferromagnetic layer. If the magnetizations are antiparallel, the injected electrons will be more likely reflected from the second interface, due to the reduced density of states for that spin in the second ferromagnet. This interface scattering increases the resistance of the anti-parallel orientation [8].

B. MRAM

The physics is similar in description to GMR, although the transport is by tunneling through a nonmagnetic insulating layer, not ballistic transport through a metallic nano-region. A metallic TMR is being employed as a non-volatile magnetic random access memory (MRAM), whose operating principle is shown in Fig. 2. Non-volatility is crucial here: the information about a memory element is stored in the magnetization configuration of the ferromagnetic layers; this information need not be refreshed, nor does it disappear after the power is switched off.

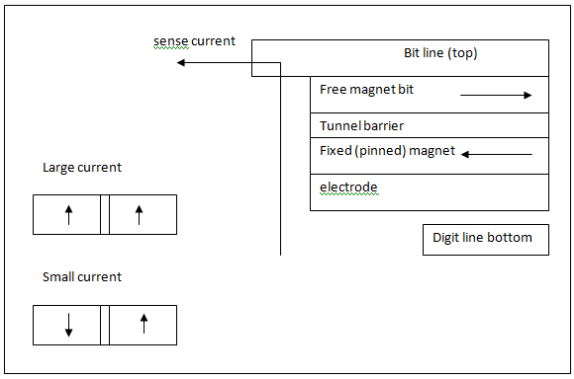

Figure 2: Magnetic Random Access Memory (MRAM).

C. Spin Transistor

The most sought for semiconductor Spintronics device is spin transistor. Since there are many spin transistors proposed, and only few convincingly demonstrated, it is too early to say in which direction the field develops [9]. Various designs have various advantages and disadvantages, but without experimental demonstrations theoretical proposals are hard to judge. We should also mention that the word transistor is often liberally used to describe any three terminal devices, without a prospect for current amplification. Such devices can be useful for electrical injection or as spin valves, but not for logic elements which require voltage controlled ON and OFF states with the ratio of the electrical currents in these states of at least 1000 to 1. Selected spin transistor schemes are shown in Fig. 3.

The most straightforward scheme is a spin metal-oxide-silicon field-effect transistor (spin MOSFET). This device would act as a spin valve in the setting of a conventional field-effect transistor. If the magnetizations of the ferromagnetic source and drain (also called emitter and collector) are parallel, the transport channel is open (ON); if the magnetizations are antiparallel, the channel is closed (OFF). This structure is yet to be demonstrated.

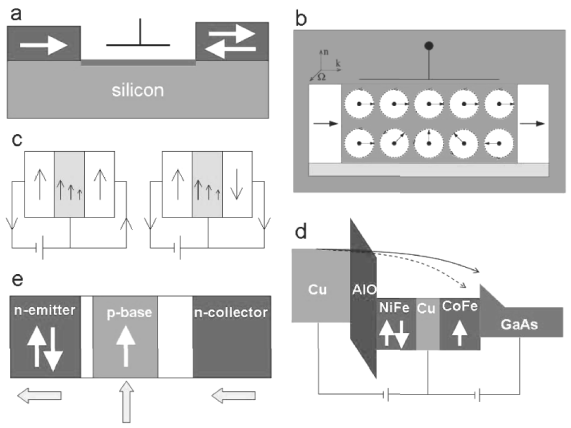

Figure 3: (a) spin metal-oxide-silicon field effect transistor (spin MOSFET), (b) Datta-Das spin FET, (c) Johnsons spin-valve transistor, (d) a hot electron spin-valve transistor, (e) magnetic bipolar junction transistor.

The so-called Datta-Das spin transistor, in Fig. 3(b), uses spin-orbit coupling of the Bychkov-Rashba type for its operational principle. The source and drain are ferromagnetic. The transport channel is a two dimensional electron gas. The top gate, which in conventional field-effect transistors controls the channel conductance, now controls the spin-orbit coupling strength. Electrons injected with momentum parallel to the transport feel an effective magnetic spin-orbit field transverse to that direction. The electron spins then process with a single precession frequency, assuming a ballistic one dimensional transport. Depending on the precession speed, the spin either processes very little (or even multiples of π), in which case the electron will enter into the drain (ON), or by π (or its odd multiples), in which case the electron bounces back, increasing the channels resistance (OFF). Different variants of the Datta-Das scheme have been proposed.

The Johnson spin switch, shown in Fig. 3(c), originally proposed as an all-metal Ohmic transistor is based on a spin-valve geometry in which the nonmagnetic layer offers an additional contact. This structure offers little amplification, if any, since the base current would be similar in magnitude to the collector current. The transistor works as follows: if the magnetizations of the two ferromagnetic layers are parallel, the collector current flows in the same direction as indicated, into the collector. If the magnetizations are antiparallel, the collector current is opposite.

Hot electron spin transistors form a large class of devices. These are usually hybrid metal/semiconductor structures, offering again little potential for current amplification due to the large base current. Nevertheless, these devices offer huge magneto currents, as well as practical ways to inject spin into semiconductors such as silicon. In the structure shown in Fig. 3(d), the emitter is a nonmagnetic metal (Cu), while the collector is a nonmagnetic semiconductor (GaAs). The base is formed by a ferromagnetic spin-valve: NiFe/Cu/CoFe. The base forms a Schottky barrier with the collector. Electrons that tunnel from the emitter to the base are hot electrons (not thermalized to the Fermi level of the base). These electrons lose energy depending on the relative orientation of the magnetizations in the spin valve. If the magnetizations are parallel, the energy loss is greater than for an antiparallel orientation. The loss of energy is directly reflected in the collector current, since only the electrons of energy high enough to overcome the potential Schottky barrier contribute to the collector current. This large spin filtering effect has been demonstrated to give large magnetocurrent.
An all-semiconductor version of a hot electron spin transistor has also been proposed.

D. Magnetic Bipolar Transistor

Finally, the magnetic bipolar transistor, depicted in Fig. 3(e), is based on the conventional junction transistor design, substituting ferromagnetic semiconductors in the active regions, say the base. This transistor allows for spin-control of current amplification due to spin-dependent tunneling across the emitter/base contact (called the depletion layer). Although the diode version of the transistor (a single magnetic p-n junction) has been demonstrated, the transistor is still a theoretical concept.

E. Spintronics in Other Fields

Other spintronics devices include a proposed scheme for reconfigurable logic, a room temperature spin-transference device, electron spin resonance transistor, 2D channel spin valve controlledby ferromagnetic gates, spin capacitor, spin lasers. Since at the moment most devices are theoretical concepts, it is simply too early to say which schemes will be practical, as well as which role and which functionalities will be played and taken over by spintronics devices from the future semiconductor technologies. Some of the spintronics devices are listed below,

1. Resonant tunneling diodes
2. Magnetic RTDs
    a) Paramagnetic spin-RTDs
    b) Ferromagnetic spin-RTDs
    c) Spin-RTDs with magnetic barriers
    d) Magnetic inter-band RTDs
    e) Nonmagnetic spin-RTDs
3. Digital magneto resistance in magnetic MOBILEs
4. Magnetic diode
5. Magneto-amplification

IV. ADVANTAGES AND DISADVANTAGES

Sensors, switches and isolators can be made from Spintronics technology. The cost and power are extremely low, making these devices highly competitive. The performance of the isolators in particular, can bemuch better than their optical counterparts at lower cost. Memories built from these devices could ultimately compete with mainstream semiconductor memories in density, speed, and cost, with the important added bonus of non-volatility and the potential for significant tolerance to extremely harsh environments. 16 Kbit nonvolatile, radiation hard, magnetic random access memory chip (under a square inch in size and had an access time of under 100 nanoseconds) was developed by Honeywell using their radiation hard CMOS under-layers.They are simultaneously developing a magnetic memory chip based on anisotropic magnetoresistance (AMR).
GMR memory was at least a factor of four faster based on the larger changes in resistance that GMR afforded [10].This

memory has unlimited read and write. This is better than ferroelectric-RAM (FeRAM) which still is limited in the number of times it can be cycled. The memory has a nondestructive read out (NDRO) so that the information will not be lost and the data storage has very high integrity [11].

Advantages:

1. Non-volatility,
2. Increased data processing speed
3. Decreased electric power consumption
4. Increased integration densities
5. Nondestructive read out (NDRO)

Disadvantages

1 Hard to achieve complete spin polarization
2 Very difficult to maintain spin polarization for long time at room temperature
3 Electron spin get distorted due to solid impurities and optical source
4 Room temperature demonstration of all these spin devices is quite difficult

V. CONCLUSION

The new field of Spintronics was born in the intersection of magnetism, electronic transport, and optics. It has achieved commercial success in some areas and is advancing toward additional applications that rely on recent fundamental discoveries. The field is sufficiently broad that there is no single central obstacle to the application of these fundamental physical principles to new devices. Some of the advances that might bemost helpful would be room-temperature demonstrations ofinjection of nearly 100% spin-polarized current from a ferromagnetic metal, ferromagnetic semiconductor with very low optical loss.

These are, of course, only a small selection of the possible areas that would have a tremendous effect on Spintronics research and on achieving the devices described here (and others).

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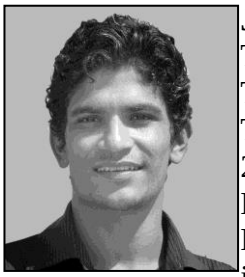

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Impact of pH value on the Structural and Optical Studies of ZnS & ZnS-Ni Nano Materials

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Abstract- The behavior of doped and undoped nano-particles find a great deal of application in opto-electronic and semi-conductor devices, so ZnS nano-crystals were grown into poly-vinyl alcohol matrix by chemical route at different wt percentage. Optical properties of both undoped and doped with ZnS nano-crystalline compounds were studied. The nano structure was characterized with the help of X-ray diffraction (XRD) and Hi- resolution Transmission Electron Microscopy (HRTEM). Surface morphology was studied with the help of Scanning Electron Microscopy (SEM). Average particle size of ZnS and ZnS-Ni were found to be obtained from XRD was about 2.28 nm. Peak of Photo-luminescence (PL) emission spectra was found at 515 nm and another peak at 495 nm corresponding to dopant 0.5 % and 1.0 % at different pH value. Energy dispersive X-ray fluorescence (EDX) spectra showed presence of Zn, S, & Ni with 67.92, 27.50 & 4.58 weight% respectively. Optical absorption with different value of pH were studied in UV-VIS Spectrophotometer and showed a strong absorbance with a tendency towards blue shift. As the value of pH decreases more blue shift occurs the particle size decreases. As the surface states are important for optical properties, at 0.5% doping with pH=3, the particle size is 2 nm which is least leads to increase in surface to volume ratio and because of it the surface states of Ni in ZnS increases which can leads to reduce the excitonic emission. Selected area electron diffraction (SAED) showed a set of three well defined rings corresponding to planes 111, 220, 311 which tallied well with the JCPDS card No. 05-0566.

Index Terms- Nano-crystalline, XRD, EDX, SEM, TEM, HRTEM

I. Introduction

The synthesis and characterization of nano crystals grown with different chemicals have generated lots of interest among the researchers. Low-dimensional semiconductors, like ZnS composite nano-structured thin films have attracted much interest because of their valuable photoluminescence properties. Chemical growth process is a very simple, economical and convenient method. In optical sensors, electroluminescence devices, digital displays, etc. doped ZnS nano materials are being used extensively. Photo luminescent properties and efficiency of ZnS depends on intrinsic surface states of the particles, and nature of the chemicals treatment employed in their fabrication. Research is also noticed on the application of these types of films in light-emitting materials as well as on their optical properties[1,2]. The optical light emission in blue – red spectral region is characterized by blue shift at smaller crystallite dimension. We are trying to characterize the properties of ZnS with different percentage of doping agent (Ni) at different pH value with the help of instrument like X-ray Powder Diffractometer (XRD), Scanning Electron Microscopes (SEM), High Resolution Transmission Electron Microscopes (HRTEM), Photo-luminescence spectrometer (PL), UV visible spectrophotometer (UV-VIS), etc.

II. Experimental

Polyvinyl Alcohol (PVA) was used as a matrix in synthesizing ZnS nano-particles. Different weight percentage solutions of PVA and $ZnCl_2$ were taken in deionized water and stirred at 200 rpm in a magnetic stirrer at temperature 70^o C for 3 hours. The solution was kept overnight for complete dissolution and found to be transparent. A 2 weight percentage Na_2S solution was added till the whole solution appears milky. The solution was kept over night inside a dark chamber. As soon as the nano-structure was formed, it embedded into the gap . The chemical reaction between $ZnCl_2$ and Na_2S, the product were ZnS, 2NaCl. To prepare different percentage of ZnS : Ni solution, $NiCl_2.6H_2O$ was mixed by weight percentage with deionized water . Solution so obtained was mixed with a another solution of PVA and $ZnCl_2$. Then the solution was stirred at 200 rpm in a magnetic stirred at constant temperature 70^o C. 0.08 M weight percentage of Na_2S solution was added to the solution. Precipitation found was washed with deionized water and taken for study.

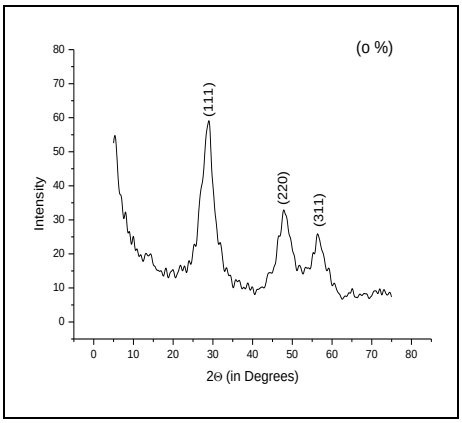

Fig.1a:X-ray diffractogram of ZnS

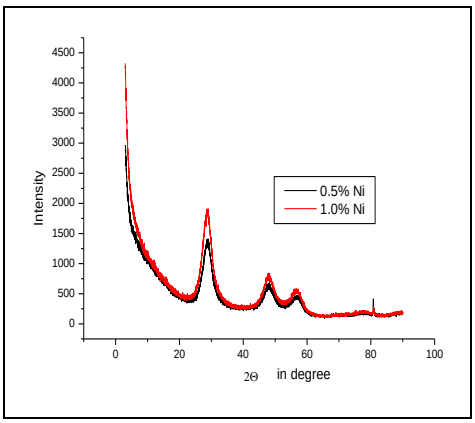

Fig.1b:X-ray diffractogram of ZnS-Ni

XRD studies.

The XRD studies were obtained from powder pattern scanned in Philips X'pert Pro Powder diffractometer using Cu-K radiation with the operating voltage 40 kV and current 20 mA. The intensity peaks at different percentage of of doping are almost same although the heights are different which indicate that Ni is corporate with size of the particle. The pattern observed was found to be within the nano range[3,4]. XRD patterns revealed the films to be polycrystalline [5]. Planes (111), (220) and (311) were found to be present which satisfied well with the JCPDS card No. 05-0566. The average particle size corresponding to the FWHM was calculated with the Scherrer formulae.

$$Dp = \frac{0.94\lambda}{\beta_{1/2}\cos\theta}$$

and found to be 2.28 nm[6,7].

Photo luminescence studies:

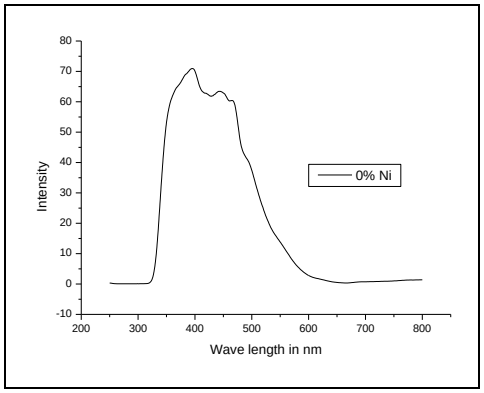

Fig.2a: PL spectra of ZnS

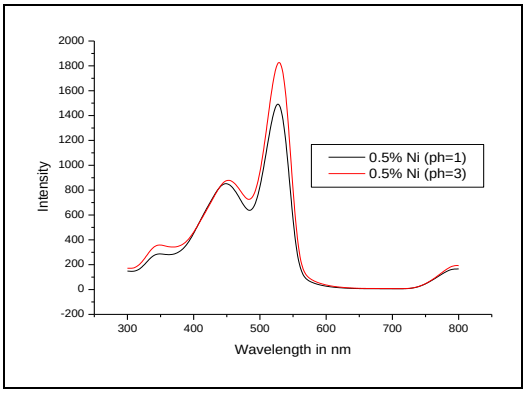

Fig.2b: PL spectra of ZnS-Ni with ph=1,3

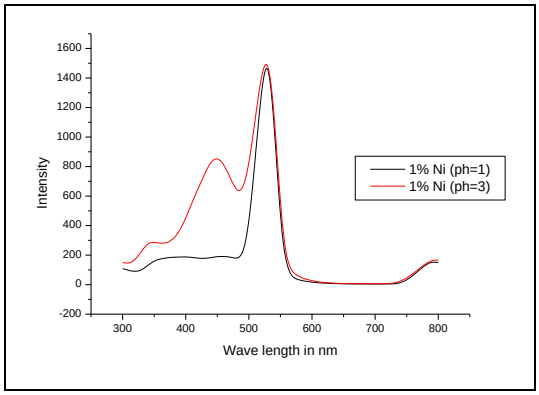

Fig.2c: PL spectra of ZnS-Ni with pH=1,3

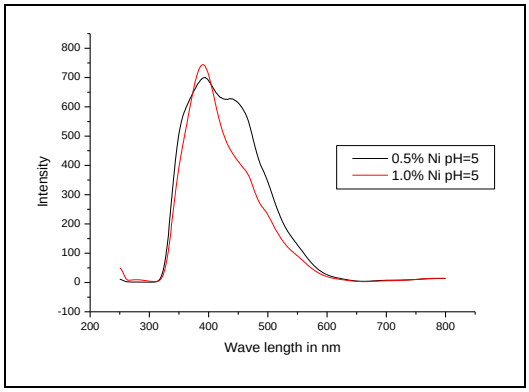

Fig.2a: PL spectra of ZnS-Ni with pH=5

The photo luminescence studies of nano crystalline undoped ZnS & doped ZnS-Ni were done at room temperature by using F-2500 FL Spectrophotometer and the Pl graphs are shown in fig 2 (a, b, c, d). In all the measurement the excitation wavelength was 240 nm . For 0% doping the three Pl peaks wereat 398 nm, 440 nm. 469 nm. Photo-luminescence peak for 0.5% doping were observed at 515 nm, 525 nm, 556 nm both for pH value at 1 and 3 shown in Fig 2b while that for 1% doping the peaks were at 495 nm, 523 nm, 544 nm at pH value 1 and 3 shown in fig2c. When pH=5, the Pl peaks for 0.5% doping were at 391 nm, 448 nm while for 1% doping the peak is at 394 nm. The intensity decreases with increase of concentration (from 0.5% to 1%) for both values of pH 1 and 3 and this is because of non-irradiative recombination. Localized electronic states occurs because of incorporation of Ni ZnS and the band-gap that comes from the 3d shell of Ni in ZnS [8]. In case of 1% doping (pH=1), there is only one peak at 544 nm and for pH=5 there is one peak at 394 nm and this is because of the impact of pH on the sample.

Optical absorbance study:

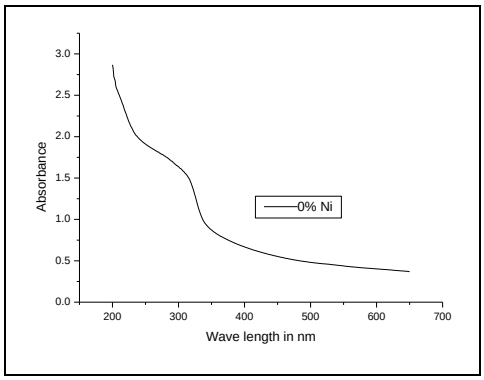

Fig3a: Absorbance graph of ZnS

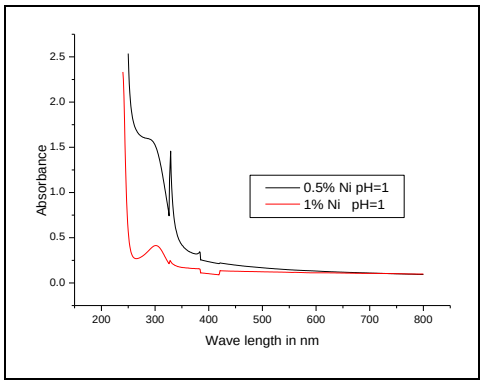

Fig3b: Absorbance graph of ZnS-Ni, pH=1

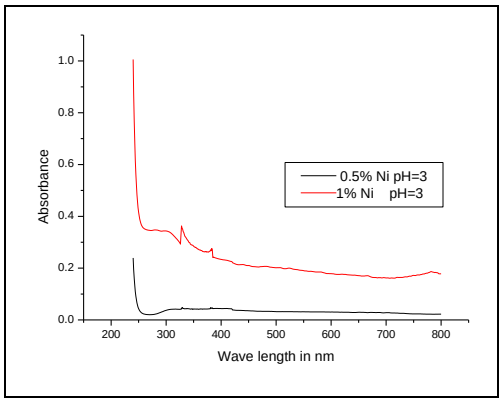

Fig3c: Absorbance graph of ZnS-Ni, ph=3

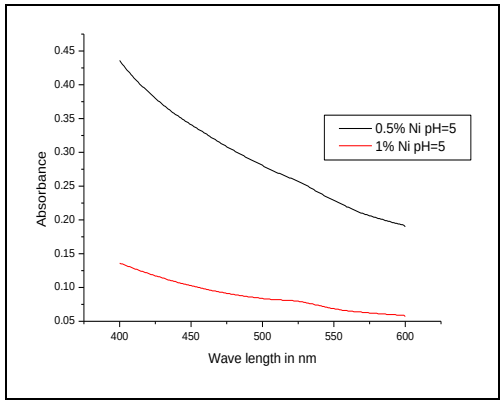

Fig3d: Absorbance graph of ZnS-Ni, pH=5

Optical absorption studies were carried out with UV-VIS in a Double Beam Automated spectrophotometer (Hitachi – U3210) and showed absorbance at wavelength 357 nm and 337 nm respectively when doping percentage are 0.5% and 1.0% with pH=1. For pH = 3, the absorbance of 0.5% and 1.0% doping are at 323 nm and 390 nm respectively. Again for pH = 5, the absorbance of 0.5% and 1.0% doping are respectively at 543 nm and 541 nm. For 0% doping the band gap energy in 3.49 eV. This spectra of undoped and Ni doped ZnS nano crystal are distinguishable. This indicates that Ni doping has effect on the electronic absorption spectra of ZnS[9,10]. The spectra showed a blue shift due to quantum confinement of the excitons present in ZnS-Ni for which more discrete energy spectrum of individual particles exist. As the value of pH decreases more blue shift occurs (pH value from 5 to 1) the particle size decreases. As the surface states are important for optical properties, at 0.5% doping with pH=3, the particle size is 2 nm which is least leads to increase in surface to volume ratio and because of it the surface states of Ni in ZnS increases which can leads to reduce the excitonic emission[11,12]. The blue shift energy is maximum for pH=5, which is due to the fact that Ni is forming new energy levels in ZnS energy band.

pH	Doping percentage	Band gap energy in eV	Blue shift energy in eV	Particle size in nm from TEM
1	0.5%	3.48	0.01	4.4
1	1.0%	3.69	0.20	7.97
3	0.5%	3.85	0.36	2.0
3	1.0%	3.19	0.30	5.3
5	0.5%	2.30	1.19	8.83
5	1%	2.29	1.20	11.0

Table: I: Variation of particle size with pH

SEM studies:

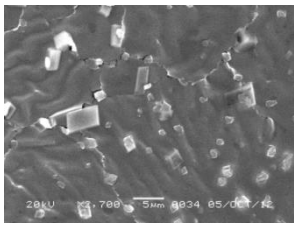

Fig 4a: SEM photo of ZnS

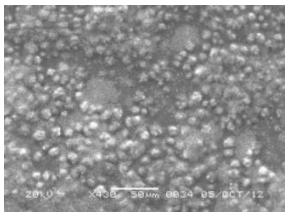

Fig. 4b: SEM photo of ZnS-Ni

Photographs of the nano-crystalline thin film were taken with (JEOL, JSM-6360) SEM and shown in Fig. 4. The surface morphology of the film prepared at 70^{o}C with PVA was observed and found that all the particles thus formed not exactly spherical. Study showed surface of the film was smooth, uniform and without any crack. Average particle size of ZnS and ZnS-Ni were found to be 5 and 21nm respectively. The SEM studies showed the well crystalline structure of ZnS nano particles.

HRTEM:

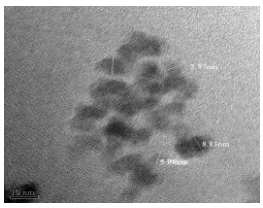

Fig.5a: ZnS ,

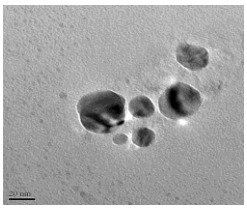

Fig.5b: ZnS-Ni

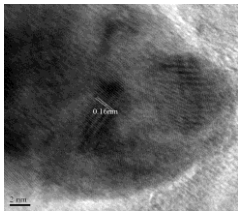

Fig.5c: Lattice distance of ZnS-Ni

HRTEM image showed in fig 5, give clear lattice fringes of the (001) plane indicating crystal growth along [001] direction. The particle size obtained from HRTEM image was 5 -11 nm. The lattice distances for the planes (111) and (311) were found to be 0-32 nm and 0.16 nm respectively obtained from TEM studies which well satisfied with those values 0.31098 nm and 0.1625 nm obtained from XRD data.

Electron diffraction studies:

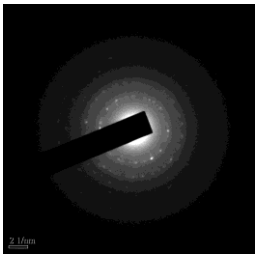

Fig.6a: SAED image of ZnS

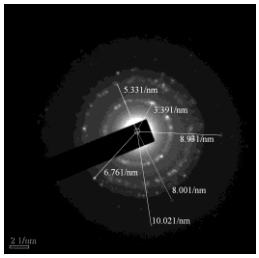

Fig.6b: SAED image of ZnS-Ni

Selected area electron diffraction (SAED) was done with the help of HRTEM. Photos of SAED of undoped ZnS [fig.6a and 6b] also showed a set of three well defined rings corresponding to the planes (111), (220) and (311) in case of undoped ZnS, which is also in good agreement with that of XRD data.

EDX Studies:

Element	Weight%	Atomic%
SK	27.50	43.44
NiL	4.58	3.95
ZnL	67.92	52.62
Total	100.00	

Table: II Weight percentage of elements from EDX

Table II shows the composition of ZnS-Ni particles with the help of Energy Dispersive X-ray Spectroscopy (EDX). Energy dispersive X-ray fluorescence (EDX) spectra showed presence of Zn, S, & Ni with 67.92, 27.50 & 4.58 weight% respectively.

III. Conclusion

ZnS nano crystalline materials (un-doped and doped with Ni) had been synthesized by chemical route. The structural and optical characterization of the nano particles were done with the help of XRD, TEM, SEM, SAED, UV-VIS spectrophotometer. PL spectra revealed formation of doped as well as un-doped nano particles. EDX study reveals the presence of Zn, S and Ni in nano materials. As the value of pH decreases more blue shift occurs (pH value from 5 to 1) and the particle size decreases. Since the surface states are very important for optical properties, at 0.5% doping with pH=3, the particle size is 2 nm which is least leads to increase in surface to volume ratio and because of it the surface states of Ni in ZnSincreases which can leads to reduce the excitonic emission.

Novelty Statement

It is observed that as the value of pH decreases more blue shift occurs (pH value from 5 to 1) and the particle size decreases. As the surface states are important for optical properties, at 0.5% doping with pH=3, the particle size is 2 nm which is least leads to increase in surface to volume ratio and because of it the surface states of Ni in ZnS increases which can leads to reduce the excitonic emission.

Acknowledgement

The authors are very much thankful to Dr. P. K. Baruah, Department of Chemistry, Gauhati University for his help in taking UV-VIS and PL data. We are also thankful to SAIF, Shillong for providing TEM and SEM facility. Authors also like to offer their gratitude to SAIF, Guwahati, The authors like to offer thanks to Institute of Advance Study in Science and Technology.(IASST), Assam for providing XRD facilities. We are thankful to Dr. Pradut. Sarma of A.V.College, Guwahati, for his help in taking UV absorbtion spectra. The authors are also grateful to Prof. K. C. Sarma, Head, Dept. of Instrumentation & USIC, Gauhati University for constant guidance and help.

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Magnetohydrodynamic Power Generation

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Abstract- Magnetohydrodynamic (MHD) power generation process is basically based on the physics background of space plasma. The basic principle is the Faradays Law of electromagnetic induction. In this device plasma (Ionized gas) is the working fluid similar to the mechanism that happening in the magnetosphere of our earth's atmosphere. Except here the process is controlled and we increase the fluid density and pressure to get maximum efficiency in the generating power. Most problems come from the low conductivity feature in the gas at high temperature. High temperature gaseous conductor at high velocity is passed through a powerful magnetic field and a current is generated and extracted by placing electrodes at suitable position in the gas stream, and hence the thermal energy of gas is directly converted in to electrical energy. In this paper the process involved in MHD power generation will be discussed in detail along with the simplified analysis of MDH system and recent developments in magnetohydrodynamics and their related issues.

Index Terms- Electromagnetic induction, Hall Effect, Magneto hydrodynamics, MHD generator, Plasma

I. INTRODUCTION

We all are aware of power generation using hydel,thermal and nuclear resources.In all the systems,the potential energy or thermal energy is first converted in to mechanical energy and then the mechanical energy is converted in to elecrtrical energy. The conversion of potential energy in to mechanical energy is considerably high (70 to 80%) but conversion of thermal energy in to mechanical energy is considerably poor(40 to 45%).In addition to this the mechanical components required for converting heat energy in to mechanical energy are large in number and considerably costly.This requires huge capital cost as well as maintenance cost also.

The scientists are thinking to eliminate the mechanical system and convert thermal in to direct electrical energy for the last 50-years and more.Unfortunately, no system is yet developed in large capacity(MW) to compete with conventional systems.In addition to this the efficiency of such conversion remained considerably poor(less than10%)therefore,these power generating systems are not developed on large scale.

I.I Thermodynamic energy conversion

The electricity generation process, most often, is characterised by the transition of primary or secondary energy, from thermal to mechanical and then to electricity. At the current state of development, most of the power plants are based on processes known as conventional. The production of electricity, through conventional forms or commercial of primary energy, concern only the hydroelectric and thermal power station, where the thermal power stations are different for use of primary source (usually fossil fuels such as natural gas, oil, coal, etc., wood and biomass, municipal or industrial solid wast, etc., or nuclear fuels and more rarely geothermal energy). In the hydroelectric power generation, mechanical energy, in different forms (kinetic, potential and pressure) from flowing fluid, is converted into electricity with a water turbine and an alternator. In the thermal power plants the thermal energy is converted into mechanical

energy and from this machine the mechanical energy into electricity. The majority of thermal power plants are powered by fuels, usually fossil or nuclear. Apart some cases, such as power plants that use thermal energy available in nature (primarily solar and geothermal), the form of energy at the base of each of processes is the chemical potential energy of the fuel.

The potential energy of the fossil fuel is converted into heat energy through a chemical exothermic reaction (combustion), characterized by generation of thermal energy equivalent, in absolute value, to the enthalpy variation for the same reaction. In the case of nuclear fuels there is a fission reaction. The heat is then transmitted to elastic working fluid evolving in appropriate machines (usually gas turbine or reciprocating engine) producing mechanical work. In that case, it has converted thermal energy to mechanical (thermodynamics conversion). The mechanical work produced is finally transferred to an electric generator, which operates the last conversion of energy in electric form. It should be noted that in any conversion process one can not fully convert the energy from one form to another, each of the steps being characterized by a conversion efficiency, a coefficient that takes into account the fraction of the energy initially available, which is converted in the desired form.[1]

I.II Direct energy conversion systems

The possibilities of improving significantly the conventional energy conversion processes are mainly related to technological progress. They still have small margins and for this reason the researchers have turned to the development of other systems, so-called no-conventional. In the conventional conversion systems a significant loss of energy occurs in the transition from thermal to mechanical energy (thermodynamic conversion). Research is focusing its efforts on conversion processes that do not use this step. The absence of moving mechanical parts may allow the achievement of operating temperatures much higher than those typical of conventional processes, resulting therefore, at least potentially, a higher conversion efficiency. These processes are known as direct conversion, as primary and secondary energy is converted directly into electricity without the need to pass through a stage of mechanical energy [2]. The direct energy conversion methods that nowadays are taken into account in terms of industrial application are:

- Photovoltaic generation systems (Photovoltaic Solar Cells)[3]
- Electrochemical energy conversion (Fuel Cells) [4]
- Magnetohydrodynamic generation(MHD)[5]
- Electrogasdynamic generation(EGD)[6]
- Thermoeletric power generation [7]

In the first two processes the conversion fromthe primary to the secondary energy form takes place avoiding the conversion in the intermediate thermal energy. The Figure 1 shows the energy conversion stages in the direct generation of electric energy.

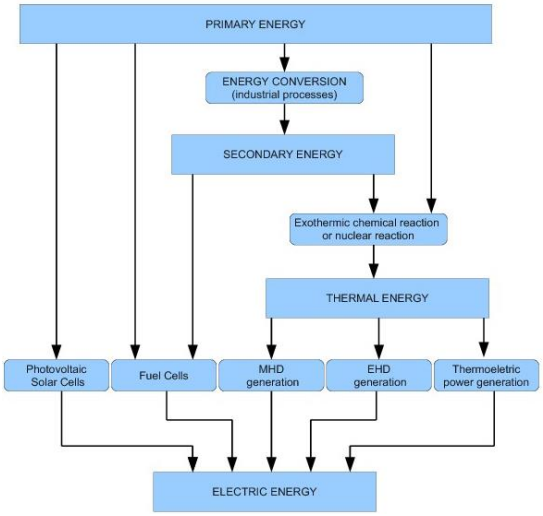

Figure 1: Direct energy conversion stages

The design of an energy converter is often dictated by the type of energy to be converted, although it is the duty of the engineer to seek out new and more efficient ways of transforming the primary sources of the energy into electricity. There are many reasons for the use of new and direct conversion schemes. These can be grouped into three important areas: efficiency,

reliability, and the use of new sources of energy. It is hoped that when a processes occurs directly, rather than passing through several steps, it is likely to be more efficient. This will lead to less expenditure of the primary energy reserve and a lower investment per installed unit power. Efficiencies are, however, still low at this stage of development of most direct energy conversion schemes. As for reliability, there are places where energy conversion equipment must run for years without breaking down and without maintenance. These are situation where the ultimate reliability is required. Finally, the possibility of using new sources of energy seems enhanced by the development of the new direct energy converters.

There are many ways whereby the direct energy conversion of thermal to electrical energy can be obtained. In the following section the main one, magnetohydrodynamic power generation , is mentioned very briefly to give an overall background picture of the interest in direct conversion

II. MAGNETOHYDRODYNAMIC POWER GENERATION

The magnetohydrodynamic power generator[8] is a device that generates electric power by means of the interaction of a moving fluid (usually a ionized gas or plasma) and a magnetic field. As all direct conversion processes the MHD generators can also convert thermal energy directly into electricity without moving parts. In this way the static energy converters, with no moving mechanical part, can improve the dynamic conversion, working at temperature more higher than conventional processes. The typical configuration of MHD generator is shown in Figure 2.

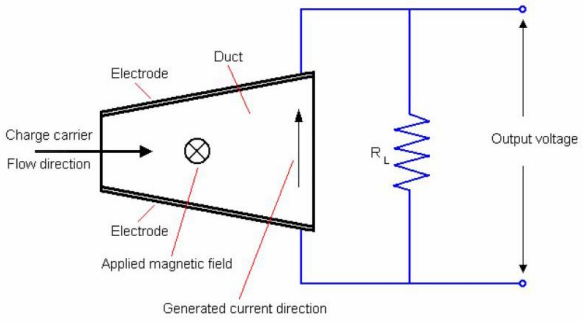

Figure 2: MHD channel

The underlying principle of MHD power generation is elegantly simple. Typically, an electrically conducting gas is produced at high pressure by combustion of a fossil fuel. The gas is then directed through a magnetic field, resulting due to the Hall effect. The MHD system constitutes a heat engine, involving an expansion of the gas from high to low pressure in a manner similar to that employed in a conventional gas turbogenerator. In the turbogenerator, the gas interacts with blade surfaces to drive the turbine and the attached electric generator. In the MHD system, the kinetic energy of the gas is converted directly to electric energy as it is allowed to expand.

It is known, that if we have a current flowing in a conductor immersed in a magnetic field, in the same conductor will be generated a Lorentz force that is perpendicular to the direction of the magnetic field and to the current.

The induced emf(E) is given by

$$E_i = \vec{u} \cdot \vec{B}$$

where $\vec{u}$ is the velocity of ionized gas and $\vec{B}$ is the strength of magnetic field intensity.

the induced current density is given by

$$\vec{I}_i = \sigma . \vec{E}$$

where σ is the electrical conductivity of gas.

The retarding force on the conductor is the Lorentz force given by

$$F_i = \vec{I} \cdot \vec{B}$$

In an MHD converter the electrical conductor is replaced by a plasma current at high speed and with high temperature to be partially ionized . So, the current flow is not only made of electrically neutral molecules but also with a mix of positive ions and electrons. When an high velocity gas flows into convergent-divergent duct and passes through the magnetic field an e.m.f is induced, mutual perpendicular to the magnetic field direction and to the direction of the gas flow. Electrodes in opposite side walls of the MHD flow channel provide an interface to an external circuit. Electrons pass from the fluid at one wall to an electrode, to an external load, to the electrode on the opposite wall, and then back to the fluid, completing a circuit. Thus the MHD channel flow is a direct current source that can be applied directly to an external load or can be linked with a power conditioning converter to produce alternating current. The electric energy produced is proportional to the reduction of kinetic energy and enthalpy of the fluid current. MHD effects can be produced with electrons in metallic liquids such as mercury and sodium or in hot gases containing ions and free electrons. In both cases, the electrons are highly mobile and move readily among the atoms and ions while local net charge neutrality is maintained. Any small volume of the fluid contains the same total positive charges in the ions and negative charges, because any charge imbalance would produce large electrostatic forces to restore the balance.

Most theoretical and experimental work and power plant development and application studies have focussed on high-temperature ionized gas as the working fluid. Unfortunately, most common gases do not ionize significantly at temperatures obtainable with fossil fuel chemical reactions. This makes it necessary to seed the hot gasses with small amounts of ionizable materials such as alkali metals. Materials such as cesium and potassium have ionization potentials low enough that they ionize at temperatures obtainable with combustion reaction in air. Recovery and reuse of seed materials from the MHD channel exhaust are usually considered necessary from both economic and pollution standpoints.

Interest in MHD power generation was originally stimulated by the observation that the interaction of a plasma with a magnetic field could occur at much higher temperatures than were possible in a rotating mechanical turbine. The limiting performance from the point of view of efficiency of a heat engine is limited by the Carnot cycle. A system employing an MHD generator offers the potential of an ultimate efficiency in the range of 60 to 65%. This is much better than the 35 to 40% efficiency that can be achieved in a modern conventional thermal power station.

The power output of an MHD generator for each cubic metre of its channel volume is proportional to the product of the gas conductivity, the square of the gas velocity, and the square of the strength of the magnetic field through which the gas passes. For MHD generators to operate competitively with good performance and reasonable physical dimensions, the electrical conductivity of the plasma must be in a temperature range above about 1800K.

Apart of the MHD power generator, other apparatus are necessary to form the overall MHD system. It is necessary to burn the fuel and the oxidizer, to add the seed, and to make arrangements for exporting the generated electrical power. The fuel is usually fossil and the oxidizer is air, for obvious economic reasons. For large systems, some precautions should be taken to limit the amount of losses. The air may be enriched with more oxygen, and preheating of the incoming oxidizer becomes necessary to allow thermal ionization. In practice a number of issues must be considered in the implementation of a MHD generator: Generator efficiency, Economics, and Toxic products. These issues are affected by the choice of one of the three MHD generator designs. These are the Faraday generator, the Hall generator, and the disk generator

II.I Faraday generator

A simple Faraday generator would consist of a wedge-shaped pipe or tube of some non-conductive material. When an electrically conductive fluid flows through the tube, in the presence of a significant perpendicularmagnetic field, a charge is induced in the field, which can be drawn off as electrical power by placing the electrodes on the sides at 90 degree angles to the

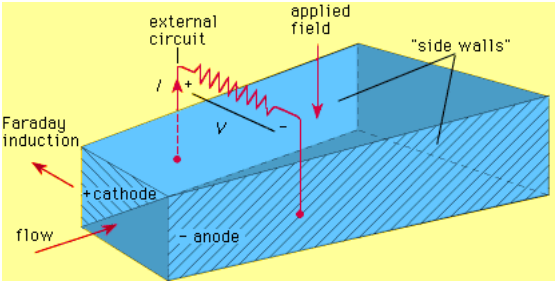

Figure 3: Faradys generator

magnetic field. The main practical problem of a Faraday generator is that differential voltages and currents in the fluid short through the electrodes on the sides of the duct. The most powerful waste is from the Hall effect current.

II.II Hall generator

The most common answer is to overcome the problems of faradys generator is the Hall effect to create a current that flows with the fluid. The normal scheme is to place arrays of short, vertical electrodes on the sides of the duct. The first and last electrodes in the duct supply the load. Each other electrode is shorted to an electrode on the opposite side of the duct. Losses are less than that of a Faraday generator, and voltages are higher because there is less shorting of the final induced current. However, this design has problems because the speed of the material flow requires the middle electrodes to be offset to catch the Faraday currents. As the load varies, the fluid flow speed varies, misaligning the Faraday current with its intended electrodes, and making the generator efficiency very sensitive to its load.

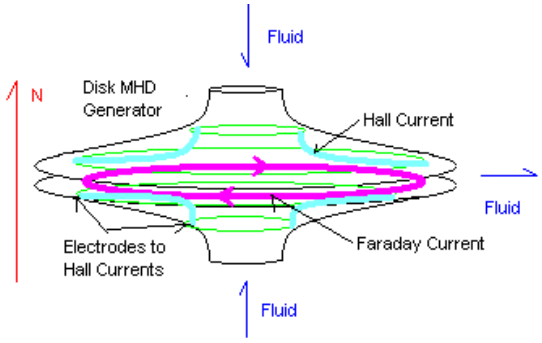

Figure 4: Disk generator

II.III Disk generator

The third, currently most efficient answer is the Hall effect disk generator. This design currently holds the efficiency and energy density records for MHD generation. A disk generator has fluid flowing between the center of a disk, and a duct wrapped around the edge. The magnetic excitation field is made by a pair of circular Helmholtz coils above and below the disk. The Faraday currents flow in a perfect dead short around the periphery of the disk. The Hall effect currents flow between ring electrodes near the center and ring electrodes near the periphery. Another significant advantage of this design is that the magnet is more efficient. First, it has simple parallel field lines. Second, because the fluid is processed in a disk, the magnet can be closer to the fluid, and magnetic field strengths increase as the 7th power of distance. Finally, the generator is compact for its power, so the magnet is also smaller. The resulting magnet uses a much smaller percentage of the generated power.

III. POWERCYCLE FOR MHD-GENERATOR

MHD generator replaced the gas turbine used in conventional cycle is shown in Figure 5. A compressor is used to elevate the pressure and then heat is added to increase the gas temperature which is sufficient to ionize the gas.Then the gas flow is accelerated by passsing through the nozzle before entering MHD generator.The gas passing through the MHD generator is deaccelerated and electrical energy is generated

It is obvious that the MHD-cycle is thermal power cycle and the thermal efficiency is given by

$$\eta = \frac{Workoutput}{Heatinput} = \frac{(h_3 - h_4) - (h_2 - h_1)}{(h_3 - h_2)}$$

where indicated enthalpies are stagnation values which takes into account the K.E of the flowing gas The stagnation enthalpy of the followin gas is given by

$$h_o = h + \frac{u^2}{2}$$

where u is the velocity of the flowing gas.

In actual MHD-generator, the gas velocity is sufficiently high (sonic and ebove) so that the K.E of the flowing gas represents substantial portion of the total enegy.

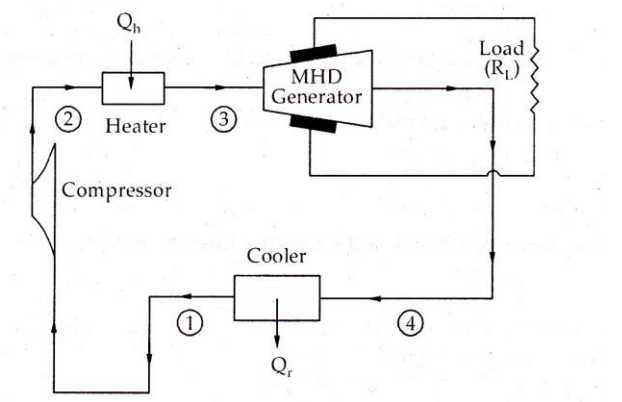

Figure 5: Power cycle for MHD power generation

III.I Simplified analysis of MHD Generator

The following assumptions are made in the analysis of the MHD generator.

1. working gas is an ideal gas
2. gas flowing at constant velocity and pressure
3. magnetic flux generated remains constant
4. no heat transfer to the surroundings
5. gas flow is uniform

When the high velocity ionized gas flows through the magnetic field,the induced EMF tries to slow down the motion of the gas as it acts in the opposite direcion.The duct is made diverging as the gas velocity decreases along the flow direction.The elecrical energy is extracted from the thermal energy of the gases keeping axial velocity constant.The electrical energy is produced when the condutive gas cuts the magnetic lines of force.The gas is accelerated to restore its velocity with decrease of temperature and axial velocity held constant,large power is developed if the applied magnetic flux density and gas velocity are high.The lorentz force induced on electrons acts in the direction of retarding the gas flow.The direction of Lorentz force is opposite to the velocity of conducting gas. The induced emf generated is given by

$$E_i = \vec{u} \cdot \vec{B}$$

The elecromagnetic force acting on the gas particle in the presence of electric field E is given by

$$F = Q(E + E_i) = Q[E + u.B]$$

The force F acts on the particle at right angles to both magnetic field and gas velocity.Gas particles flow in the direction of the electric field . Current intensity between the electrode connected externally in perpendicular direction is given by,

$$E_z = -\frac{V}{\delta}$$

where δ is the distance between the electrodes.

Total electric fieldE_{zt} is given by

$$E_{zt} = E_i + E_z = u.B - \frac{V}{\delta} = \frac{(u.B.\delta) - V}{\delta}$$

B=Magnetic field(w/m^2)

u=Gas velocity(w/m)

E=Electric field($volts/m$)

δ=Distance between the electrode(m)

V_o=Open circuit voltage(volts)

For open circuit voltage E_{zt} becomes zero

$$V_o = u.B.\delta$$

If R_g is internal resistance and R_L is the load resistance and I is the flowing current,then

$$I=\frac{v_o}{R_g+R_L}$$

W(power output from MHD generator)

$$V_oI=I^2R_g=(\frac{v_o}{R_g+R_L})^2.R_g$$

The condition for maximum power,

$$R_g=R_L\ W_{max}=\frac{v_o^2}{4R_g}=\frac{(u.B.\delta)^2}{4R_g}$$

but $R_g=\frac{\delta}{\sigma.A}$ where σ is gas conductivity(*mho*/*m*) and A is electrode surface area(m^2)

$$W_{max}=\frac{u^2.B^2.\delta^2}{4.\sigma}*\sigma.A$$

$$=\frac{u^2.B^2.\sigma}{4}(A.\delta)$$

where($A.\delta$) becomes the volume of MHD generator.

$$W'_{max}=\frac{u^2.B^2.\sigma}{4}/m^3 ofMHDgenerator$$

This shows that W'_{max} is proportional to the square of magnetic flux ,therefore it needs strong magnetic field to make the generator compact.

Conversion efficiency of MHD (η_c),

$$\eta_c=\frac{V_{max}}{u.B}$$

$$V_{max}=u.B.\delta-I_{max}\frac{\delta}{\sigma.A}$$

$$I_{max}=\frac{V_o}{R_g+R_L}=\frac{UB\delta}{2R_g}=\frac{u.B.A.\sigma}{2}$$

$$\eta_c=\left(\delta-\frac{\delta^2}{2\sigma}\right)=\delta\left(1-\frac{\delta}{2\sigma}\right)$$

$$\eta_c=\frac{[uB\delta-(\frac{uBA\delta}{2})]*(\delta/2\sigma)}{uB}$$

IV. MHD PHENOMENA DESCRIPTION

IV.I MHD Equations

The complete set of magnetohydrodynamic equations for a Newtonian, constant property fluid flow includes, the Navier-Stokes equations of motion (i.e., momentum equation), the equation of mass continuity, Maxwell's equations, and Ohm's Law . In differential form they constitute the following system of equations:

$$\varrho(\frac{\partial u}{\partial t}+(u.\nabla)u)=-\nabla p+jxB+\mu_f\nabla^2u+\varrho g$$

Navier-Stokes equations of motion

(i.e., momentum equation) where MHD body force is

(j* B) and $j=\sigma(E+uB)$

$\frac{\partial \varrho}{\partial t}+\nabla.\varrho u=0$ .... equation of mass continuity

$E=-\frac{\partial B}{\partial t}$.... Maxwells equations

$\nabla*B=\mu_m j$ ....Ohms Law

ϱ=*fluiddensity*

u=*fluidvelocity*

μ_m=*magneticpermeability*

μ_f=*fluiddynamicviscosity*

B=*magneticfieldintensity*

E=electircfield

σ=*electricalconductivity*

IV.II Dimensionless parameters

Fluid mechanics equations typically are cast in dimensionless form so that the relative strengths of the different terms can be inferred by the size of any multiplying factors. The equation of motion can be written in dimensionless form by making the substitutions:

Parameter	NaK (100degC)	Hg (20degC)	Electrolyte(20degC) 15% KOH	Air (3000degC) with 2% K
Re	$1.6x10^5$	$9.1x10^5$	$4.3x10^4$	350
Ha	6800	2700	17.5	98
N	290	8.2	$7x10^{-}3$	27
Re_m	0.30	0.14	$1.2x10^5$	$1.3x10^5$

$$j^*=\frac{j}{\sigma u_o B_o}$$

$$p^*=\frac{p}{\sigma u_o B_o^2 a}$$

$$\nabla^*=\frac{1}{a}\nabla \qquad u^*=\frac{u}{u_o} \qquad B^*=\frac{B}{B_O}$$

where a, u_o and B_o are characteristic values of length, velocity and applied magnetic field. Characteristic values of the current density and pressure have been selected carefully in order to scale the phenomena of interest; different values could have been selected, leading to different systems of non-dimensionalization. Using this system, the equation of motion (excluding gravity) becomes,

$$\frac{1}{N}\left(\frac{\partial u^*}{\partial t}+(u^*.\nabla)u^*\right)=-\nabla p^*+j^**B^*+\frac{1}{Ha^2}\nabla^2 u^*$$

The characteristic parameters Re, Ha and N are the Reynolds number, the Hartmann number, which is an average measure of the ratio of magnetic to viscous forces, and the interaction parameter, which is a measure of the ratio of magnetic to inertial forces. They are defined as:

$$Re=\frac{\varrho u_o a}{\mu_f} \qquad Ha=aB_o\sqrt{\frac{\sigma_f}{\mu_f}}$$

$$N=\frac{Ha^2}{Re}=aB_o^2.\sigma_f/\varrho u_o$$

When the Hartmann number and interaction parameter are both sufficiently large, the momentum equation throughout the bulk of the fluid can be reduced to the simple form:

$$\nabla p=j*B$$

Table 1 gives representative values of these characteristic dimensionless parameters for example cases of interest.

Table 1: Typical values of Re, Ha, N, and Re_m for several materials (assuming a=0.1 m, B=1 T, v=1 m/s)

The dimensionless product ωτ , often called the Hall parameter, is an important characteristic number in MHD design. The conductivity tensor is anisotropic due to the Hall component unless ωτ∠∠1 On a microscopic scale, the Hall parameter indicates the average angular travel of electrons between collisions.Since the mean free path is inversely proportional to pressure, lower pressure and higher values of B give larger values of ωτ .[11]

V. Different MHD systems

As of 1994, the 22%efficiency record for closed-cycle disk MHD generators was held by Tokyo Technical Institute. Typical open-cycle Hall duct coa

lMHD generators are lower, near 17%. These efficiencies make MHD unattractive, by itself, for utility power generation, since conventional Rankine cycle power plants easily reach 40%.

However, the exhaust of an MHD generator burning fossil fuel is almost as hot as the flame of a conventional steam boiler. By routing its exhaust gases into a boiler to make steam,MHD and a steam Rankine cycle can convert fossil fuels into electricity with an estimated efficiency up to 60 percent, compared to the 40 percent of a typical coal plant. Repowering of existing thermal power plants is possible with a significant increase of the efficiency of the plant. Efficiencies greater than 65-70% can be reached if a triple cycle, including an MHD generator, a gas turbine and a steam turbine, is utilized. The abundance of coal reserves throughout much of the world has favoured the development of coal-fired MHD systems for electric power production. Coal can be burned at a temperature high enough to provide thermal ionization. However, as the gas expands along the duct or channel, its electrical conductivity drops along with its temperature. Thus, power production with thermal ionization is essentially finished when the temperature falls to about 2500 K. To be economically competitive, a coal-fired power station would have to combine an MHD generator with a conventional steam plant in what is termed a binary cycle. The hot gas is first passed through the MHD generator (a process known as topping) and then onto the turbogenerator of a conventional steam plant (the bottoming phase). An MHD power plant employing such an arrangement is known as an opencycle , or once-through, system.

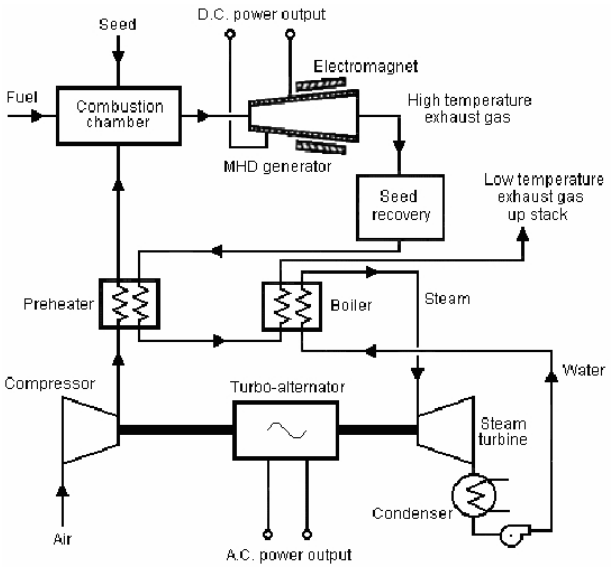

Figure 6: The typical open cycle scheme for a coal-firedMHD systems[9]

The Figure 6 shows the typical open cycle scheme for a coal-fired MHD systems for electric power production Coal combustion as a source of heat has several advantages[9]. For example, it results in coal slag, which under magnetohydrodynamic conditions is molten and provides a layer that covers all of the insulator and electrode walls The electrical conductivity of this layer is sufficient to provide conduction between the gas and the electrode structure but not so high as to cause significant leakage of electric currents and consequent power loss. The reduction in thermal losses to the walls because of the slag layer more than compensates for any electrical losses arising from its presence. However, the dust could degrade the MHD generator elements. In fact, an important item in the development of the MHD generator is the development of a durable electrode. The development of suitable materials for use in MHD generator is one of the most challenging areas. The very high temperatures (2700 K) coupled with the highly corrosive seed-laden atmosphere limit the choice of materials in contact with the plasma. These materials in contact with the high temperature plasmas in MHD generator are simultaneously subjected to stresses of mechanical, thermal, chemical and electromagnetic nature. The use of a seed material in conjunction with

coal offers environmental benefits. In particular, the recombination chemistry that occurs in the duct of a MHD generator favours the formation of potassium sulphate in the combustion of high-sulfur coals, there by reducing sulphur dioxide emissions to the atmosphere. The need to recover seed material also ensures that a high level of particulate removal is built into an MHD coal-fired plant. Finally, by careful design of the boiler and the combustion controls, low levels of nitrogen oxide emissions can be achieved. The problems due to the direct combustion of coal can be overcome combining the MHD generator on the Integrated Gasification Combined Cycle (IGCC), it is a technology that turns coal into gas synthesis gas (syngas). All the treatments on the gas are performed before the combustion, so that the electrostatic precipitator is no longer necessary. On the other hand, eliminating the most part of the sulphur before the Claus/Scot process is a great advantage, in particular in the cases of coal with a high percentage of sulphur. In addition to natural gas as a fuel source, more MHD power generation systems have been proposed.

A magnetohydrodynamic generator might be heated by a Nuclear reactor (either fission or fusion). Reactors of this type operate at temperatures as high as 2000^0C. By pumping the reactor coolant into a magnetohydrodynamic generator before a traditional heat exchanger an estimated efficiency of 60% can be realised. The Figure 7 shown the typical close-cycle system for nuclear source[10].

In theory, solar concentrators can provide thermal energy at a temperature high enough to provide thermal ionization. Thus, solar-based MHD systems have potential, provided that solar collectors can be developed that operate reliably for extended periods at high temperatures. MHD generators have not been employed for large scale mass energy conversion because other techniques with comparable efficiency have a lower lifecycle investment cost. Advances in natural gas turbines achieved similar thermal efficiencies at lower costs by having the turbines

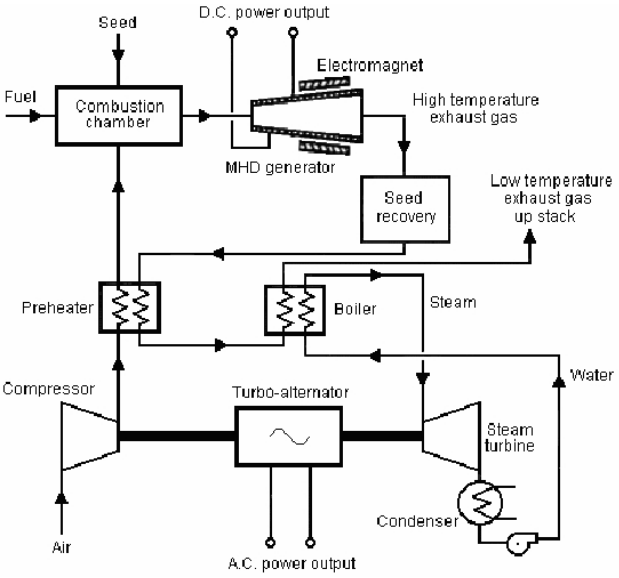

Figure 7: The typical close cycle scheme for nuclear source[10]

exhaust drive a Rankine cycle steam plant. To get more electricity from coal, it is cheaper to simply add more low-temperature steam generating capacity. Presently, the most often considered use if MHD generator is as a topping device for conventional steam plants. The fact there are no moving mechanical parts will make operation at high temperature feasible. The upper limit temperature in a steam plant is about 750^0C, which is far below the temperatures reached by MHD generators (about 2700^0C). To obtain good conducting gases, it is necessary to add cesium or potassium as seed materials and to solve the problem of corrosion. Advances in refractory material are needed. The cost of seeding increases substantially the cost of installed power. The cost of wall material is an important part of the total cost of an MHD generator. Good insulating and refractory materials working for a reasonably long time without deterioration should be found. The problem of high temperatures could be alleviated by the use of some type of non thermal ionization. This can also make the possibility of a nuclear reactor MHD generator coupling feasible, with the advantage of having an entirely static power plant. From the tremendous amount of work done in this field, both theoretically and experimentally, it seems that a fossil fueled MHD topper is the most

promising MHD generator and most probably will be the first to be operating to on the industrial level. Many problems need to be solved before an MHD power plant becomes competitive: seed recovery, superconductivity for the magnet, high temperature materials, AC power generation, and progress in non equilibrium ionization techniques.

VI. Near Future Power Generation System

VI.I Energy Re-Circulating LNG/MHD System

Figure 8 shows proposed energy re-circulating type MHD power generation system with LNG heat source which has been proposed by Prof. Y. Okuno at Tokyo Institute of Technology. The system does not combined with any other system and is called closed cycle MHD single system. We can see that plant efficiency is expected over 60% even the enthalpy extraction ratio of the MHD generator is only 30%. Thermal input to the MHD generator is 200% and electric output is 60% in spite of only 100% input thermal energy to the system because 100 of heat is recovered by regenerator. Enthalpy extraction ratio of above 30 achieved by experiments with shock tube facility. So this estimation of efficiency is considered to be realistic in near future[12].

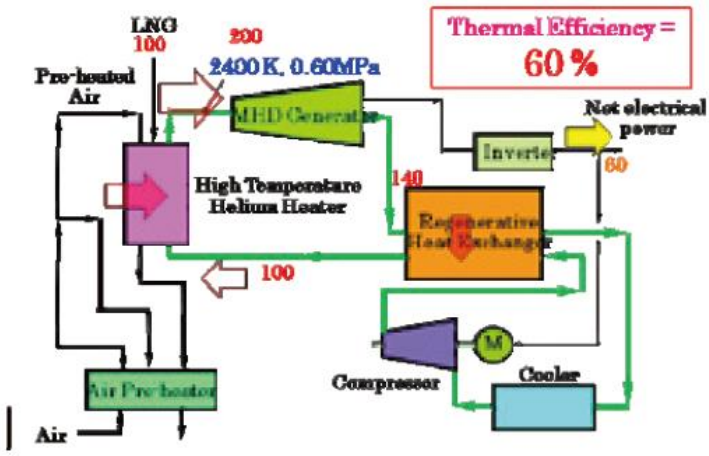

Figure 8: Energy Re-circulating type MHD single system with LNG as heat source.[12]

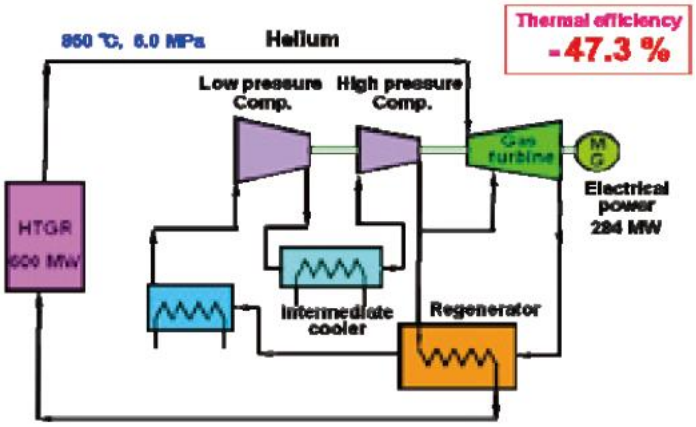

Figure 9: Energy Re-circulating type gas-turbine single system with nuclear reactor as heat source.

VI.II Energy Re-Circulating Nuclear/Gas Turbine System

It is pointed out that efficiency of power generation system with nuclear fission reactor must be increased in order to reduce CO_2 emission. Energy re-circulating type gas-turbine single system with nuclear reactor is proposed. Schematic of this system is shown in Figure 9.

Here, working gas is re-circulating helium and high temperature gas-cooled reactor (HTGR) is considered to be used in this system. We can expect high plant efficiency about 47% in contrast with 35% for the case of BWR/steam-turbine system. This remarkable increase in efficiency results in saving by over 25% of nuclear fuel consumption. Main issue may be development of increase operating temperature.

VI.III Energy Re-Circulating Nuclear/MHD System

Because, in previous nuclear/gas-turbine system, highest working temperature is considered to be 850^0C owing to requirement from difficulty in developing HTGR, its efficiency is relatively low. A system using MHD generator to achieve higher efficiency is proposed as shown in Figure 10. This system is a special power generation system driven by

HTGR directly connected with MHD single power generation system for space applications. Typical gas dynamic parameters of heat, Q in MW, temperature, T in K, and pressure, P in MPa are shown in this figure. Working medium of helium mixed with xenon is used so as to connect closed cycle MHD system directly to HTGR. We exclude alkali-metal seed from the system. Mixed inert gas (MIG) system has been studied to eliminate system complexity of seed injection, mixing and recovery. Ionization potential of MIG working medium is much higher than that of inert gas seeded with alkali-metal, and therefore, ionization level, namely electrical conductivity, is not enough at the temperature of the reactor exit, 1800K. So, it must be pre-ionized electrically. Disk shaped Hall-type MHD generator is used for simple geometry, fewer electrode connections and simple structure of superconducting magnet. Regenerator which is installed just downstream of the MHD generator can regenerate heat exhausted from the generator in order to minimize waste heat radiated from the radiation cooler and to improve plant efficiency. Other components are staged compressor with intercoolers and radiation cooler[13].

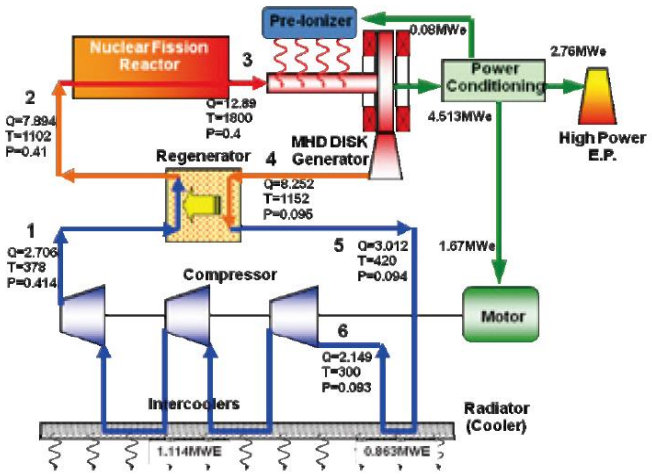

Figure 10: Energy Re-circulating type MHD single system with nuclear reactor as heat source for space applications

Input power from the HTGR is fixed as 5MW. Thermal input to the MHD generator is about 13MW which is the sum of input thermal energy from HTGR of 5MW and recovered one from the regenerator of about 8MW. Enthalpy extraction ratio, which is the ratio of output electrical power to thermal input, is assumed to be reasonable value of 35%. Generated electric power is 4.5MW and net output is 2.76generated power is used for compressor power. Finally, total plant efficiency reached to 55 to this system and 2.76MW net output electric power. Main reasons of high efficiency are high operating temperature and thermal energy recovery by regenerating heat exchanger. We have to note that we can reduce fuel consumption and recognized that this system will be an important candidate in near future.

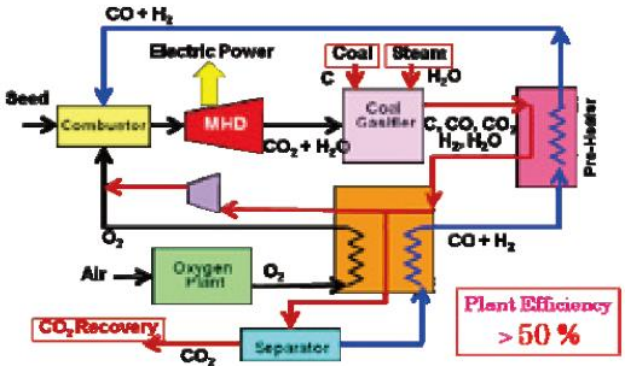

Figure 11: CO_2 Recovery type MHD generator plant.

VI.IV CO_2 Recovery Type MHD Power System

To reduce CO2 emission is one of the urgent requirements to reduce global climate change based on green house effect. If we burn fossil fuel, CO2 must be exhausted. Therefore, we have to develop two directions; 1) increase plant efficiency which leads to reduce fuel consumption and 2)CO2 recovery type power generation system. We discuss how to increase plant efficiency using MHD generator previously. We would like to discuss how to design CO2 recovery type plant. At first, if we burn fossil fuel with air, exhaust gas contains so much N2 and we have to separate CO2 from N2 and H2O. This process requires so much energy and again increases CO2 production. If combustion exhaust contains only CO2

and H2O, it is easy to separate CO2 from H2O. This can be achieved by burning fuels with pure oxygen. Of course some amount of energy loss to produce oxygen takes place. However, temperature of combustion gas can be increased and if this increase in temperature can be effectively used to increase of plant efficiency, such penalty can be compensated. Basic ideas of CO_2 recovery type MHD power generation system are as follows: Heat source is coal synthesized gas burning with pure oxygen. Coal must be considered as a heat source in near future with in 200 years instead of LNG or oil. Nitrogen free with oxygen separate plant is included. Figure 11 shows typical CO_2 recovery type MHD generator plant proposed by Prof. N. Kayukawa at Hokkaido University. In this system, H_2 and CO is burned with pure oxygen to drive MHD generator at the temperature around 2800^0C. Downstream part after MHD generator, heat is recovered by regenerative coal gasification process, fuel pre-heating, and steam decomposition. Energy penalty for oxygen production plant can be recovered due to operate at high temperature with high efficiency of the MHD generator. It is known that only MHD generators can be operated such high temperature regime. Total plant efficiency can be expected as over 50% with CO_2 recovery.

VII. Conclusion

In the conventional conversion systems a significant loss of energy occurs in the transition from thermal to mechanical energy (thermodynamic conversion). The performance from the point of view of efficiency of a heat engine is limited by the Carnot cycle. The Carnot efficiency is governed solely by the extreme temperatures of the cycle. The low temperature of the cycle is related to the temperature of the environment, the maximum temperature is rather related to the mechanical resistance of the material at high temperature. Nowadays, gas turbines are the technologies that can work to the highest value of temperature cycle, with values around 1500 K. These technologies are usually used as a topper in a combined cycle gas turbine (CCGT) plant. The Carnot efficiency for a thermal engine that works on those temperatures is about 80%.

In the MHD generator the advantage of having no moving parts allows to work at higher temperatures than a conventional energy conversion. It is possible to work with temperature around 3000K, and a these temperature the maximum theoretical efficiency would be near 90%. In the section of near future MHD power generation system the plant efficiency can be increased by increasing the working temperature, do not use condenser of steam-turbine to reduce exhaust heat, and to construct energy re-circulating type system.

Also, in order to reduce CO_2 emission, use nuclear power with high efficiency. We have to construct nuclear powered energy re-circulating type system. Also idea of CO2 recovery type power generation system must be developed. Energy re-circulating type Nuclear/MHD power system was proposed to achieve high efficiency using high operating temperature and eliminating bottoming cycle. For reduction of CO_2 emission, CO_2 recovery type generator system was proposed, which has special features of using coal synthesized gas burning with pure oxygen and heat recovery systems.

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Analysis of GI/GI/1 Queue by Push-Out Simulation Technique

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Abstract- This paper is concerned with the sensitivity analysis of GI/GI/1 queueing model by "push-out" simulation technique, which is based on discrete event dynamic system using structural parameters. The study of "push-out" technique is extension of score function simulation method for sensitivity analysis and stochastic optimization.

Index Terms- Simulation, score function, structural parameter, joint distribution.
***Mathematical Subject Classification*:** 60K25, 60K30.

I. INTRODUCTION

In this paper we discuss the sensitivity analysis by simulation transformation technique called "push-out". We consider GI/GI/1 queueing model which is based on discrete events dynamic system using structural parameters. The customers arrive and take services as general distribution using single server. The study of the GI/GI/1 queue is extension of score function simulation method for sensitivity analysis and stochastic optimization.

Several researchers have discussed sensitivity analysis and stochastic optimization for many queueing models in different frame-works, Asmussen and Melamed [1] considered regenerative simulation of TES progress. Dussault et al. [2] discussed combining stochastic counterpart and stochastic approximation methods. Glasserman [3] discussed gradient estimation via perturbation analysis. Sensitivity analysis of GI/GI/m/B queue with respect to buffer size by the score function method was discussed by Kriman [5]. Convergent rates for steady- state a derivative estimator was considered by L' Ecuyer [6]. Marti [7] discussed stochastic optimization method of structural design and considered efficiency of score function method for sensitivity analysis and optimization of queueing networks. Rubinstein [10] discussed sensitivity analysis of discrete events dynamic system by the "push- out" method.

This term is derived from the fact that we push-out the parameter v_2 from the original sample performance L(Y, v_2) into an auxiliary probability function (pdf) via a suitable transformation, and then apply the score function simulation method to perform sensitivity analysis and optimization. Then we differentiate the resulting (auxiliary) sample performance with respect to v = (v_1, v_2).

II. PRELIMINARIES

It is desired to estimate the steady- state expected waiting time λ(v) in stable G/G/1 queue as

$$\lambda(v) = E_{v_1}\{L(Y_t, v_2)\} \qquad (1)$$

where L(Y_t, v_2) is sample performance depending on the parameter vector v_2 and input sequence Y_t = {y_1, y_2 ……..y_t) of independent identically distributed random vectors with common pdf (probability density function) f(y, v_1). Subscript v_1 in $E_{v_1}\{L\}$ indicates that the expectation is taken with respect to the pdf f(y,v_1) and combined vector of parameter given here by v = {v_1, v_2}. We assume f depends on the parameter vector v_1 but not on v_2 and L depend on v_2 but not on v_1. Pflug [8] defined the parameter v_1 and v_2 as the probability measure and random process respectively.

III. "PUSH-OUT" TECHNIQUE

We consider "push- out" technique which shows that typically smoothes out the sample performance function L(y, v_2) with respect to v_2 by rendering it independent of v_2. To determine the idea of the "push-out" technique, let there exists a vector valued function x = x(y, v_2) and the real valued function $\bar{L}$(x) independent of v_2, such that

$$L(y, v_2) = \bar{L}\{x(y, v_2)\} \qquad (2)$$

Suppose that Y ~ f(y, v_2) and the corresponding random vector X = x(Y, v_2) for which the pdf is $\bar{f}(x, v_1, v_2)$, then

$$L(v) = \int_{x \in X} \bar{L}(x)\bar{f}(x, v)dx = E_{\bar{f}}\{\bar{L}(x)\} \qquad (3)$$

where expectation is now taken with respect to the pdf $\bar{f}(x, v_1, v_2)$. As mentioned in (1) the term "push- out" derived from the fact that the parameter v_2 is pushed out from L{y, v_2} to an auxiliary pdf $\bar{f}(x, v_1, v_2)$.

The derivative of $\nabla \lambda$(v) is similar, but one needs to make use of the identity

$$\frac{d}{dv}\int_{a(v)}^{b(v)} g(v, x)dx = \int_{a(v)}^{b(v)} \frac{\partial}{\partial v} g(v, x)dx + \frac{db(v)}{dv} g(v, b(v))$$

$$- \frac{da(v)}{dv} g(v, a(v)) \qquad (4)$$

A representation of L(y, v_2) of the form (1) and the subsequent transformation (2) are not always available, and if available, it may be hard to calculate $\bar{f}(x, v_1, v_2)$. Let for every v_2, x = x(y, v_2) be one-to-one and have an inverse y = y(x, v_2) and assumed to be continuously differentiable in each component of x, then

$$\bar{f}(x, v_1, v_2) = f\{y(x, v_2), v_1\}. \left| \frac{\partial y(x, v_1)}{\partial x} \right| \qquad (5)$$

where $\frac{\partial y}{\partial x}$ denotes absolute value of the determinant of the Jacobean of y(x, v_2) with respect to x.

Definition 1. [11]. Let G be the probability measure with pdf (probability density function) g(z) so that
dG(z) = g(z)dz.

sup $\{f(z, v_1)\} \subset$ sup $\{g(z)\}$, then $\lambda(v) = E_g\{L(Z, v_2)W(Z, v_1)\}$ (6)

where $W(Z, v_1) = f(z, v_1)/g(z)$ is likelihood ratio discussed in Glynn [4], and subscript g indicate that the expectation is taken with respect to dominating pdf (probability density function) g(z). Under the standard regulatory condition admitting the interchangeability of the expectation and differentiation operator, we have

$$\nabla^k_{v_1} \lambda(v) = E_g\{L(Z, v_2) \nabla^k_{v_1} W(Z, v_1)\} \text{ for } k = 1, 2, \ldots \qquad (7)$$

$$\nabla^k_{v_2} \lambda(v) = E_g\{\nabla^k_{v_2} L(Z, v_2) W(Z, v_1)\} \text{ for } k = 1, 2, \ldots \qquad (8)$$

Definition 2. [9]. Let g(z) be a pdf (probability density function) that dominates the pdf $\tilde{f}$ (z, v), then from (6), (7), (8) we have

$$\nabla^k \lambda(v) = E_g\{\tilde{L}(Z) \nabla^k \hat{W}(Z, u)\}$$

where $\hat{W}(Z, u) = \tilde{f}(z, u)/g(z)$ and Z ~ g(z). (9)

Now for a given sample $\{Z_1, Z_2 \ldots Z_n\}$ from g(z) $\nabla^k \lambda(v)$ may be estimated as

$$\nabla^k \tilde{\lambda}_N(v) = \frac{1}{N} \sum_{i=1}^{N} \tilde{L}(Z_i) \nabla^k \hat{W}(Z_i, v) \quad \text{for } k = 0, 1, 2\ldots$$

where $\nabla^0 \lambda_N(v) = \lambda_N(v)$ and estimate $\nabla^k \tilde{\lambda}_N(v)$ referred to as push-out score function (POSF).

IV. MODEL DESCRIPTIONS

Let L_n and £$_n$ be sojourn time and waiting time distribution of n^{th} customer respectively, and

y_{1n} = service time of n^{th} customer,
y_{2n} = time between arrival of the n^{th} and $(n-1)^{th}$ customer,
where $y_{10} = y_{20} = 0$.

Let X be steady-state random variable with steady-state cumulative density function (cdf)

$F_X(x, v) = p_v(X \le x) = \lim_{n \to \infty} p_v(X_n \le x)$, and $f_x(x_1)$ is pdf of random variable such that X $\in$ {L, £} and $f_x(x, v) = \frac{\partial F_x(x, v)}{\partial x}$.

Estimation of $F_x(x, v)$ and $f_x(x, v)$ for related random variables such as virtual waiting time and queue length are discussed by Rubinstein [11]. Let τ be the number of customers served during a busy period in a steady-state GI/GI/1 queue with FCFS (first come first served) discipline. Let v be the service time distribution variable of $f(y, v)$.

V. MAIN RESULTS

Theorem1. Let X $\in$ {L, £} the steady-state expected waiting time cdf (cumulative density function)
$F_X(x, v) = p_v(X \le x)$ of the sample performance is estimated as

$$\tilde{F}_{XN}(x, v) = \frac{1}{N} \sum_{i=1}^{N} \tilde{I}(Z_i) \tilde{W}(Z_i, u).$$

Proof: Since X $\in$ {L, £} be random variable of the waiting time distribution such that

$X = \sum_{t=1}^{\tau} L_t$ where τ is number of customers served during busy period in the steady-state. Using likelihood ratio which is discussed in Glynn [4], we have

$$F_X(x, v) = E_g\{I_{(-\infty, 0)}(X - x) \tilde{W}_t(Z_\tau, v)\}, \qquad (10)$$

where $\tilde{W}_t = \prod_{j=1}^{t} W_j$, $W_j = \frac{f(Z_j, v)}{g(Z_j)}$, $Z_j \sim g(z)$,
and $Z_\tau = (Z_1, Z_2, \ldots\ldots\ldots\ldots Z_\tau)$. The higher order derivatives of F_X may be similarly represented.

Standard likelihood ratio Glynn [4], estimators of $F_X(x, v)$ based on (1) required calculation of the estimator function $I_{(-\infty, 0)}(X - x)$ for each value of x separately. Estimation of $F_X(x, v)$ for multiple values of x and v from single simulation run is as:
$F_X(x, v) = E_v\{I_{(-\infty, 0)}(X - x)\}$.
Since L_n and £$_n$ are sojourn and waiting time of n^{th} customer, then
L_n = £$_n$ + Y_{1n}, for n= 1, 2, 3……..

Now $F_X(x, v)$ may be written as

$F_X(x, v) = E_u\{ I_{(-\infty, 0)}(\tilde{X})\}$ and $u = (x, v)$

where $\tilde{X} = \sum_{n=1}^{\tau-1} L_n + £_\tau + \tilde{Y}_\tau$,

$\tilde{Y}_\tau = Y_\tau - x$ and $\tilde{Y}_\tau \sim \tilde{f}(y, u)$ for $\tilde{f}(y, 0, u) = f(y, u)$.

So the cdf $F_X(x, v)$ may be represented as

$F_X(x, v) = E_g\{ \tilde{I}_\tau \tilde{W}_\tau(u) \}$ where $\tilde{W}_\tau(u) = \hat{W}_\tau(u) \prod_{j=1}^{\tau-1} W_j(u)$,

$W_j(v) = \frac{f(Z_j, v)}{g(Z_j)}$, j = 1, 2 ….. (τ – 1),

$\hat{W}_\tau(u) = \frac{\bar{f}(Z_\tau, u)}{g(Z_\tau)}$ for $Z_k \sim g(z)$, k = 1, 2 ….. τ, and indicator function

$\tilde{I}_\tau = I_{(-\infty, 0)}(\sum_{n=1}^{\tau-1} L_n + £_\tau + Z_\tau)$.

Now we may estimate $F_X(x, v)$ as

$$\tilde{F}_{XN}(x, v) = \frac{1}{N} \sum_{i=1}^{N} \tilde{I}(Z_{\tau i}) \tilde{W}(Z_{\tau i}, u) \quad (11)$$

where $Z_{\tau i} = (Z_{1i}, Z_{2i}, \ldots\ldots Z_{\tau i})$ for i = 1, 2, 3……..N is a sample from g(z). At steady-state when τ = 1 in equation (11), we get the required result.

Theorem 2. In the sample performance $\tilde{I}_\tau = I_{(-\infty, 0)}(\sum_{n=1}^{\tau-1} L_n + £_\tau + Z_\tau)$, the sojourn time and waiting time distribution $\sum_{n=1}^{\tau-1} L_n$ and $£_n$ can be obtained by variate Z_τ from the dominating pdf (probability density function) g(z).

Proof: Let L be the random variable of sojourn time distribution, then estimation of steady-state cdf $F_L(x, v) = p_v(L \le x)$

Arguing similar to theorem 1, we have

$F_L(x, v) = E_v\{ I_{(-\infty, 0)}(L - x)\}$.

or we can represent $F_L(x, v) = E_u\{ I_{(-\infty, 0)}(\tilde{L}_n)\}$ and $u = (x, v)$

where $\tilde{L}_n = Z_n + \tilde{Y}_{1n}$, $Y_{1n} \sim f(y, v)$, $\tilde{Y}_{1n} = Y_{1n} - x$, $\tilde{Y}_{1n} \sim \bar{f}(y, v)$ and

$I_n = I_{(-\infty, 0)}(\tilde{L}_n)$ represent regenerative process across busy cycle.

But $F_L(x, v) = \frac{E_u\{\sum_{n=1}^{\tau} I_n\}}{E_u(\tau)}$. (12)

Now using (12) and above arguments, we obtain

$$F_L(x, v) = \frac{E_g\{\sum_{n=1}^{\tau} \tilde{I}_n \tilde{W}_n(u)\}}{E_g\{\sum_{n=1}^{\tau} \tilde{W}_n(u)\}} \quad (13)$$

where $\tilde{I}_n = I_{(-\infty, 0)}(£_n + Z_n)$, $\tilde{W}_n(u) = \hat{W}_n(u) \prod_{j=1}^{n-1} W_j(v)$,

$W_j(v) = \frac{f(Z_j, v)}{g(Z_j)}$ and

$\hat{W}_n(u) = \frac{\tilde{f}(Z_n, v)}{g(Z_n)}$, $Z_n \sim g(z)$ for n = 1, 2, 3, ….τ.

Since $\tilde{Y}_1 = Y_1 + x$, then we choose the dominating probability density function (pdf) g(y) as $\tilde{f}(y, x_0, v_0)$ provided $x_0 \ge x$ and $y \ge 0$. Now $F_L(x, v)$ may be estimated as

$$\tilde{F}_L(x, v) = \frac{\sum_{i=1}^{N} \sum_{n=1}^{\tau_i} \tilde{I}_{ni}(Z_{ni}) \tilde{W}_{ni}(Z_{ni}, u)\}}{\sum_{i=1}^{N} \sum_{n=1}^{\tau_i} \tilde{W}_{ni}(Z_{ni}, u)\}}.$$

where $\{Z_{ni}\} = \{(Z_{1i}, Z_{2i}, \ldots\ldots Z_{ni}): n = 1, 2, \ldots\ldots \tau_i, i = 1, 2, \ldots\ldots N)\}$ is a random sample from dominating pdf g(z).

Remark: When both variate $£_n$ and L_n are associated with the sample performance $\tilde{I}_n = I_{(-\infty, 0)}(£_n + Z_n)$, can be obtained by simulation and $\tilde{Y}$ can be similarly generated from the dominating pdf, $g(y) = \tilde{f}(y, x_0, v_0)$. To estimate the steady-state pdf f of the sojourn time process $\{L_n\}$ we have to differentiate (7) with respect to x and similarly for the estimation of higher order derivatives $F_L(x, v)$.

The condition is applicable to estimate $F_L(x, v)$ when the underlying process $\{£_n\}$ is not known analytically.

Example: Let the probability density function of waiting time distribution $f(y, v) = v \exp(-vy)$ be known, then we can estimate the waiting time auxiliary pdf (probability density function).

Solution: Since $f(y, v) = v \exp(-vy)$ then

$\tilde{f}(y, x, v) = v \exp(-v(y + x))$, $y \ge -x$.

Now dominating pdf may be selected as

$g(y) = v_0 \exp(- v_0 (y + x_0)$ where $x < x_0$, $y > - x_0$ and

$\tilde{f}(y, x, v) = f(y, v)$ for $n = 1, 2 \ldots\ldots \tau - 1$.

So, $\tilde{f}(y, x, v) = v \exp(-v (y + x))$ for $n = \tau$.

Similarly we can estimate the dominating pdf g(y).

It is important to note that, the procedure above can be adapted to general queueing networks, particularly to those in which the distribution of neither L_n nor $£_n$ is not analytically available.

VI. Discussion

In this paper we discuss the sensitivity analysis of GI/GI/1 queueing model by a transformation technique called "push-out" simulation technique. The study of "push-out" technique is extension of score function method for sensitivity analysis and stochastic optimization. We discuss the conditions under which such types of transformation are useful.

When sojourn and waiting time of any customer in the queueing system are not available analytically, then using suitable transformation and score function method, we can estimate the waiting and sojourn time distribution of the customer for the given model. "push-out" technique is a transformation technique, which is totally a model dependent.

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Clinical malaria: Aspects of demographic and health-seeking characteristics of inmates of New Bakassi Resettlement in Ekpiri-Ikang, Nigeria

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***Abstract*-** Nigerians in Bakassi were evacuated after International Court of Arbitration awarded Bakassi to Cameroon. This study, carried out after two years of resettlement, was aimed at determining the incidence, health-seeking occurrences and spatial clustering of clinical malaria among New Bakassi resettlees at Ekpiri-Ikang, Nigeria. Records from approved hospitals and structured questionnaires were employed. Overall, 25.4% of resettlees seeking medical assistance were diagnosed with clinical malaria. Prevalence was highest among the 0-9 years age group; higher among females of reproductive age than among their male counterparts (χ^2-test; $p < 0.05$); comparable between sexes in all other age brackets, (χ^2-test; $p > 0.05$). The risk of having malaria was six times as high among children (0 – 9 years) than among adults (OR 5.99; 95% CI 1.738 TO 1.842); twice as high among females than among males (OR 1.79; 95% CI 0.531 to 0.627); five times as high among females of reproductive age than among their male counterparts (OR 4.55; 95% CI 1.349 to 1.581). Malaria incidence was 2.4 episodes/person/year (2.2 for males; 2.6 for females). Generally, females had higher number of episodes than males. Overall, 6.5% of respondents had zero malaria episode per year, and were from 8.3% of the total households. From the latter, 15.4% had two residents each with zero malaria episode. The occurrence of clinical malaria was high among health-seeking resettlees generally, especially among children and women of reproductive age. Very few households (8.3%) had zero malaria episodes.

***Index Terms*-** Malaria, Incident rate, health-seeking, Resettlement, Nigeria

I. INTRODUCTION

Sub-Saharan Africa is the hotbed of clinical malaria, accounting for about 80% of 110 million global cases, and with up to 2 million mortality cases [1]. About 588 million people are at risk and there is endemicity in 45 African countries with Nigeria accounting for a quarter of all cases [2]. Malaria, is holoendemic in Nigeria especially in the rural areas [3], could be hyperendemic in urban areas [4], is perennially stable but transmission is most intense during the rainy season. It is the commonest cause of work and school absenteeism and outpatient attendance in the country [5]; a leading cause of hospital admissions and child mortality in Africa [6]; a serious impediment to economic and social development in Nigeria [7]. Furthermore, the vectors that transmit the malaria parasites, *Plasmodium*, especially *Anopheles gambiae* and *An. funestus* are quite abundant in the country [8]. With Nigeria located close to the equator, there are consequent hot and humid conditions which are favourable for malaria transmission. The combination of these ecological factors including preponderance of clear surface water bodies increases the vectorial capacity of the anopheline mosquitoes [9].

The total number of refugees worldwide is put at 9.2 million; an estimated 25 million people are displaced by conflicts worldwide, while the number of those uprooted for developmental projects is thought to be much higher [10]. About 30% of displaced persons in the world are found in Sub-Saharan Africa region, which has the worst overall access to clean drinking water. The displaced persons are considered to be among the most vulnerable group in the world. Forced movements of populations are precursory to health hazards [11], social stress, insecurity, and outbreak of relocation-related diseases [12-13], exacerbate malaria transmission leading to malaria epidemics [14].

The refugee and Internally Displaced Persons (IDP) camps in sub-Saharan Africa are characterized by overcrowding, poor accommodation, unsafe and inadequate water supply, poor sanitation, poor system of waste disposal, the amount and quality of food available, and poor sewerage systems, heighten vulnerability to epidemics, as these conditions predispose to parasitic and communicable diseases including malaria. The impact of malaria is greatest when the populations are most vulnerable [15]. Malaria infections were of particular concern among the refugee population because of the severe morbidity [16]. The weakest segments of the demographic spectrum such as infants, children and the elderly are the most strongly affected.

In October 2002, the International Court of Justice sitting in France, on a case brought by Cameroon against Nigeria, awarded the oil-rich Bakassi Peninsula to the former. This necessitated the resettlement of Nigerians in Bakassi to the New Bakassi camp at Ekpri- Ikang in Cross River State in October, 2009. This study is aimed at ascertaining the incidence rate, spatial clustering, and health-seeking epistemology of clinical malaria among New Bakassi resettlees in Ekpiri-Ikang, Nigeria.

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II. MATERIALS AND METHODS

A. *Description of Study population.* The New Bakassi Resettlement Camp is located in Ekpri- Ikang in Cross River State which lies between latitudes 4°49' 47'' N and longitudes 8°30' 49''E, on an altitude of 76 meters [17]. The population of the host community is 19,424. There are a total of 500 houses in the resettlees' camp. The houses could be described as modern as they are built with zinc roofing, painted, louvres-fitted windows, and with relatively good finishing. Only a few of these houses have mosquito nets. The houses were grossly inadequate for the resettlees hence a number of families were accommodated in one house. There were about 2,500 families housed in just 300 of the 500 houses in the camp.

The resettlees are Nigerians and are from five states of the federation namely, Cross River, Akwa Ibom, Bayelsa, Rivers, and Delta states. They were all professional fishermen living in the Bakassi Peninsula before their forced relocation to Ekpri-Ikang.

The resettlees have access to water through a bore-hole provided by the Cross River State Government. The bore-hole was however erratic, surrounded by bushes, and yet to be provided with reliable electricity.

B. *Field trips.*
Field trips to the New Bakassi Resettlement Camp, Ekpri –Ikang, Cross Rivers State were carried out between December 2009 and February 2010. Inventory of the available sanitary and recreational facilities, house types and settlement patterns was taken.

C. *Interactive sessions and questionnaire administration.* Interactive sessions were held with some of the resettlees in the local Efik dialect with an interpreter, and focused on explaining the aim of the study, their relationship with the host community, their general welfare including feeding and healthcare, and the need for them to give honest answers in the structured questionnaire. The questionnaire which bothered on the number of episodes of malaria per year, daily routines of the resettlees, their feeding and the general welfare, was randomly administered on a different day and setting, adjusting for age and sex. Every second person of the age and sex encountered was recruited for the questionnaire study. For children, their guardian helped with answers to the questions. Literate respondents were allowed to complete the questionnaire on their own, but their answers were revalidated by the study team to ensure accuracy.

D. *Collection of medical and laboratory records.*
Medical records of the resettles regarding clinical malaria were collected from the two approved medical facilities approved by the Government to oversee the health concerns of the resettlees. These are the Dispensary in the Camp and the General hospital, Calabar.
Information collected included clinical malaria diagnoses as reported by these two approved health institutions used by the resettlees since inception in relation to sex and age. These were collected, collated and analyzed.

E. *Data analysis.* SPSS 14.0 for Windows was used for data entry. Statistical analyses were carried out on differences between prevalences of infections using chi-square tests. P-values < 0.05 were considered statistically significant. Risk assessment was evaluated from Odds Ratio, while the Incidence of clinical episode was calculated as the number of episodes of malaria per person per year [18].

III. RESULTS

A. *Prevalence among health-seekers.*
The prevalence of malaria among health-seeking New Bakassi resettlees in relation to age and sex is presented in Figure 1. Overall, 25.4% of the resettlees who sought for medical assistance in the approved health institutions were diagnosed with clinical malaria. Among these, there were more females with clinical malaria than males (χ^2-test; $p < 0.05$). Prevalence was highest among the 0-9 years age group, and followed distantly by the 20-29 years age group. From the latter age group, prevalence decreased steadily until the last age group.

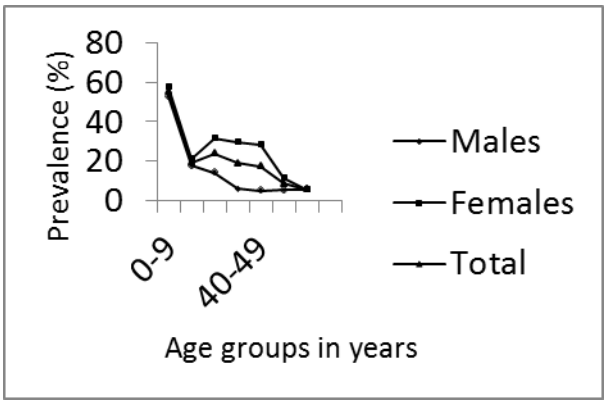

Figure 1. Prevalence of malaria among health-seeking New Bakassi resettlees in relation to age and sex

Prevalence was significantly higher among females of reproductive age than among their male counterparts (χ2-test; $p < 0.05$). In all other age brackets, prevalence was comparable between sexes (χ2-test; $p > 0.05$). Further analysis of the differences between the reproductive and non-reproductive categories showed a significantly higher prevalence of clinical malaria among non-reproductive females (inclusive of the 0-9 years age group) than among their reproductive counterparts (see Figure 2). When the 0-9 years were excluded from the non-reproductive females, the reverse was obtained. However, a comparison between the non-reproductive males and their reproductive counterparts showed that prevalence was significantly higher among the non-reproductive cluster than among their reproductive counterpart regardless of whether the 0-9 years age group was included or excluded from the study.

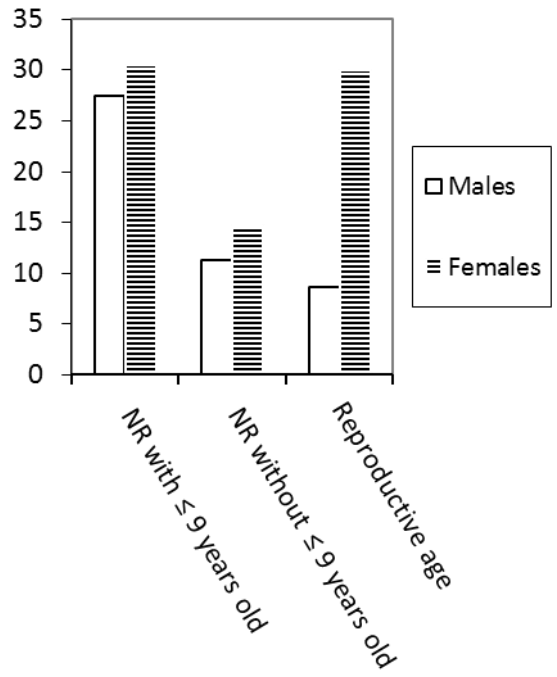

Figure 2. Sex-related differentials in prevalence of clinical malaria between reproductive and non-reproductive ages of health-seeking Bakassi resettles

(NR: Non-reproductive age groups; Reproductive age: represents age groups between 20 to 49 years. All others fall within the NR).

B. Risk assessments of health-seeking occurrence due to malaria.

The risk of clinical malaria was six times as high among children than among adults (0 – 9 years; OR 5.99; 95% CI 1.738 TO 1.842).

Overall, the risk of health-seeking occurrence due to malaria was twice as high among females (OR 1.79; 95% CI 0.531 to 0.627), than among males; five times as high among females of reproductive age than among their male counterparts (OR 4.55; 95% CI 1.349 to 1.581). However, among the non-reproductive age categories (1-19, 50 - ≥ 60 years age categories) there was no association between the risk of health-seeking occurrence due to malaria among females (OR 1.08; 95% CI 0.111 to 0.007) and the males.

Among males resettlees, the risk of health-seeking occurrence due to malaria was six times as high among the non-reproductive age cluster as among the reproductive counterparts (OR 5.68; CI 95% 1.570 to 1.904). Among the females, there was no association between the risk of health-seeking occurrence due to malaria among non-reproductive cluster and their reproductive counterparts (OR 1.01; CI 95% -0.060 to 0.078).

C. Incidence rates.

Malaria incidence, calculated from data provided by the respondents, decreased with increasing age among females, while among males the age groups 20 -29 years and 30 – 39 years recorded the lowest (See Table 1). Overall incidence was 2.4 episodes/person/year (2.2 for males; 2.6 for females). For the more vulnerable groups, that is, children under 10 years of age and reproductive females, it was 3.1 and 2.4 respectively.

There were a total of 1,087 malaria episodes in the year 2009 between January and December recalled by 460 respondents. The number of episodes per person per year ranged from 0 to 5 episodes with a median and mode of 2 and 3 episodes respectively. In relation to age and sex, the range of number of episodes per person per year (see Table 2) showed considerable variation, narrowing more among the older age groups especially females of the 50 – 59 age group. The greatest percentage of the youngest two age groups (56.0 % for 0 – 9 years and 51.1 % for 10 – 19 years) had 3 episodes/person/year; for the oldest age groups it was 2 episodes/person/year (57.1% for 50 – 59 years and 57.6% for ≥ 60 years).

Generally, females had higher number of malaria episodes than males (see Figure 3). The odd of not having malaria episode was high among males (OR 11.37; 95% CI 1.67 to 3.17); this translates to reduction in risk of having malaria episode by 92%.

D. *Spatial clustering of clinical episodes*

Overall, 6.5% (30/460) of respondents had no malaria episodes within a year duration, and they were from 8.3% (25/300) of the total households. From households of respondents without malaria episodes, 15.4% had two respondents each with no malaria episode. On the other hand, 5.1% (16/300) of households had two respondents each with malaria episodes with an average incidence of 4.3 episodes/person/year.

IV. DISCUSSION

Malaria was highly prevalent among the New Bakassi resettlees at Ekpiri-Ikang. **T**he risk for malaria is high among IDPs and refugees [19], especially in sub-Saharan Africa where it is the most common health problem [20]. Actually, prevalence could be much higher if asymptomatic malaria cases are factored in [21]. *Plasmodium* infection without overt malaria disease [22], is common in sub-Saharan Africa, with some areas experiencing parasitaemia prevalence as high as 90% [20-21]. In a refugee camp in Kenya, malaria was the most common diagnosis among health-seeking Barawan refugees who presented themselves to the clinic at the refugee camp [23].

Prevalence among children of 0-9 years was the highest of all the age groups in this study, and is congruent with reports across Africa [18]. Similarly, the average number of clinical malaria episodes per child less than ten years of age in this study was 3.3 episodes per year. Malaria incidence in sub-Saharan Africa is between 1.6 and 5.4, and various studies have recorded the incidence to be between 3 and 5 episodes per year [18,24-28]. In the West African sub-region, children followed up for five years in Senegal were found to experience between 0–40 episodes of clinical malaria [29]. There was an unexplained high susceptibility to clinical malaria for a proportion of children with

some children suffering a malaria attack every 4 to 6 weeks over many years [30]. Such exceptional cases of high susceptibility to clinical malaria were not encountered at Ekpiri-Ikang Camp.

Table 1. Incidence of malaria among respondents in New Bakassi Resettlees Camp at Ekpiri-Ikang, Nigeria in relation to age and sex.

Age	Males			Females			Total		
	NResp[a]	TNE[b]	AvEpis[c]	NExam	TNE	AvEpis	NExam	TNE	AvEpis
0 – 9	48	145	3.0	52	163	3.1	100	308	3.1
10 – 19	43	101	2.3	49	130	2.7	92	231	2.5
20 – 29	36	41	1.1	38	87	2.3	74	128	1.7
30 – 39	32	23	0.7	36	85	2.4	68	108	1.6
40 – 49	24	59	2.5	27	66	2.4	51	125	2.5
50 – 59	19	55	2.9	23	51	2.2	42	106	2.5
≥ 60	15	43	2.9	18	38	2.1	33	81	2.5
Total	217	467	2.2	243	620	2.6	460	1087	2.4

[a] NResp: Number of respondents; [b]TNE: Total number of episodes; [c] AvEpis: Average number of episodes.

Table 2. Number of malaria episodes in 2009 as recalled by respondents in the New Bakassi Resettlees Camp at Ekpiri-ikang, Nigeria in relation to age and sex

Age	No. exam	No. of episodes					
		0	1	2	3	4	≥ 5
Males							
0 - 9	48	3	2	3	27	9	4
10 – 19	43	5	3	10	22	3	0
20 – 29	36	6	20	9	1	0	0
30 – 39	32	10	21	1	0	0	0
40 -49	24	3	2	4	11	4	0
50 – 59	19	0	0	6	9	4	0
≥ 60	15	0	0	5	7	3	0
Females							
0 - 9	52	1	3	4	29	10	5
10 – 19	49	2	3	13	25	4	2
20 – 29	38	0	6	19	9	4	0
30 – 39	36	0	4	16	15	1	0
40 -49	27	0	2	13	10	2	0
50 – 59	23	0	0	18	5	0	0
≥ 60	18	0	1	14	3	0	0
Total							
0 - 9	100	4	5	7	56	19	9
10 – 19	92	7	6	23	47	7	2
20 – 29	74	6	26	28	10	4	0
30 – 39	68	10	25	17	15	1	0
40 -49	51	3	4	17	21	6	0
50 – 59	42	0	0	24	14	4	0
≥ 60	33	0	1	19	10	3	0

Indeed, malaria incidence varies substantially between areas [28]. High incidence rate is responsible for high child mortality in Sub-Saharan Africa.

The risk of having malaria was six times as high among children than among adults. Among the Barawan refugees the risk of having malaria parasitemia was twice as high among children than adults [23]. This age-related disparity is probably due to acquired immunity to malaria infection among adults [31]. In malaria endemic areas, immunity to malaria varies with age [25], with maternally acquired immunity in infants waning within

three months before they slowly develop theirs [32]. This results in a progressive and homogenous decrease in malaria attacks with increasing age in children [33-36]; with incidence rates peaking towards the end of infancy and then decrease [28,32].

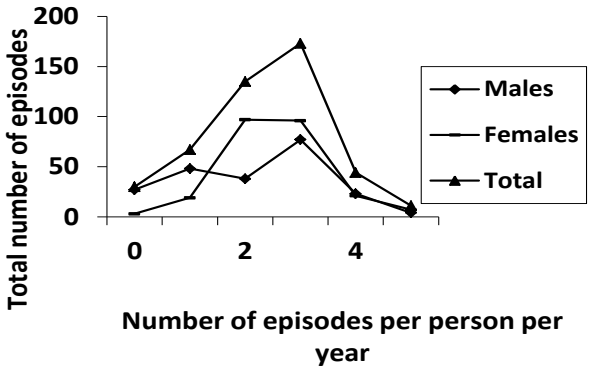

Figure 3. Distribution of number of episodes per person per year in relation to sex among respondents in New Bakassi Resettlees in Ekpiri-Ikang, Nigeria.

Prevalence of malaria was significantly higher among women of reproductive age than among their male counterparts, and is corroborated by other findings elsewhere [3,37,38]. The risk of health-seeking occurrence due to malaria was twice as high among females as among males in this study, and females were eleven times more likely to have malaria episode than males. Findings among Barawan refugees in Kenya were contrary, as males were twice as likely to be parasitemic as were females; and this was attributed to sex differences in behaviour during the evening hours (that is, males tend to be outside more) and their mode of dressing [39]. Among the Resettlees at Ekpiri-Ikang, men were better covered than women. Some have argued that females are expected to have better immunity to malaria and a variety of other parasitic diseases [40-42], while others have attributed this sex-related differences to genetic or hormonal factors [43]. However, there is consensus that pregnant women constitute a malaria-high-risk group. Malaria could cause fetal loss and maternal deaths. Furthermore, resistance of women of reproductive age is relatively weaker than those of their male counterparts. Generally, symptoms of malaria are far more severe in persons without resistance to the disease [44].

Absence of occurrence of health-seeking activity to approved health facilities does not necessary imply absence of malaria whether symptomatic or asymptomatic. Personal differences in response to malaria outcome could be the main reason for the differences in health-seeking occurrences between males and females at Ekpiri-Ikang camp. On the average, females of reproductive age may be more compelled to seek the services of a clinician than their male counterparts, especially when they are pregnant. The predominant local tradition is such that men are men when they "subdue" their ailments; the same ailments that women are encouraged to seek the services of clinicians. At best such men predominantly embarked on self medication.

Any of the resettlees could be asymptomatic even though they have the malaria parasite in their blood [45-49]. The prevalence of asymptomatic malaria could be as high as 98.5% in a Nigerian population [50]. Factors that play important roles in asymptomatic malaria include parasite and host genetics as well as socioeconomics [51], nutritional status [52].

The IDPs are vulnerable for this disease due to a wide variety of reasons. Firstly and perhaps one of the most obvious is the mere population makeup, with 45% of the 33 million displaced persons in the Sub-Saharan region comprised of children. Although adults are also at risk for contracting malaria, children are far more likely to develop severe malaria and die of the disease. Another clear reason for high malaria risk in IDP camps, especially at the early stage of setting up the camp is the lack of health services and control programs which would have been long established in a permanent setting [53]. This is true of the study population where there is total lack of health facilities. The nearest approved hospital for the resettlees being two hours drive away. To reduce malaria mortality and morbidity there must be effective case management and access to prompt effective treatment [54]. Secondly, only very few houses in the study area had window and door screens against mosquitoes and no household had treated mosquito bednets either. A similar situation which resulted in high malaria prevalence in Uganda has been reported [55]. Thirdly, the environmental presence of open water collections catalyzed by anthropogenic activities provides mosquitoes with breeding grounds. This is perhaps, one of the most important risk factors propagating malaria. With the paucity of water in the Ekpiri-Ikang camp, the storage of water by the resettlees in open containers creates increased risk for malaria as water storage containers provide additional breeding ground for the anopheline mosquitoes. Fourthly, the high population density shown by the high number of persons per room creates lots of biting options for the biting mosquito vectors to transmit diseases [56]. Vectors bite more persons in areas of higher population density and concentration increasing vulnerability to malaria [57].

Moderate spatial clustering of clinical malaria was observed from the questionnaire study. Spatial clustering of clinical malaria attacks was reported in Kenya and Pemba Island in Tanzania [28,58]. There are evidence of heterogeneity in malaria infections with 20% of the population carrying 80% of all infections [59], and the existence of a group of children with more clinical malaria disease than others [60-62]. Reasons adduced for these included behavioural differences between households, genetic factors including genetic polymorphism represented by sickle cell trait, as well as continuous exposure which genuinely reduces susceptibility [58].

V. CONCLUSION AND RECOMMENDATIONS

In conclusion, there is high prevalence of malaria in the New Bakassi Resettlement Camp at Ekpri-ikang. The preponderance of vector breeding sites helped by uninformed human activities, poor sanitary and poor social amenities, overcrowding,

malnutrition, lack of house screens against in-door biting vectors, poor personal hygiene and poor personal protective measures among others, have helped make the camp a malaria-paradise. This ugly situation must be promptly arrested as neglect or breakdown in control activities may give previously controlled malaria the opportunity to re-emerge, leading to a subsequent increase in transmission and endemicity lasting for several transmission seasons [63].

It is recommended that adequate sanitary and social facilities be put in place at New Bakassi resettlee camp at Ekpiri-Ikang that would discourage disease transmission. Provision of good pipe-borne water should be made a certainty in all future resettlement projects. Resettlees should be given health education on personal hygiene and preventive measures against acquiring infections. Treated mosquito nets should be made available to every individual and houses in the camp. Provision of a good health facility accessible to the resettlees in as minimum time as possible, while clearing of surrounding bushes and fumigation of entire camp site from time to time should the norm. Finally, targeting children with higher susceptibility may lead to more successful control interventions but this should be augmented with intermittent preventative treatment to children presenting higher episodes of clinical malaria and those who are regular callers at health facilities [58-59, 64-65].

ACKNOWLEDGEMENT

The authors express their gratitude to the Management of both the General Hospital Calabar, and the Camp Dispensary, and to all who assisted in the field trips, interactive sessions and the questionnaire administration during the study.

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Toxoplasmosis: A global infection, so widespread, so neglected

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***Abstract*-** Toxoplasmosis is an epidemiological paradox. It is one of the most prevalent and most widespread parasitic infections, yet one of the most ignored of all human infections. Between 30% and 65% of all persons worldwide are infected with Toxoplasma gondii, the causative organism. It is a coccidian parasite that infects mostly species of warm-blooded animals including man. It is asymptomatic among immunocompetent persons but presents a spectrum of clinical manifestations among the immunocompromised. Approximately 10% of congenital toxoplasmosis results in abortion or neonatal death. Infection may be associated with other diseases such as HIV/AIDS in humans or immunosuppressive therapy in any species. Toxoplasma encephalitis reportedly develops in approximately 40% of individuals with AIDS, and is fatal in 10-30% of these cases. This paper discussed updates and research trends on the biology, epidemiology, transmission, diagnosis, treatment of toxoplasmosis and made recommendations.

***Index Terms*-** Toxoplasmosis, Cat faeces, *Toxoplasma gondii,* Neglected disease

I. INTRODUCTION

Toxoplasmosis is a parasitic infection with a worldwide distribution. The causative organism, *Toxoplasma gondii, is* a coccidian parasite that infects mostly species of warm-blooded animals including man. It was first described in 1908 when found in the blood, spleen, and liver of a North Africa rodent *Ctenodactylus gondii*. The parasite was named *Toxoplasma* (arc-like form) *gondii* (after the rodent). About a third of the world's human population is estimated to carry *Toxoplasma* parasite (Ryan and Ray, 2004). It is one of the most prevalent chronic infections that man has had to contend with (Jones *et al*., 2007). Wild cats play significant role in the spread of toxoplasmosis because they are the only animals that excrete resistant oocysts into the environment. All other animals, including man, serve as intermediate hosts in which the parasite may cause systemic infection, typically resulting in the formation of tissue cysts.

Cats generally acquire the infection by feeding on infected animals, such as mice or uncooked household meat. During the first few weeks post-exposure, the infection typically causes a mild flu-like illness or no illness at all. Thereafter, the parasite rarely causes any symptoms in otherwise healthy adults. However, those with a weakened immune system, such as Acquired Immunodeficiency Syndrome (AIDS) patients or pregnant women, may become seriously ill, and occasionally may be fatal. The parasite can cause encephalitis (inflammation of the brain) and neurologic diseases, and can affect the heart, liver, inner ears, and eyes (chorioretinitis).

II. CLINICAL MANIFESTATIONS OF TOXOPLASMOSIS

The infection presents with a wide range of clinical manifestations in man, land and sea mammals, and various bird species (Akyar, 2011). When symptoms develop, they are nonspecific and include malaise, fever, sore throat, and myalgia. Clinical manifestations of toxoplasmosis are caused by cell destruction due to multiplying tachyzoites, which most commonly affect the brain, liver, lungs, skeletal muscles and eyes. Oocyst-induced infection may be more severe than that induced by ingestion of tissue cysts. Signs may persist for one to twelve weeks but more severe disease is very rare in immunocompetent individuals (Tenter *et al*., 2000). Of clinical cases, quite few may develop ocular toxoplasmosis (retinitis), but this is more commonly associated with congenital infection (Perkins, 1990).

Approximately 10% of congenital toxoplasmosis results in abortion or neonatal death. Clinical signs of congenital Toxoplasmosis is not apparent at first in most cases but infection acquired after birth is usually asymptomatic. Intrauterine meningoencephalitis could lead to the development of the following: cerebrospinal fluid (CSF) abnormalities, hydrocephalus, microcephaly, chorioretinitis, seizures, and deafness. Some of the severely affected infants die *in utero* or within a few days of birth. (Foulon *et al*, 1988). Other signs include maculopapular rash, generalized lymphadenopathy, hepatomegaly, splenomegaly, jaundice, and thrombocytopenia. The clinical course usually is benign and self-limited. Myocarditis, pericarditis, and pneumonitis are rare complications. Infants with congenital infection are asymptomatic at birth in 70% to 90% of cases, although visual impairment, learning disabilities, or mental retardation will become apparent in a large proportion of children several months to years later.

Infection may be associated with other diseases such as HIV/AIDS in humans or immunosuppressive therapy in any species (Akyar, 2011). *Toxoplasma* encephalitis reportedly develops in approximately 40% of individuals with AIDS, and is fatal in 10-30% of these cases (Patton, 1993). Among those chronically infected with AIDS, reactivated infection can result in encephalitis (inflammation of the brain), pneumonitis, and neurologic diseases, and can affect the heart, liver, and inner

ears, often with lethal outcome or less commonly, systemic toxoplasmosis (Remington *et al.,* 1995). Rarely do infants who are born to mothers living with AIDS or mothers who are immunocompromised for other reasons, have chronic infection with *T gondii* that was acquired congenitally *in utero* as a result of reactivated maternal parasitemia.

III. THE BIOLOGY OF *T. GONDII*

T. gondii belongs to the Kingdom Protista, Subkingdom Protozoa, Phylum Apicomplexa, Class Sporozoasida, Order Euccidiorida, Family Sarcolystidae, Genus *Toxoplasma,* and Species *T. gondii.* The life cycle of *T. gondii* has two phases. The sexual phase of the life cycle takes place only in cats (family Felidae), which makes cats the primary host. The second phase, the asexual phase takes place in other warm-blooded animals, including cats, mice, man, and birds (Dubey *et al.,* 1998). In both the primary and secondary hosts, the *Toxoplasma* parasite invades cells and forms a vacuole. Inside this specialized vacuole, known as parasitophorous vacuole, the parasite forms bradyzoites, which are the slowly replicating versions of the parasite. The vacuoles containing the reproductive bradyzoites form cysts mainly in the tissues of the muscles and brain. Since the parasites are inside of cells, they are safe from the host's immune system, which does not respond to the cysts (Ira *et al;* 2009). Inside the vacuoles, *T. gondii* replicates itself (by endodyogeny) until the infected cell fills with parasites and bursts, releasing tachyzoites, the motile, asexual reproducing form of the parasite. Unlike the bradyzoites, the free tachyzoites are usually efficiently cleared by the host's immune system, although some of them manage to infect cells and form bradyzoites, thus maintaining the infection. (Wilson *et al*; 1980).

Tissue cysts are ingested by a cat during feeding, for example, on an infected mouse. The cysts survive passage through the stomach of the cat, and the parasites infect epithelial cells of the small intestine where they undergo sexual reproduction and oocyst formation. Oocysts are shed with the feces. Animals and man that ingest oocysts (for example while eating unwashed vegetables) or tissue cysts (while eating improperly cooked meat) become infected. The parasite enters macrophages in the intestinal lining and is distributed via the blood stream throughout the body (Dvorak, 2008). *Toxoplasma* is able to dysregulate host's cell cycle by holding cell division before mitosis. This dysregulation of the host's cell cycle is caused by a heat-sensitive secretion (with a molecular mass larger than 10 kDa). Infected cells secrete the factor which inhibits the cell cycle of neighboring cells. The reason for *Toxoplasma's* dysregulation is unknown, but studies have shown that infection is preferential to host cells in the S-phase and host cell structures with which *Toxoplasma* interacts may not be accessible.

IV. EPIDEMIOLOGY AND WORLDWIDE DISTRIBUTION OF TOXOPLASMOSIS

T. gondii is widespread and capable of infecting many mammalian species. There is a high prevalence of toxoplasmosis throughout the world (20%–90%), as well as a high resistance and persistence of the parasite in a broad spectrum of biological matrixes (Vaz *et al*., 2010). Serological studies have indicated incidence of *Toxoplasma* infections ranging from less than 1% in young adults in some areas, to 90% among older persons in other places (Montoya and Remington, 1995). It is estimated that between 30% and 65% of all persons worldwide are infected with *Toxoplasma* (Tenter *et al*., 2000). The interest in toxoplasmosis has been stimulated over the last few years by the finding that this infection is widespread biologically as well as geographically. It is widespread perhaps, because of its simple mode of contraction. Infection can occur simply by ingestion of oocysts following the handling of contaminated soil with cat litter or the consumption of contaminated water or food. However, no direct association has been found between cat ownership and the risk of toxoplasmosis in people (Walker *et al.,* 2008).

Tansmission of tachyzoites to the fetus can occur via the placenta following primary maternal infection. The incidence of prenatal *T. gondii* infections within the same or similar populations have been estimated to range from about 1 to 120 per 10,000 births (Patton, 1993). Rarely, does infection by tachyzoites occurs from ingestion of unpasteurized milk or by direct entry into the bloodstream through a blood transfusion or laboratory accident; but it does occur through transplantation of an organ that contain tissue cysts.

T qondii has been recovered from locations throughout the world, except Antarctica. Seroprevalence among adults could be as high as 90% in many countries (Akyar, 2011). Some studies have reported of incidence of primary maternal infection during pregnancy to range from about 1 to 310 per 10,000 pregnancies in different populations in Europe, Asia, Australia and the Americas (Opsteegh *et al*., 2011). In Brazil, a recent report has it that 53.03% of pregnant women were positive for IgG and 3.26% were positive for IgM (Vaz *et al.*, 2010). *T. gondii* seropositivity among pregnant women, their fetuses, neonates, and AIDS patients have been investigated in Qatar. Widespread occurrence is confirmed in East Mediteranean (Akyar, 2011). In many developing countries, the exact prevalence of toxoplasmosis is not well articulated unlike in the developed world (Lindstrom *et a*l., 2006), but there is large variation between countries. In France, for example, around 88% of the population are carriers, probably due to a high consumption of raw and lightly cooked meat (Ancha and Szyfres, 2003). In Germany, the Netherlands and Brazil there are high prevalence rates of 68%, 80% and 67% respectively (Henriquez *et al*, 2009). In Britain about 22% are carriers, while in South Korea the rate is 4.3% (Tenter *et al*., 2000). The *T. gondii* seroprevalence for the Dutch human population has decreased from 40.5% in 1995/1996 to 26.0% in 2006/2007 (Hofhuis *et al*., 2010). This is thought to be an effect of the decreased prevalence in consumption animals, especially in pigs, due to increased intensive indoor farming. A stable infection pressure from the environment is suggested by the unchanged seroprevalence in sheep when compared to studies in the eighties (Opsteegh *et al.,* 2011). However, differences may have been missed due to methodological differences between studies (Opsteegh *et al.,* 2011). In the United States, the Center for Disease Control and Prevention, reports that the overall seroprevalence as determined from specimens collected by the National Health and Nutritional Examination Survey (NHANES) between 1999 and 2004 was 10.8%, while seroprevalence among women of childbearing age

(15 to 44 years old) was 11% (Torda, 2001. In certain areas of western Europe and Africa, the sero-positivity rate is reported to be approximately 50 – 78% in individuals with AIDS (Montoya and Liesenfeld, 2004).

Toxoplasmosis has long been reported to be widespread in West Africa (UNAIDS, 2004). In sub-Saharan Africa, toxoplasmosis often remain undetected and untreated due to insufficient diagnostic procedures (Lindstrom *et al*, 2006). Several studies have shown a consistently high *T. gondii*-seroprevalence for this region, ranging from 35% to 84% in different African countries south of Sahara (Tenter et al., 2000). Considering that around 30–50% of those coinfected with HIV and *T. gondii* are expected to ultimately develop toxoplasmosis, the high seroprevalence combined with the HIV-pandemic indicate that 2.5–10 million people in this region may be at risk dying from toxoplasmosis (Lindstrom *et al*, 2006). Similarly, high incidences have been found in the Central Africa region (Dubey *et al*., 2005). There is paucity of published work on toxoplasmosis among countries in East Africa. However, a work carried out among three tribes: Baganda, Masai, and Bondei, using serological test showed widespread distribution of *T. gondii* (Tenter *et al*., 2000).

In Nigeria, toxoplasmosis has been reported both in man and some important animals. A work carried out among pregnant women attending Antenatal Clinics at University College Hospital, Ibadan, and St. Mary's Catholic Hospital, Ibadan, showed very high prevalence of *Toxoplasma* antibodies in the sera of both pregnant (75.4%) and postpartum (80.5%) women (Onadeko *et al*., 1996). However, it has been observed that the ELIZA method was not very sensitive in detecting *Toxoplasma* among Nigerian women (Onadeko *et al*., 1992). Reporting further on toxoplasmosis in Nigeria, Onadeka *et al*. (1996) observed that polydactylism, a common congenital abnormality, was traced to reinfection or recrudescence of toxoplasmosis which accounted for high antibody levels. He also observed an association between high prevalence of toxoplasmosis and overcrowding with poor environmental sanitation challenges, including considerable contamination with cat faeces. In the Middle belt region of the country, high prevalence of toxoplasmosis has been reported among pregnant women from Benue State. Among women of the 39-42 age bracket, 71.4% presented with serological evidence of toxoplasmosis (Olusi *et al*., 1996).

In Northern Nigeria, more work have been reported on veterinary toxoplasmosis. High seroprevalence of of toxoplasmosis have been reported among some animals of economic importance, such as sheep (Okoh *et al*., 1984), chicken in Zaria (Aganga, 1985), pet dogs in Zaria (Aganga and Ortese, 1984), and dogs in Maiduguri (Kamani *et al*., 2010). These studies reveal the high preponderance and spread of veterinary toxoplasmosis in Northern Nigeria. They also show that these animals reported as having high prevalence may represent possible animal source of infection to humans in the region (Clementino *et al*., 2010).

V. TRANSMISSION OF TOXOPLASMOSIS

Carnivorous animals are often infected with *Toxoplasma* through ingestion of bradyzoites from tissue cysts in infected prey, as are persons who eat undercooked meat, particularly that of pigs, sheep and goats. Infection can also be through the milk of sheep, goats and cattle, and sometimes through chicken eggs (Eyles, 2001). *Toxoplasma* cysts are less commonly found in poultry and rarely found in beef. Its prevalence in commercial farm animals has decreased significantly with the advent of intensive management practices (Clementino *et al*., 2009). Free range poultry, swine, small ruminants, marsupials and some wild game are more likely to harbour cysts. Tachyzoites are killed relatively easily by pasteurization, and uncommonly survive gastric digestion but any kind of cooking will definitely kill tachyzoites in an egg.

Oocysts are only shed by cats but unsporulated oocyst in fresh feces are not uninfective. Appropriate oxygen, humidity, and temperature are necessary for sporulation to occur. Sporulated oocysts are the most environmentally resistant life stage of the parasite (Halland, 2004). Ingestion of even as few as ten oocysts may infect an intermediate host, while ingestion of 100 or more oocysts can cause a patent infection in a cat, which may shed tons of hundreds of millions of oocysts (Patton, 1993).

In utero transmission of *Toxoplasma* occurs only if primary infection of the mother occurs during pregnancy. Parasitemia then results in placentitis and infection of the fetus. This is more likely to occur in man, sheep and goats, and sometimes in mice, cats and dogs. Under normal circumstances, a female that has been exposed to *Toxoplasma* 4-6 months prior to pregnancy will develop sufficient immunity to protect herself and the fetus for the rest of her life (Vaz *et al*., 2010). However, if the immune response is suppressed by drug therapy or disease such as AIDS in man, both the mother and the fetus may become susceptible to infection again (Tenter *et al*., 2000). The risk of vertical transmission to the fetus increases from the first trimester (10-24%) to the third trimester (60-90%), and the potential of congenital defect is more severe with earlier infections (Patton, 1993).

VI. ECONOMIC IMPORTANCE OF TOXOPLASMOSIS

Toxoplasmosis leads to a myriad of diseases. The risk-prone group of individuals including fetuses, new-born babies and immunological impaired patients develops chorioretinitis, lymphadenitis, or rarely, mycocarditis and polymyositis (Jones *et al.*, 2003). It can cause more serious progression and complications such as abortion, when accompanied with some other infection such as human immunodeficiency virus (HIV), and catalyzes: birth defects (Ouermi *et al*., 2009), reproductive disorders (Montoya and Liesenfeld, 2004), and transmission of Hepatitis B virus (HBV). Children with acute congenital toxoplasmosis often die in the first month of life (Akyar, 2011). It causes tremendous losses of animals too, including valuable livestock. Infection of dairy goats with *T. gondii* is widespread and constitutes a public health concern (Zhao et al., 2011), resulting in significant reproductive losses (Dubey, 2009; Walsh *et al*., 1999).

VII. BEHAVIORAL CHANGES ASSOCIATED WITH *TOXOPLASMA* INFECTION

One of the dramatic characteristics of *T. gondii* is its ability to change the behaviour of its host. It has been reported that infected rats and mice are less fearful of cats, and some of the infected rats seek out cat-urine-marked areas. This effect is advantageous to the parasite, as the setting catalyzes the proliferation of the parasites as the infected rat is eaten by the cat (Beyer *et al*; 1986). The mechanism for this change is not completely understood, but It could also be a result of subtle effects on the nervous system (Obendorf *et al.,* 1996; Berdoy *et al*., 2000). However, there is evidence that toxoplasmosis infection raises dopamine levels and concentrates in the amygdala in infected mice. (Henriquez *et al*., 2009). Perhaps, this could be as a result of low-grade encephalitis marked by presence of cysts in the brain, which induces the production of neurotransmitter (dopamine), which acts similarly to dopamine reuptake inhibitor type antidepressants and stimulants (Laing *et al*., 1996). This observation of behavioral change among rats and mice has led to speculation that *Toxoplasma* may have similar effects in man, even in the latent phase that had previously been considered asymptomatic (Tenter *et al*., 2000). Correlations have been found between latent *Toxoplasma* infections and various characteristics such as: decreased novelty seeking behavior, slower reactions, as well as lower rule-consciousness and greater jealousy (in men) Greater warmth, conscientiousness and moralistic behavior (in women).

VIII. DIAGNOSIS OF TOXOPLASMOSIS

Serologic tests are the primary means of diagnosis. Immunoglobulin (Ig) G-specific antibodies achieve a peak concentration during about one to two months after infection and remain positive indefinitely. For patients with seroconversion or a fourfold increase in IgG antibody titer, specific IgM antibody determinations should be performed as the presence of *T gondii*-specific IgM antibodies may indicate acute or recent infection. Enzyme immunoassay tests are the more sensitive assays for IgM, detection, and this can be achieved 2 weeks after infection. Peak concentrations of IgM antibody ia achieved in one month, but decreases thereafter to an undetectable level within 6 to 9 months. This undetectable level can persist for as long as 2 years, and during this period, it confounds the differentiation of acute and remote infections. Tests to detect IgA and IgE antibodies, which decrease to undetectable concentrations sooner than IgM antibodies, are useful for the diagnosis of congenital infections and infections in other patients, such as pregnant women, for whom more precise information about the duration of infection is needed.

Detection of *T gondii* DNA in amniotic fluid by polymerase chain reaction assay has been shown to be a safe and accurate method of diagnosis. Serial fetal ultrasonographic examinations should be performed in cases of suspected congenital infection to detect any increase in size of the lateral ventricles of the central nervous system or other signs of fetal infection. Quantitative screening for IgG antibodies to *T.gondii* is used to determine the immune status of pregnant women and newborns. Anti-Toxo IgG antibodies may persist throughout life. Consequently, a steady anti-Toxo IgG titer shows earlier exposure, whereas a fourfold or greater rise shows active infection. Furthermore, among infants, serial determination of the anti-Toxo, IgG level will assist in determining between *T.gondii* infection that occurred congenitally (plateau level) or neonatally (increase in titer). (Akyar, 2011). If the diagnosis for an infant is unclear at the time of delivery, evaluation of the infant should include ophthalmologic, auditory, and neurologic examinations; lumbar puncture; and computed tomography of the head. Attempt should be made to isolate *T gondii* from the placenta, umbilical cord, or blood specimen from the infant by mouse inoculation.

Patients with HIV infection who are infected latently with *T gondii* have variable titers of IgG antibody to *T gondii* but rarely have IgM antibody. Although seroconversion and fourfold increases in IgG antibody titers may occur, the ability to diagnose active disease in patients with AIDS is impaired by immunosuppression. In HIV-infected patients who are seropositive for *T gondii* IgG, *T gondii* encephalitis is diagnosed presumptively on the basis of the presence of characteristic clinical and radiographic findings. If the infection does not respond to an empiric trial of anti-*T gondii* therapy, demonstration of *T gondii* organisms, antigen, or DNA in biopsied tissue, blood, or cerebrospinal fluid may be necessary to confirm the diagnosis.

IX. PREVENTION AND CONTROL OF TOXOPLASMOSIS

Improper handling of cat litter and not necessarily ownership of cat is accepted as a risk factor of toxoplasmosis (Walker *et al*., 2008). This definitely determines what measures would be effective in preventing or controlling the spread of toxoplasmosis. There are general sanitation and food safety steps needed to be taken to prevent one from becoming infected with *Toxoplasma.* (i) Cats found to be shedding oocysts should be removed from the premises temporarily and treated to eliminate shedding. Since cats are usually meticulous groomers, it is unlikely that oocysts will be found on their fur. This means that regular handling will not be a significant risk. (ii) Microwave cooking, salting and smoking do not consistently kill all infective *Toxoplasma* stages. So meat should be frozen to –12ºC for at least 24 hours to kill *Toxoplasma* tissue cysts, but it must be noted that sporulated oocysts can survive at –20ºC for up to 28 days. (iii) Kitchen utensils and surfaces that have come in contact with raw meat should be washed with soap and scalding hot water to kill any bradyzoites or tachyzoites present. (iv) Individuals should always wash their hands thoroughly after contact with cat stool, litter or litter box**.** (v) Cat feces should be disposed of daily to reduce the risk of transmission. Feces and dirty litter can be disposed of in a septic system if the litter is biodegradable, sealed tightly in a plastic bag and placed in the garbage, or incinerated. Backyard compost units do not produce sufficient heat to destroy oocysts and other pathogens potentially present in fecal material. (vi) keep cats out of sandboxes and other areas where children play to prevent the cats defecating there (Tenter *et al*., 2000). (vii) Unwashed fruits or vegetables as well as unpasteurised milk should not be eaten. (viii) One must ensure that all avenues that could bring one in contact with cat faeces either directly or indirectly are blocked, while the intermediate host population must be properly checked.

X. TREATMENT OF TOXOPLASMOSIS

Traditional drug therapy for clinical toxoplasmosis consists of a combination of pyrimethamine and sulfonamides. This combination can cause dose-related bone marrow suppression with resultant anemia, leucopenia, thrombocytopenia, and reversible acute renal failure. Leucovorin (folinic acid) could be added to the combination to prevent bone marrow suppression and to reduce the severity of congenital infection and increase the proportion of infants asymptomatic at birth (Daffos *et al*; 1988). Spiramycin is one of the current drugs of choice for treatment of infected pregnant women. Treatment may decrease the severity of congenital toxoplasmosis or long term consequences, but possibly not the risk of transmission (Tenter *et al*., 2000).

XI. CONCLUSION

The preponderance of toxoplasmosis around the world is predicated on the anthropogenic activities favourable to the transmission of the parasite to man and animals. The paucity of research in developing countries is perhaps, caused by sophisticated and expensive methods for verification of infection, since the widespread occurrence of the infection in the area is not in doubt. Furthermore, health authorities must make a policy to monitor the clinical and laboratory parameters of pregnant women as regards their toxoplasmosis status. It is essential that both clinical and laboratory parameters be used in establishment of toxoplasmosis status to ensure better accuracy (Boyer *et al*. 2005; Mazzola *et al*. 2007; Mioranza *et al*. 2008). The war against toxoplasmosis is one we cannot afford to lose. Urgent steps are needed to launch enlightenment campaigns on the disease epidemiology to mitigate the tide of rapid spread of toxoplasmosis.

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Development of a Physical Capacity Program for Training Stroke Patients with Hemiplegia

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Abstract- This study was an experimental research using a two-group pre-posttest aiming to develop a physical capacity program for stroke patients with hemiplegia. The samples consisted of stroke patients aged 40-69 years old who had lost physical capacity less than 6 months and had been treated from a hospital in Thailand. 64 patients were involved and assigned to a control or experimental group by using a simple random sampling technique. The experimental group received a physical capacity program for 12 months, while the control group received a routine rehabilitation program from the hospital. The program included training activities of daily living such as sitting on a wheel chair, walking, speaking, dressing, taking a bath and eating. Data were analyzed by using descriptive statistics, paired t-test and the analysis of covariance. The results revealed the levels of activities of daily living of the patients in the experimental group were significantly higher than those in the control group. The findings suggested stroke patients would gain benefits from the physical capacity program because they become more active in their rehabilitation. Nurses and other health care professionals in communities should further use the physical capacity program to continuously promote activities of daily living in stroke patients with hemiplegia.

Index Terms- Activities of Daily Living; Hemiplegia; Physical Capacity Program; Stroke

I. INTRODUCTION

Stroke is a serious public health problem in worldwide due to high mortality and disability rates. In Thailand from 2005-2006, stroke was the third leading cause of death after heart disease and cancer respectively. [1] Hemiplegia is one of the most common disabilities resulting from stroke. It is the term used to describe the status of paralysis occurs on one side of the body opposite the side of the brain damaged by stroke, and may affect the face, an arm, a leg, or the entire side of the body. [2] The patients may have difficulties with everyday activities such as walking or grasping objects. Some patients may have problems with swallowing. [3] Many rehabilitation programs were designed to improve muscle strength of stroke patients at hospitals. [4-8] However, a few programs intended to develop physical capacity of stroke survivors in day to day lives. Time spending for physiotherapy at the hospital may not much enough for physical improvement. Those stroke patients need effective programs to advocate their physical capacities continuously at home. Thus, in order to fill the gap of knowledge on the rehabilitation programs for stroke patients, the present research study aimed to develop a physical capacity program for stroke patients with hemiplegia.

II. REVIEW OF LITERATURE

Stroke is the symptom of the brain or nervous syndrome which can significantly interfere with the ability to perform daily activities. This occurring is caused by an obstruction or hemorrhage within the brain. [9] About 80% of stroke people have suffer from weakness on one side of their bodies, this condition is called hemiplegia [10] and found in persons age 40-60 years. [11] People with hemiplegia may have trouble moving their arms and legs, difficulty walking and may also experience a loss of balance. They may have problems of doing simple everyday activities like grabbing objects, dressing, eating, and using the bathroom. They may also have problems of talking and understanding what people say. [2] Rehabilitation should be start within 24 hours after the patients' medical conditions have been stabilized. Patients are prompted to change positions frequently while lying in bed and to engage in range-of-motion exercises to strengthen their stroke-impaired limbs. Rehabilitation should be an ongoing process to maintain skills of basic activities of daily living and the patients should receive the recovery within six months following the stroke. [12-13]

Most rehabilitation efforts are focused on muscle exercise and cardio respiratory fitness with a physical therapist at a hospital [4-8], while a few of efforts are spent on tasks associated with training the patients to perform everyday living such as getting dressed, taking a shower and using a rest room. The activities of daily living can increase stroke patients' abilities for common social interaction and enhance a profound positive psychological condition. [14] To achieve this tasks, several studies suggested health care professionals as well as family caregivers should together to provide emotional support these patients to perform activities of daily living. [15-17] The patients need to be a maximize recovery and help them return to maximum independence. Time spending for rehabilitation must take too long and need continuously practice at home. [18] Recent research supported the idea of a best make of physical training in stroke patients can enhance abilities of a day-to-day life. [19-25] Nurses have their roles in rehabilitative care for patients, training a physical capacity program for stroke patients with hemiplegia would take benefits both physical and psychological condition for these patients. However, little has been found about this program, it is important to see the whether the program could increase physical capacity for these patients.

III. RESEARCH ELABORATIONS

A. Design

This experimental research involved the use of two-group pre-post test. Data were obtained, at six months in time, via activities of daily living levels.

B. Ethical Considerations

Ethical approval was attained from an institute of review board of on human rights, prior to commencing the study. In addition, the leaders of the hospital, where data were gathered, also granted approval for the primary investigator (PI) to access potential samples. Potential samples were informed about: the study's purpose; what study participation would entail; voluntary participation; confidentiality and anonymity issues; the right to withdraw at any time without repercussions and participation not affecting their quality of, or access to, medical care or any other services at the hospital. Informed consent was obtained from each sample prior to his/her participation in the study.

C. Setting

The study took place in a rural village in central Thailand. Samples of the community generally were stay with their adult children during the day. Public transportation services were lacking, in the village, so residents relied on personal motorbikes/cars or friends/neighbors for transportation.

D. Samples

Potential samples consisted of Thais, registered a hospital, who were: diagnosed with stroke and hemiplegia less than 6 months; 40 years of age or older. Persons who appeared to have cognitive impairments were excluded from the study. Potential samples were identified and asked to participate in the study, by a registered nurse, at the hospital, who was aware of the study's purpose and inclusion criteria. The initial 64 potential participants, who volunteered and met the inclusion criteria, completed the study.

The same amount of samples participated in an experimental and control group (n = 32). The samples were mostly male in experimental (n = 20; 62.5%) and in control group (n = 18; 56.3%); were between less than 50 to more than 69 years of age in both groups (mean = 61.7 years); and had an educational level of primary school (n = 20; 62.5%). Majority of the experimental group demonstrated the right side of weakness (n = 17; 53.1%) while the control group showed the same amount of left side weakness. Both group were typically having a muscle power of grad 4 in investigational (n = 13; 40.6%) and the other group (n = 15; 46.9%), and had no previous of hemiplegia in experimental (n = 26; 81.3%) and control groups (n = 27; 84.4%). The samples took a problem of hypertension in experimental (n = 25; 78.1%) and the other (n = 24; 75%). The caregivers in trial group were their couples (n = 14; 43.8%) but children in controller (n = 16; 50%), and they had no experience in taking care of stroke patients. Most members of both groups had a monthly income of 5000 to 10000 Baht [$170 to $340 USD] in an experimental (n = 11; 34.4%) and the other group (n = 13; 37.5%)

E. Measurements

In addition to the physical training being used to generate data were collected through use of three instruments. These included: a Demographic Data Questionnaire (DDQ); the Abilities of Daily Living Assessment (ADLA) [18]; and, the Physical Capacity Program (PCP). [18]

The PI-developed Demographic Data Questionnaire (DDQ) was used to determine each sample's: gender; age; educational level; side of weakness; muscle power; health problem; caregiver; caregiver experience in taking care; and, monthly household income.

The Abilities of Daily Living Assessment (ADLA) [18]; was used to measure the samples' of their abilities of daily living. The ADLA contained 14 items including: physical cleansing; dressing; wearing shoes, taking a bath, using a rest room, physical movement, going upstairs; eating, cooking; driving, cloth cleansing; house cleansing; shopping; and, calling a phone. All items were measured on a 5-point rating scale ranging from 1 = "need assistant" to 5 = "self-help." A total score was determined by summing scores across all items. Thus, scores on the ADLA could range from 14 to 70. Interpretations of the total score provided a measure of: low abilities of daily living [ADL] (14 to 31); moderate ADL (32 to 49); and, high ADL (50 to 70). [18] The content validity of the ADL previously was determined by education experts. [18] The instrument's internal consistency reliability, in this study, was found to be 0.83.

The Physical Capacity Program (PCP) [18] was used to train samples' physical capacity to perform ADL. The PCP was captured by 7 sequences: adjusting a position of lying and sitting in bed and wheelchair; moving joints, body moving; standing; walking; speaking; and, doing ADL. Each capacity was measured by the ADLA. Content validity of the PCP was assessed, prior to use in the study, by five experts in cardiovascular disease, physical therapist and community health nursing. The experts assessed the average content validity index (CVI) to be 0.96. The internal consistency reliability of the instrument, in this study, was found to be 0.91.

F. Procedure

One month prior to the start of the study, each sample was administered the: DDQ and ADLA. The questionnaires were administered, individually, to each sample in a hospital. During the 12-month physical training process, each sample's ADL level was assessed, during his/her weekly healthcare appointment, by the nurses. The PI retrieved each sample's ADL values from the respective health records, prior to training session. During the middle and last physical training session, each sample again was administered the ADL.

G. Data analysis

Descriptive statistics were used to assess the samples' demographic characteristics and calculate their scores on the ADL. A paired-samples t-test (the assumption of normality was tested to be reasonable before analysis) was used to compare, before and after participation in the PCP and the samples' ADL scores. The analysis of covariance (ANCOVA) was used to evaluate the difference of ADL between the experimental and control group.

IV. RESULS

As noted in Table 1, after 12 months of taking part in the PCP sessions, the samples' ADL scores significantly increased; compared to their ADL scores prior to participating in the PCP sessions. In addition, the mean scores of ADL at the 1-month period influenced the mean score of ADL at the 12-month dated with significantly increased compared to their ADL levels prior to taking part in the PCP sessions (Table 2).

Table 1: ADL scores after participation in the PCP

Paired Differences	**Month 1st**		**Month 6th**		**Month 12th**		***t***	**P-Value**
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**		
Experimental group	19.53	13.35	22.94	11.95	55.31	12.65	12.15	.000*
Control group	17.80	17.50	21.72	18.87	39.31	14.29	6.84	.000*

*p < .01

Table 2: ANCOVA in the mean **s**cores after participation in the PCP

Source	**df**	**SS**	**MS**	**F-Test**	**P-Value**
Covariate	1	345439.527	345439.527	149.479	.000*
Between group	1	55515.182	55515.182	24.023	.000*
Within group	61	140968.537	2310.960		
Total	64	5500662.040			

*p < .01

V. CONCLUSIONS

Taking part in the PCP was beneficial for enhancement of samples' ADL. This finding is consistent with prior studies wherein a physical training in stroke patients can enhance abilities of a day-to-day life. [19-25] As revealed, the findings showed an improvement in the physical capacity of stroke patients with hemiparesis in the experimental group. This may be due to several beneficial physiological changes according to the fact that the PCP helps increasing muscular strength. Joints became more flexible thus improve motivation, body balance. [26-27] These findings further support the contention that use of the PCP to improve ADL is beneficial for stroke patients with hemiplegia. The positive findings demonstrated the PCP can serve as a form of mutual aid for the purpose of improving the ADL of stroke patients with hemiplegia. Thus, establishing PCP in communal settings, for the purpose of fostering ADL stroke patients, is recommended. Future studies need to consider developing and accessing the effectiveness of PCP for stroke patients with hemiplegia that: include more female samples; are implemented in other areas of Thailand; include variables not addressed in this study that potentially could influence ADL.

ACKNOWLEDGMENT

The Faculty of Nursing of Srinakharinwirot University financially supported this study.

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Effect of Compensation on Performance of Public Secondary School Teachers in Eldoret Municipality Kenya

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Abstract- The study sought to examine the effect of compensation on performance of public secondary school teachers in Eldoret Municipality Uasin Gishu County,Kenya.Teachers in Kenya have always portrayed lack of devotion in their work places. This is evident in their instability in the teaching profession and low morale in performing their teaching tasks and hence unsatisfactory performance. Poor remuneration has often been given as a cause of low morale among teachers thus leading to numerous strikes. The problem of inadequate compensation makes the teachers dissatisfied, thus leaving the profession to other well or better paying jobs. The study was carried out among public secondary school teachers in Eldoret municipality; Uasin Gishu County. The study adopted descriptive survey design. Simple random sampling was used to select the teachers and purposive sampling to select the head teachers. The sample population comprising of 114 teachers and 14 head teachers, was selected for the study. Questionnaires and interview schedule were used to collect data.91 out of 114 questionnaires were returned for the teachers and 11 out of 14 questionnaires for the head teachers were returned. Data collected was then coded, analyzed and presented by use of descriptive statistics such as frequency tables, percentages, mean graphs and pie-charts. Based on the findings the study concluded that fair compensation has an effect on public secondary school teachers' performance this is because the compensation policy in place demoralizes the teachers, does not enhance task performance and negatively affects the productivity of the teachers in the schools.

Index Terms- Compensation; performance, intrinsic rewards and extrinsic rewards

I. INTRODUCTION

Compensation is often regarded as direct and indirect monetary and non-monetary rewards given to employees on the basis of the value of the job, their personal contributions, and performance. It is one of the physical needs that influence motivation which in turn affects the employee performance. The objectives of any good compensation are to attract, motivate and retain good people for the attainment of organisational goals. Compensation should therefore be acknowledged as a major factor affecting employee performance.

II. RESEARCH ELABORATIONS

Dessler, (2005) defines compensation as all forms of payments or rewards given to employees which arise from employment. Compensation is one of the basic reasons for employees to seek employment. Employees are compensated for their services and efforts they exert in their work. Harrison & Liska, (2008) in their study affirm that reward is the centre pieces of the employment contract-after all it is the main reason why people work. This includes all types of rewards, both intrinsic and extrinsic, that are received as a result of employment by the employee. Intrinsic rewards include rewards within the job such as responsibility, autonomy appreciation from the boss and feelings of accomplishment among others. Extrinsic rewards are tangible rewards like pay bonuses and fringe benefits.

Currently both developed and developing countries are experiencing shortage of qualified teachers in certain subjects or schools. at the same time, evidence has emerged that clearly identifies the teacher as one of the single most important factors in a student's learning (Hanushek 1992, sanders & Rivers 1996; and Rivkin et al 2001).Robbins (2001) stated that when employees feel their efforts are appreciated and the company introduced a system of fair compensation and satisfaction, the company will have optimized motivation and hence increased employee performance.

Effective teachers are critical to high student achievement. To do these teachers need to be adequately compensated. First to note is that qualified teachers are in short supply in some places and in specific subjects. Secondly, teaching appears to be a less popular professional choice for young people. In most countries teaching is less respected than it once was, and yet teachers' roles have become more complex as student populations have become more diverse and expectations for their achievement have risen. teachers are required to be responsible for both academic and socio emotional development of Students and remain up to date with emerging knowledge in their subjects and field (OECD 2005).as a result teacher education programs are attracting students for whom the profession is not their first choice or whose academic backgrounds are weaker. Given these conditions, some countries have implemented a variety of compensation and incentive programs aimed at improving teacher performance. These programs include individualized salaries, incentive for teachers in hardship areas and incentives based on student performance in national examinations.

Compensation has a great influence in the recruitment of employees, motivation; productivity and employee turnover

(Benardin&Russel, 1993).The level and the strategic role of compensation should be of concern because the level of compensation will determine the lifestyle, self esteem and the value of the company. However providing appropriate compensation that is fair and adequate to meet the requirements of a good compensation package is the most difficult to implement by most organizations.

Zaman et al (2011) indicated that there is a significant and positive relationship between extrinsic rewards and employee motivation and hence performance but the challenge is that employers are not offering fair and adequate financial rewards to their employees. if employees feel that their effort is appreciated and the company has a good compensation structure based on job evaluation, the employees' motivation and commitment will improve and hence performance. The greater the rewards offered to the employee the greater the levels of their performance. Bates & Holton (1995) defines performance as a multi-dimensional construct, the measurement of which varies, depending on a variety of factors. They add that it is important to determine whether the measured objective is to asses performance outcomes or behaviour.

The study survey results in 1996 conducted by Mclean and Tanner (Hays, 1999) revealed that 70% of CEOs (chief executive officer) and 58% of human resource managers said that the company can implement compensation programs to improve performance of employees. Patton (1999) states that 'if you heard that money does not provide the motivation to do better or if the compensation in the form of money was ranked low, it is the result of a disability survey". In addition, he said that it is funny if a person is not motivated to excel by money.

In the study conducted by Probst & Brubaker, (2001) it indicated that the difference between job satisfaction and dissatisfaction lies in the employees and the amount and type of rewards that the employee expects .employees expect that their contribution and efforts should be valued and given importance in the same way they value their job and work towards accomplishing the tasks assigned. Prasetya and Kato (2011) their analysis revealed that there are significant influences from both financial and non financial on the employee performance.

III. Methodology

The study targeted public secondary school teachers employed by the teachers service commission (TSC) within Eldoret municipality in Uasin Gishu county. The population in this study was 14 secondary schools, 160 teachers and 14 head teachers from Eldoret municipality. The cross-sectional descriptive survey approach was adopted. A survey, according to Kothari, (2008), is a method of securing information concerning an existing phenomenon from all or selected number of respondents of the concerned universe.

Simple random sampling technique was used to select the public secondary and teachers. 114 teachers were randomly sampled (cochran's formula) from a target population of 160 teachers. It ensured that conclusion from the study can be generalized to the entire population (Mugenda & Mugenda 1999). Purposive sampling was used to sample the head teachers. This is because purposive sampling is characterized by the use of judgment and a deliberate effort to obtain a representative sample by including presumably typical areas of the group in the sample. Data were collected by use of questionnaires and interviews. Questionnaires were used because they are convenient tools where there are a large number of respondents to be handled. Questionnaires were distributed to all the teacher respondents with the intention of obtaining the primary data. The data was collected from the head teachers using interviews. The piloting of the questionnaire was carried out in the 2 schools outside the municipality to establish the reliability of the research instrument. The data obtained were tallied, organized, and its frequencies and percentages calculated and presented in form of tables. This was done by use of descriptive statistics.

IV. Findings and Discussions

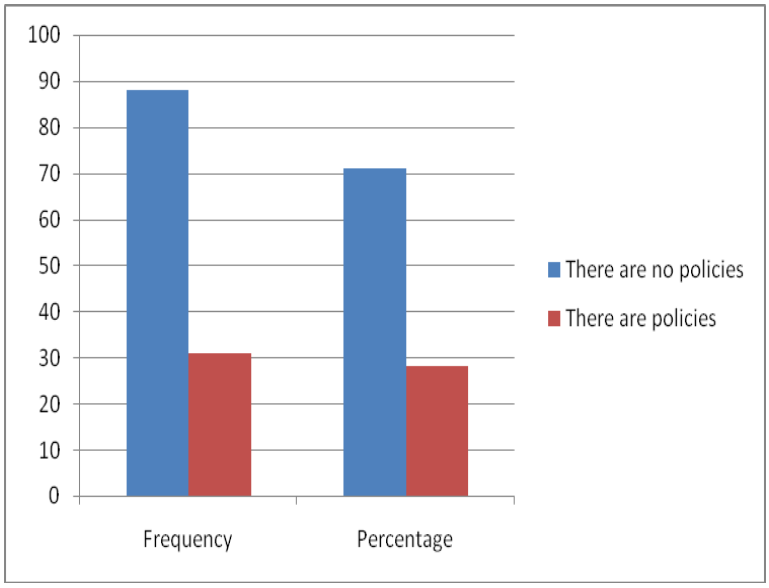

Figure 1: Teachers compensation Policies
Source: Survey Data (2011)

Majority of the teachers in public secondary schools were uncomfortable with the compensation policies in place. This was evident by 81 or 88.5% of the respondents who indicated that they were not comfortable or 15 or 16.66% who were happy with the compensation policies. On the same note for those who indicated that they were not happy with the policies 73 or 80% did said that the package was too small or minimal to meet their basic needs.18 or 20% stated that the compensation was much lower than what other employees in the private sector or in the public service were taking home.

Head Teachers' Response On Compensation

Majority of the head teacher's respondent that is 10 or 95% either disagreed or strongly disagreed with the statement that teachers were adequately compensated. The average salary received was not appropriate with their educational qualifications. It is way below teachers' expectations.

The teachers' compensation package

Descriptive statistical analysis was conducted to analyze the percentage distribution of the respondents' answers to the questionnaires distributed. The items on the questionnaire included: basic pay, allowances, overtime, mode of payment, staff loans, review of basic pay and allowances.

Table.1.Responses on teachers compensation package

Scale Factors	Very Satisfied	Fairly Satisfied	Dissatisfied	Very Dissatisfied
Basic Pay	0%	0%	58.31%	41.69%
Allowances	0%	0%	100%	0%
Overtime	0%	0%	0%	0%
Mode Of Payment	0%	77%	23%	0%
Staff Loans	0%		19.2%	80.8%
Review Of Basic Pay And Allowances	0%	30%	70%	0%

Source :Processed Primary Data (2011)

Based on the findings the results the teachers' compensation package was not satisfactory. Majority of the teachers were either dissatisfied or very dissatisfied as per the findings which were presented by 53 respondents or 58.31% and 38 or 41.69% respectively with their basic pay. This means that the basic pay provided by the Teachers Service Commission (TSC) was not sufficient enough to meet the needs of the teachers and is not what the teachers expected.

On Allowances provided by the teachers service commission (TSC); the entire sampled figure of 91 or 100% of the teachers indicated that they were dissatisfied with allowances provided by the TSC. Meaning that the allowances provided were not appropriate.

Overtime; none of the respondents responded to this question. It can be concluded that since the teachers were not receiving any overtime they did not see the need to respond to this question.

Mode of payment; majority of the teachers were satisfied with the mode of payment. this was arrived at from the findings where 70 or 77% stated that they were either very satisfied or satisfied with the current arrangement of payment. Only 21 teachers or 23% stated that they were dissatisfied.

Staff loans; majority of the teachers, 74 or 80.8% were very dissatisfied with the of provision for staff loans. The rest that is 17 or 19.2% were dissatisfied.

Compensation systems and its effect on performance

The study wanted to find out whether the reward system affected teachers' level of performance. the responses were as indicated in table below:

Table 2: Compensation System and Performance

Response	Frequency	Percentage	Mean
Strongly Disagree	48	53.0%	53.0
Fairly Agree	20	22.1%	22.1
Disagree	10	10.7%	10.7
Strong Agree	8	8.4%	8.4
Agree	5	5.8%	5.8

Source: Processed Primary data (2011)

From the findings in, only 8 or 8.4% strongly agree that the reward system was motivating employees. 5 or 5.8% agreed, while 20 or 22.1 % fairly agreed. Some 10 or 10.7% disagreed and 48 or 53% strongly disagreed. This implied that the teachers were not satisfied with the compensation system in place by the teachers service commission TSC.

Intrinsic rewards

The intrinsic rewards are intangible and none financial and play a significant role in motivating employees, the teachers made the following responses in relation to intrinsic rewards.

Table 3: Responses on intrinsic rewards

Intrinsic Response	Frequency	Percentage	Mean
No Response	43	47.5%	47.5
Recognition	17	18.3%	18.3
Status Symbols And Praise	16	17.5%	17.5
Promotion	15	16.7%	16.7

Source: Processed Primary data (2011)

15 or 16.7%.of the teachers indicated that the employer applied promotion as an intrinsic reward, 17 or 18.3% noted that recognition was the intrinsic reward used by the employer, status symbols and praise intrinsic rewards are also applied by the school as indicated by 16 or 17.5% of the teacher. Conspicuously 43 or 47.5% of the teachers did not respond to the question. This implied that intrinsic rewards were missing in those schools.

V. Conclusions and Recommendations

The descriptive statistical analysis on the questionnaire and interview answers from public secondary school teachers in Eldoret municipality Uasin Gishu county on the compensation package provided by the Teachers Service Commission indicated that the compensation provided by the TSC was overall " not satisfactory". as many of the teachers were uncomfortable with the compensation package and policies in place.

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Gulgulia- Hindi- Khortha Code-Switching: A Study of Language Contact Phenomenon in Dhanbad (Jharkhand, India)

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Abstract- This study shows that in the present scenario, Gulgulia speakers widely show traits of code-switching, not just in the outside domain but also in the home domain. This research, a socio-linguistic analysis of contact between Gulgulia, Hindi and Khortha etc. seeks to determine the social, psychological and linguistic factors that constraint the use of Gulgulia language in the day-to-day communication of the Gulgulia people. As the use of other neighbouring languages increases in the Gulgulia community, the question arises- Whether Gulgulia will be threatened under the dominance of neighbouring languages?

The data for this study will be collected through individual and group conversation recordings made from the community members. The recordings will comprise of sentences through which I can show Gulgulia sentences with Hindi or Khortha insertions. Moreover a quantitative data on insertions can also be presented with the aid of a table showing the distribution of the main word class insertions in Gulgulia.

Therefore, in this study, we mainly investigated the multilingual contact phenomenon as a pathway for code-switching motivated by language contact phenomenon. Our intention here will be to examine the present day Gulgulia, in order to illustrate how code-switching is influenced by a combination of language internal and language external (contact) motivations. We will be addressing the issues of contact- induced language change in the most genuine use of the language.

Index Terms- Code-Switching, Language Contact, Gulgulia Community

I. INTRODUCTION

Language contact occurs when two or more languages or varieties interact. Multilingualism has likely been common throughout much of human history, and today most people in the world are multilingual. In tribal hunter-gatherer societies, multilingualism has been common, as tribes need to communicate with neighbouring people and there is often intermarriage. When speakers of different languages interact closely, it is typical for their languages to influence each other. Language contact occurs in a variety of phenomena, including language convergence, borrowing and relexification. The most common products are pidgins, creoles, code-switching and mixed languages.

Dhanbad is a city in the state of Jharkhand that has a landed history of growth, urbanisation and migration of people. Hindi is the major language of the city. However, several other languages such as Kurmali, Santhali, Bhojpuri, Maithili, and Bengali are also widely spoken presenting a picture of severe language contact. Amidst all these languages, this paper centrally focuses on the language of a nomadic community namely 'the Gulgulia' showing traits of code-switching and code-mixing within the community as a result from its contact with Hindi and Khortha. Gulgulias are often found on out-skirts of villages, near railway-stations or forests. They are widely distributed in the states of Jharkhand, Bihar and Bengal who live by arranging shows of animals, begging and even petty thieving. The Gulgulia language has few speakers left and the people of the community have now started mixing with the people living nearby and interact in Hindi or other local languages depending on the contiguity of their settlement. It is most likely that the Gulgulia language may have no speaker left after a short time and the language may disappear. This paper chiefly describes how language contact leads to code-switching in Gulgulia and examine how multilingualism can influence the evolution of this language more generally. This study will help preserve one of the dying languages in Jharkhand.

II. THE GULGULIA COMMUNITY

The Gulgulias are a nomadic community, often found on the outskirts of villages, near railway stations or forests. They are chiefly distributed in the states of Bihar, Jharkhand and Bengal. They speak Gulgulia which is the mother-tongue of the community reported in the paper, 'Mother Tongues of India according to the 1961 Census' by B. Mallikarjun. Since they are nomadic people, they have picked up other languages being used in the region and show traits of multilingualism.

The Gulgulias are divided into a number of exogamous patrilineal *gotras* like Sonarkheli, Kungera, Maldahia, etc. The community is aware of the *Varna* system. They consider themselves at the lowest rung of the *Varna* hierarchy. Their families are nuclear. They are nomadic people; therefore they have no immovable property. The movable property is inherited by the sons. The eldest son succeeds to the social offices, held by father.

They are a landless community. Traditionally, they earned money by arranging shows of animals but these days they beg or work as daily labourers in tea stalls or shops. Sometimes they collect honey from the jungle and sell it in the local *hat* (market). They have no traditional caste council or a panchayat. They are Hindus. They worship Lakshmi, Sitala, Durga, Jagadmai Devi, etc. They make an altar below a tree to worship their Gods. They celebrate Durgapuja, Kalipuja, the Holi festival and participate in the annual festival of Karama.

They are illiterate. Their children do not go to school due to poverty and their nomadic lifestyle. However, in Patherdih area of Dhanbad (Jharkhand) there are three children having recently joined the school.

III. CODE- SWITCHING

Code- switching stands as a linguistic behaviour which takes place when languages come into contact. However, it stays distinct from other language contact phenomena such as bilingualism, borrowings, pidgins, creoles, calques and language interference. According to Rosamina Lowi "Code-switching is viewed as bilingual/ multilingual practice that is used not only as a conversational tool, but also as a way to establish, maintain and delineate ethnic boundaries and identities". Code-switching is also referred as code mixing, code-shifting or code-changing and has been defined as the act of "alternation of two languages within a single discourse, sentence or constituent" (Poplack 1980:583). It is the tendency of the speakers to practice code-switching generally, when they are competent in two languages simultaneously. Code-switching and Code-mixing have been considered as two separate concepts. On the one hand where Code-switching refers to the alternate use of sentences from two languages in a single discourse, code-mixing refers to the alternate use of constituents from two languages within a sentence (Obiamalu and Mbagwu). This paper is interested in both types but we shall use code-switching to refer to both.

IV. MAJOR TYPES OF CODE-SWITCHING

Intersentential switching occurs outside the sentence or the clause level (i.e. at sentence or clause boundaries).It is sometimes called "extra-sentential" switching.

Intra-sentential switching occurs within a sentence or a clause.

Tag-switching is the switching of either a tag phrase or a word, or both, from language-B to language-A, (common intra-sentential switches).

Intra-word switching occurs within a word, itself, such as at a morpheme boundary.

V. THE DATA

We present here sample of Gulgulia-Hindi-Khortha code-switched/ mixed utterances from our corpus of data. The first sentence shows the code switched/mixed utterance and the second sentence shows the complete Gulgulia form. Gulgulia is written in plain, Hindi is underlined and Khortha is italicized. The gloss in English is written below each utterance.

1) həmɑr ***sər le*** ðərð bɦəigəl.
   həmɑr munɖɑ ʈe ðərð bɦəigəl
   (My head is aching.)
2) həmɑr **ðəvɑ** ɑ:ni ɖe.
   həmɑr kəngi ɑ:ni ɖe.
   (Bring my medicine.)
3) ɑ:dʒ ʈʊ̃m kɑməʈ pəre **gəe ʈɦe** ?
   ɑ:dʒ ʈʊ̃m kɑməʈ pəre gəigər ?
   (Did you go on work today?)
4) **dʒb bədʒɑr** le gɦʊ̃ri ke ɑ:sbi, ʈəkɦən ek kedʒi: a:m **leʈe a:nɑ**.
   dʒkɦən hɑʈ le gɦʊ̃ri ke ɑ:sbi, ʈəkɦən ek kedʒi: a:m ni:e a: n.
   (While returning from the market, bring 1 kilo of mangoes.)
5) a:dʒ həmar kɑm ***bɦalo nə bɦəigo***.
   a:dʒ həmar kɑm bɑuɖɦ nə bɦəigəl.
   (Today my work has not been good.)
6) ***dʒəlđi kɔre ʈel ni:e a:n***, ʈəb ma:ʧʰo rɑnbo.
   bɦiɔ ʈel ɑ:ni ðe, ʈəb ma:ʧʰo rɑnbo.
   (Bring me the oil quickly, then I will fry the fish.)
7) **ɑ:dʒkl**, dʒharkɦəndɇ nəksəli: səmi:sɑ ʧrəm pər bɦəigəl.
   əkhən, dʒharkɦəndɇ nəksəli: səmi:sɑ ʧrəm pər bɦəigəl.
   (These days, the naxal problem in Jharkhand is at its extreme.)
8) Iɦ ʧʰoɽija bi:ɦɑ ***ɦəvek ɦe ki nɑ***?
   Iɦ ʧʰoɽija bi:ɦɑ bɦəl ki nɑi?
   (Is this girl married?)
9) həmə ***nəɦane vɑ:sʈe*** pokɦrɑ dʒɑiʧʰi:.
   həmə nəɦɑijɑ: le pokɦrɑ dʒɑiʧʰi:.
   (I am going to the pond for bathing.)
10) həmə ʈɑngi nie: ***dʒɑ: rəhe ɦe***, gaʧʰ kaʈbo.
    həmə ʈɑngi nie: dʒɑi ʧʰi:s, gaʧʰ kaʈbo.
    (I am taking the axe to cut the tree.)

VI. METHODOLOGY

The recordings used for this study were recorded at multiple locations and at different situations on about 20 Gulgulia people over a period of 1 week.

The recordings were mainly in the form of paper jottings. Since the researcher never intentionally set out to go looking for instances of Code- Switching, but rather noted them down as they randomly occurred in the spontaneous speech of different individuals on different occasions, thus there was no audio-cassette recording.

VII. DOMAINS OF CODE-SWITCHING IN THE GULGULIA CONTEXT

There is a shift in Language behaviour from one domain to another. It is the tendency of individuals to adapt to different varieties, codes and styles and keep switching over from one code to another depending upon the domain. Language behaviour gets influenced by an individual's social intimacy, social relationship, social distance and the situation of the speaker and the hearer. The speaker doesn't initiate his way or style of language use, rather it is the context which determines the varieties according to the situations.

1. CODE-SWITCHING IN THE HOME DOMAIN

Members use a type of code with their family-members which is more informal, casual and simple. They speak Gulgulia among themselves. However, during their informal talk, they show traits of code-switching particularly at the lexical level. When the reason was asked for such a lexical shift, they told the investigator that they are the nomadic community roaming from one place to another, in search of food and shelter. In their course of migration, they pick words from other regional dominant languages and make them an integral part of their mother-tongue.

Sometimes, the members are away from their community for about six months and are very much prone to acquire this trait of code-switching.

2. CODE-SWITCHING IN THE SOCIAL DOMAIN

Members use Gulgulia with minor traits of lexical code-switching in the social domain involving their own community members. The community considers themselves at the lowest rung of the Varna hierarchy and generally keep their community get-togethers restricted among its own community members. Thus on such occasions, Gulgulia language is the means of communication among the members. However, during occasions like some campaigns or processions, they largely proclaim their needs and demands in the dominant language of the region so that their voice could reach the maximum.

Amidst these social domains, Gulgulias show a peculiar behaviour of code-switching during religious ceremonies. Although they themselves conduct their religious rituals with the oldest members of the community conducting the rituals without inviting any priest, yet they conduct the proceedings in either, Hindi, Bengali, Khortha etc. When enquired why they exclude their vernacular for religious purposes, they stated that they don't have their own festivals, so for conduction of festivals which are inherited from other communities, they employ the language of the community to which the festival is related to.

3. CODE-SWITCHING IN THE OUTSIDE DOMAIN

Members generally switch their codes from Gulgulia to other regional languages during earning their livelihood i.e. while begging or presenting animal shows etc. Sometimes or often they switch over from one language to another in order to address and attract more and more public and thus they happen to learn different language in different contexts. However, they make use of argot when they want to prevent others from understanding what they say.

VIII. QUANTITATIVE DATA ON INSERTIONS

The distribution of the main word class insertions is presented in the following table as:

All Hindi parts of speech in Gulgulia sentences are presented as 'H' in 'Gu'. Similarly, Khortha parts of speech in Gulgulia sentences are presented as 'K' in 'Gu'.

	NOUN	VERB	ADVERB	ADJECTIVE	TOTAL
JHARIA					
H in Gu	55	40	20	12	127
K in Gu	35	25	12	10	82
	90	65	32	22	209
SINDRI					
H in Gu	43	40	20	7	110
K in Gu	45	36	15	12	108
	88	76	35	19	218
PATHERDIH					
H in Gu	22	37	14	7	80
K in Gu	59	40	28	18	145
	81	77	42	25	225
TOTAL					
H in Gu	120	117	54	26	317
K in Gu	139	101	55	40	335

The table shows that the total Khortha insertions in Gulgulia sentences outnumber the total Hindi insertions in Gulgulia sentences, 335 to 317 insertions (except with regard to verbs where total hindi insertions in Gulgulia sentences is greater than total Khortha insertions i.e. 117 to 101).

The frequency is particularly more noticeable in Patherdih, where Khortha insertions are favoured in Gulgulia sentences making up 145 of the total 335 insertions from all three sites.

For open classes within each site, the relative frequency is NOUN> VERB> ADVERB> ADJECTIVE with the least frequently inserted parts of speech in Gulgulia being adjective.

The table shows that two main patterns are consistent. First, use of Hindi is favoured in Jharia. Second, use of Khortha is favoured in Patherdih. In Sindri, however, the use of the two languages seems more the same. One possible explanation is that Jharia, very famous for its coal mines and mining industry is the major commercial of the region, hence, not only are there many Hindi speakers, but more importantly, Hindi is usually the lingua franca, particularly in nearly all the main markets. Contrary to this, Patherdih is closely situated near Santhaldih where Khortha is primarily spoken. Hence, the Gulgulias situated at Patherdih have traits of switching to Khortha more often. Sindri stands as a neutral town with Hindi as its prominent lingua franca as well as its nearness again to Santhaldih causing Khortha influence in the Gulgulia language.

IX. FACTORS RESPONSIBLE FOR CODE-SWITCHING IN GULGULIA

In Gulgulia, excluding the religious domain when the members deliberately switch their codes to the language to which the festival is related to, the investigator found four factors that contribute most in Gulgulia language shifting.

Language attitude
Language status

Subconscious linguistic behaviour
Lexical gap

A) Language attitude

Though the members of the Gulgulia community exhibit a very positive attitude towards their language and wish to see it promoted, yet the members mostly need to revert to the use of dominant languages for earning their livelihood as communication in dominant languages fetch them more profit as more and more public could be reached.

At times, there is even conscious display of knowledge of Hindi, Bengali, Khortha extensively and English too, at minor lexical levels. The more they bring words from dominant languages in their communication, the more admiration they earn from their peer group.

B) Language status

Under Landweer's (2008) four point scale of language status namely as follows:-

- The language in question is a prestigious, nationally recognised lingua franca.
- The language in question is a regionally recognised lingua franca.
- The language in question is a locally recognised variety with neutral status.
- The language in question is a locally disparaged variety,

Gulgulia can be classed as a locally disparaged variety. In the words of Landweer,(2008) "A descending scale of relative prestige could be as follows with a nationally recognized language having the greatest prestige and thus a greater potential for use in the foreseeable future, and locally disparaged varieties having the least potential for continued use in the future (assuming other supports are also absent)."

When a language fails to attain any kind of recognition, then its survival is hardly achieved. Gulgulia is confined just within their own community having negligible prestige in the society. Al-though it is widely spoken by the community members in informal situation, is always a second choice in the formal situation. When a language stands as a second choice in most of the situation, then its survival gradually gets difficult. That is to say that the language is used less and less and finally language shift gets unavoidable. Moreover, severe illiteracy within the community shows that the documentation and preservation of the language is impossible by their own community people.

C) Subconscious linguistic behaviour

Gulgulia speakers exhibit patterns of code-switching out of habit and subconsciously switch codes with another Gulgulia speaker. Such situations could be found in their informal interactions and formal community discussions etc. It is subconscious because most people are unaware that they have switched and amazingly, none are capable to make even ten sentences without bringing in one or two Hindi, Bengali, at times English (extremely basic words like time, voter-card etc.) words or expressions.

D) Lexical gap

There are several expressions that do not have readily available equivalents in Gulgulia. Gulgulia speakers in this kind of situation do not have any other choice than to switch to expressions available in other dominant languages.
Amidst 500-600 total population of the community, three children go to school which presents the picture of severe illiteracy within the community. Thus, there is no extensive attempt carried out by the members themselves to develop terminologies for Gulgulia.

X. THE IMPACT OF CODE-SWITCHING TO THE EXISTENCE OF GULGULIA LANGUAGE IN THE FUTURE

Gulgulia community showing traits of Code- Switching is basically a linguistic phenomenon. This phenomenon is actually prevalent in all multilingual societies. It facilitates the need to communicate with other people who speak different languages. If this phenomenon exists temporarily, the language which is undergoing the shift isn't in a position to be endangered. However, if this shifting takes place continuously or permanently, then this may be threatening for the host language.
If we apply the above stated criteria in the Gulgulia context, where we see that code-switching is not just invading in the outside social domain but is also creeping in the home and particularly religious domains which declares negative impact on the Gulgulia existence. If the next generation adapt themselves of not using Gulgulia in majority walks of life and domains, this would pose danger to the Gulgulia (language) existence. If no preventive and proper action is taken to check this to happen, it is quite relevant to say that the Gulgulia language will vanish.

XI. CONCLUSION

We could undoubtedly conclude that code-switching has become an integral part of the Gulgulia life and several factors are responsible for this. It is necessary for the linguists and lexicographers to work in a co-ordinated fashion to develop Gulgulia terminologies in order to combat the issue of lexical gap. This would enable the developed terminologies to become household terms. The government should take initiatives with regard to language planning, new policy initiatives, public awareness, technical and financial support for the promotion and preservation of Gulgulia status and language. This would thereby help reduce the incidence of code-switching among the Gulgulia as well as help in the upliftment of the community and preservation of the language.

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Empirical Association of Farmers of Adopted and Non Adopted Villages of Krishi Vigyan Kendra (KVK)

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Abstract- The present study was formulated during the year 2008 in the district Srikakulam of State Andhra Pradesh, India with a sample of 80 respondents with equal proportions *i.e*. 40 farmers from adopted villages and 40 farmers from non-adopted villages were selected by random sampling. Results revealed that nine out of ten computed correlation coefficient values of personal and socio-economic variables with indirect changes were found to be positively significant association in both adopted and non adopted villages. While observing regression values, it was acknowledged that the variables viz., scientific orientation, economic orientation and innovativeness were found to have positive association at 0.05 level of probability for adopted village farmers but in case of non adopted villages the one variable education alone had positive association at 0.01 level of probability and rest of variables had no association with indirect changes.

Index Terms- adopted, indirect change, KVK, personal, socio-economic, farmers

I. Introduction

Krishi Vigyan Kendra (K.V.K.) is a viable concept developed by Indian Council of Agricultural Research (ICAR), India in the year 1974 which was rest upon a solid base of transfer of technology from laboratory to farmer's field with respect to Agriculture and allied sectors at district level. Every K.V.K. has adopted 4 to 6 economically, culturally and technologically backward villages situated within 10-20 kilo meters radius of the K.V.K. These villages are not too small or too large. Before adoption a detailed survey of the village was conducted to study the socio-economic and cultural status of that village. Since last 39 years, KVK has been vigorously conducting several technological demonstrations directly in farmers' fields with active participation of farmers to trigger the various innovations and applications in agriculture and its related fields. Today KVK plays a First Line Extension role-A linkage between research and the field in augmenting the socio-economic conditions of farmers and farmwomen. The productivity of agricultural technology at farmer's level can be enhanced through innovative and appropriate technological advancements/ interventions, complemented with institutional support in both direct as well as indirect means.

A change in one part of system often initiates the chain reaction of indirect gains stemming from the direct gains of innovation. Direct gains are the changes that occur in a immediate response to an innovation but indirect gains are the changes that occur as a result of the direct gains of innovation. In many contexts, directs changes are measured and indirect changes are neglected. Conceptualizing and measuring of indirect effects is highly complex, yet is needed for each situation if technology is to be used as an effective instrument for income generation and poverty reduction. Considering the above facts in view, the present study was formulated to know the extent to which the KVK has brought desirable changes among farming community in terms of indirect changes and their association as compared with non KVK farmers.

II. Methodology

The present study was undertaken in Srikakulam district of Andhra Pradesh in India during the year 2008 by adopting ex-post-facto research design in purposively selected four villages viz., Chimalavalasa & Divanjipeta (adopted villages), Vanjarampeta & Guyyanavalasa (non-adopted villages), two each from the purposively selected two mandals namely Amadalavalasa and Rajam out of 37 mandals in Srikakulam district of Andhra Pradesh. A total of 80 farmers were selected with equal proportions *i.e*. 40 farmers from adopted villages and 40 farmers from non-adopted villages.

Indirect changes were taken as dependent variables. Parameters viz., change in the use of high yielding varieties, pesticide & fertilizers application, nutritional education & health habits, self confidence, decision making ability, communication behaviour, economic status, socio-political participation and reduce cost of cultivation were taken as indirect changes. Ten important antecedent factors of farmer's viz., age, education, land holding, social participation, mass media exposure, extension contact, risk orientation, scientific orientation, economic orientation, achievement motivation and innovativeness were selected as independent variables. The data were statistically analysed to workout correlation coefficient and multiple linear regression coefficients to draw the meaningful inferences.

III. Results and Discussion

Table 1: Association between personal and socio-economic characteristics of adopted and non adopted villages farmers and their indirect changes

(n=40)

S. No	Independent variables	'r' values	'r' values
1	Education	0.3906*	0.7417**
2	Land holding	0.0368NS	0.1437NS
3	Social participation	0.6006**	0.5145**
4	Mass media exposure	0.5009**	0.6991**
5	Extension contact	0.7437**	0.5094**
6	Risk orientation	0.7632**	0.6702**
7	Scientific orientation	0.8290**	0.3389*
8	Economic orientation	0.7598**	0.6750**
9	Achievement motivation	0.7567**	0.5564**
10	Innovativeness	0.6980**	0.6822**

** = Significant at 0.01 level of probability NS = Non Significant
* = Significant at 0.05 level of probability

It is evident from the table 1 that the indirect changes of the farmers of adopted villages were found to have positive and significant relationship with social participation, mass media exposure, extension contact, risk orientation, scientific orientation, economic orientation, achievement motivation and innovativeness at 0.01 level of probability. The table 1 further indicating that variable education alone was found positively correlated with indirect changes at 0.05 level of probability. Whereas, land holding with indirect changes was non-significant.

In case of non adopted villages, the indirect changes were found positive relationship at 0.01 level of probability with eight personal and socio-economic variables viz., education, social participation, mass media exposure, extension contact, risk orientation, economic orientation, achievement motivation and innovativeness, whereas, scientific orientation alone contributed positively significant at 0.05 level of probability. Whereas, land holding was found to be non-significant with indirect changes. These findings were in accordance with Ghosh (2004), Kumar (2006) and Ranuji, (2006).

Table 2: Multiple linear regression analysis of personal and socio-economic characteristics with indirect changes of farmers in the adopted villages

(n=40)

S.No	Independent variables	Regression coefficient	Standard error	't' value
1	Education	0.2030	0.167	-1.222NS
2	Land holding	-0.3910	0.283	-1.383NS
3	Social participation	0.2840	0.176	1.619NS
4	Mass media exposure	-0.0304	0.129	-0.236NS
5	Extension contact	-0.0687	0.103	-0.664NS
6	Risk orientation	0.1370	0.124	1.110NS
7	Scientific orientation	0.3170	0.160	1.977*
8	Economic orientation	0.3450	0.165	2.094*
9	Achievement motivation	0.3800	0.257	1.476 NS
10	Innovativeness	0.2760	0.122	2.271*

a = 18.130
R^2 = 0.862
* = 0.05 level of significance
NS = Non Significant

$Y=18.130+0.203x_1-0.391x_2+0.284x_3-0.030x_4-0.068x_5+0.137x_6+0.317x_7*+0.345x_8*+0.380x_9+0.276_{10}*$

In multiple regression analysis ten independent variables were fitted to explain the variation in extent at indirect changes for the farmers of adopted villages. It may be seen from the Table 2 that the selected ten variables explained to the 86.2 per cent variation in the extent of indirect changes for the farmers of adopted villages. The 't' test of statistic showed that this was significant at 0.5 per cent level of probability. It was revealed from the data that out of ten variables, three variables namely, scientific orientation, economic orientation and innovativeness had a positively significant relationship with indirect changes for the farmers of adopted villages, whereas, another three variables viz., social participation, risk orientation and achievement motivation showed no significant effect on the indirect changes. Rest of the variables comprising education, land holding, mass media exposure and extension contact contributed negatively significant relationship with the indirect changes. The above findings are associated with the findings of Jahromi and Zamani (2006).

Table 3: Multiple linear regression analysis of Personal and socio-economic characteristics with indirect changes of farmers in the non-adopted villages

(n=40)

S.No	Independent variables	Regression coefficient	Standard error	't' value
1	Education	0.5440	0.174	3.132**
2	Land holding	0.4720	0.404	1.168NS
3	Social participation	0.4060	0.270	1.505NS
4	Mass media exposure	0.2280	0.204	1.120NS
5	Extension contact	-0.0326	0.101	-0.323NS
6	Risk orientation	0.0646	0.148	0.436NS
7	Scientific orientation	0.0858	0.147	0.582NS

8	Economic motivation	0.0435	0.180	0.242NS
9	Achievement motivation	0.1580	0.179	0.884NS
10	Innovativeness	0.3580	0.214	1.673NS

a = 12.162 R^2 = 0.807

** = 0.01 level of significance NS = Non Significant

$Y=12.162+0.544x_1$**$+0.472x_2+0.406x_3+228x_4-0.032x_5+0.064x_6+0.085x_7+0.043x_8+0.158x_9+0.358x_{10}$

As regard indirect changes, it was clear from the table 3 that total 10 variables explained to the extent of 80.70 percent of variation for the farmers of the non-adopted villages. The findings hereby explaining that out of ten variables, education alone yielded significant contribution in explaining the variation with indirect changes. Other eight variables viz., land holding, social participation, mass media exposure; risk orientation, scientific orientation, economic motivation, achievement motivation and innovativeness were found to have no significant association with indirect changes. The variable extension contact was only showed negatively significant relation with indirect changes. Findings are in the line of the findings of Ommani & Chizari (2006)

IV. Conclusions

Out of ten variables, nine variables viz., education, social participation, mass media exposure, extension contact, risk orientation, scientific orientation, economic orientation, achievement motivation and innovativeness, showed significant relationship with indirect changes in both adopted and non adopted villages. But the magnitude of correlation of all the variables with indirect changes is as high as in adopted villages as compared to non adopted villages. It was also acknowledged from the study that the regression coefficient values of scientific orientation, economic orientation and innovativeness contributed positive and significant association with indirect changes in adopted villages but the same variables was negatively associated in case of non adopted villages. If any farmer wants to be a successful farmer, essentially he must have these three attributes to adopt any novel idea whatever it may cost. Moreover, Farmer to farmer diffusion is being vanished today due to lack of innovative information oriented farmers in technology dissemination in most parts of the country. Hence it is a good sign that KVK has been doing an enormous role in bringing innovative, scientifically oriented and economically motivated farmers to improve livelihood security and facilitate adoption and diffusion of technologies through farmer to farmer extension. To maintain its stand, the KVK need to give further due importance for the above significant attributes with suitable changes by the staff to promote desirable changes in a consistent manner among the farming community in years to come.

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Regional Migration for Inclusion: A Study of Agriculture Labourers from North Karnataka to South Karnataka

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Abstract- For many poor people around the world migration is a way of life, and has been for centuries. But globalization has radically altered the scale of migration: people are now more aware of opportunities elsewhere and it has become easier for them to travel.

The seasonal migration of agricultural labourers is not a new phenomenon in Karnataka and India. Britishers have mobilized labour force for commercial crop production, mining and other administrative purposes during their rule. After Independence, Government of India (GOI) adopted the socialist-capitalist (mixed economy) model of development through five year planning. As a result of the defective policies of agricultural development the regional disparity is increasing, which is leading to the increase in the seasonal migration of agricultural labourers. Inclusive growth policy is an attempt to bring the backward sectors, classes, castes, tribes, women, and marginal people into main stream economy. In Karnataka state regional disparity has become a political issue. Southern Karnataka region, which is politically dominant, is developed in terms of irrigational facilities and loan availability and other basic infrastructure whereas Northern Karnataka regions are comparatively less developed. As a result, every year thousands of marginal farmers and landless agricultural labourers migrate seasonally to Southern Karnataka region for survival and inclusion.

Index Terms- agriculture labour. North karnataka, regional migration south karnataka

I. INTRODUCTION

The term migration was usually understood to cover all cases where the decision to migrate was taken freely by the individual concerned for reasons of "personal convenience" and without intervention of an external compelling factor. It therefore applied to persons, and family members, moving to another country or region to improve their material or social conditions and to improve the prospect for themselves or their family. The United Nations defines migrant as ‘an individual who has resided in a foreign country for more than one year irrespective of the causes, voluntary or involuntary, and the means, regular or irregular, used to migrate. Under such a definition, those travelling for shorter periods as tourists and business persons would not be considered as migrants. However, common usage includes certain kinds of shorter-term migrants, such as seasonal farm-workers who travel for short periods to work in planting or harvesting farm products."

Migration refers to the movement of people from one geographical location to another, either on a temporary or permanent basis (Ekong 2003). It is a common observation all over the world that rural-urban migration is a dominant pattern of internal migration. Migration is a selective process affecting individuals or families with certain economic, social, educational and demographic characteristics. People migrate in response to prevailing conditions and the reasons for it differ from one individual to another

There are two main types of migration: first, internal migration, i.e. migration within one country, and secondly international migration, which means the movement from one country to another. Agriculture labour migration is also one type of labour migration from one place to another place for their livelihood.

Agricultural labourers, especially in smaller villages away from towns and cities, are generally unskilled workers carrying on agricultural operation in the centuries old traditional ways. Most agricultural workers belong to the depressed classes, which have been neglected for ages. The low caste and depressed classes have been socially handicapped and they never had the courage to assert themselves. In some parts of India, agricultural labourers are migratory, moving in search of jobs at the time of harvesting.This movement has some time helped them to get the benefits of growth and development.

II. REVIEW OF LITERATURE

Following are some of the literature reviewed to identify the research gap.based on this the objectives of the work has been framed

Manon Domingues, Dos Santo Thiser analyses the dynamics of migratory flows and growth in a developing economy. We show that when workers freely choose their location, some natives can rationally decide to return to their home country after they have accumulated a certain amount of knowledge abroad, while some prefer to stay permanently in the same economy (either at home or abroad). We point out that worker mobility can have an expansionary effect on the developing economy. Moreover, we show that in the long-run, as the sending economy develops, fewer natives are likely to emigrate and more migrants are likely to return.

Shigemi Yabuuchia, Sarbajit Chaudhurib(2005) develops a three sector general equilibrium structure with diverse trade pattern and imperfection in the unskilled labour market to analyze the consequences of international mobility of skilled and unskilled labour on the skilled-unskilled wage inequality in the developing economies. The analysis finds that an emigration (immigration) of either type of labour is likely to produce a favorable effect on the wage inequality. In particular, the result of emigration (immigration) of skilled labour on the relative

wage inequality is counterintuitive. These results have important policy implications for an overpopulated developing country like India

Manolo I. Abella (2005) while the growth of trade may have substituted for potential movements of labour, its overall impact has been to stimulate economic growth and employment, and social and demographic changes which in turn create shortages of labour. As the regional economy continues to expand at a rapid pace, pressures will increase for importing foreign labour to do jobs that national workers no longer want.

The World Bank's (2006) Global Economic Prospects Report asserts that "migration should not be viewed as a substitute for economic development in the country of origin [as ultimately] development depends on sound domestic economic policies."

Naresh Kumar and A.S. Sidhu (2005) attempt to identify the push and pull factors which influence workers' inter-state migration, on the basis of perceptions of workers. A sample of 200 workers drawn from 25 brick-kilns located in three districts of Punjab were interviewed. This study found that industrial development, better job opportunities and comparatively higher wages in Punjab have emerged as the most important pull factors which motivate labour to migrate. But lack of development, inadequate agricultural land and poor economic conditions of family forced laborers to migrate out of its native place. The study further found that economic factors have emerged more significant as compared to non-economic factors in the process of migration. Study recommends that in view of the slow absorption rate in the urban industrial sector, the labour migration should be regulated. Concrete plans and their effective implementation are necessary in order to reach the people.

Research gap:

Migration is one of the common trends in these days. In the same way agriculture labour migration is also common in these days. Agriculture labourer face so many problems in his living condition and these problems push him from his native place and migrate to other places where he get good employment and income opportunity. In Karnataka there is lot of disparities between North and South Karnataka and the drought is more prevalent in North which has led to the migration of agricultural labourers from north to south Karnataka in search of jobs. This study focuses on this type of migrant labourers who have migrated from north Karnataka to south Karnataka for employment in construction fields, and tries to prove that this type of migration of the marginalized section has helped in their inclusive growth.

Objectives:

The main objectives of this paper are

1) To study the socioeconomic conditions of the migrant labourers, before and after the migration.
2) To identify whether migration has led to inclusive growth taking into consideration the income and education level as well as caste background of these people.

Hypotheses:

H_o=there is no change in labourers income after the migration.

H_1 = there is a significant change in income after the migration.

Methodology:

Details regarding the socio-economic conditions of the selected laborers are based on the information collected through interview schedule.100 respondents are selected from different construction fields in Mysore. Primary data collected from the respondents with the help of questionnaire. SPSS package is use for data analysis. Paired T test method was used to analyze wage differences before and after migration. Excel is used for tabulation and construction of Chart .The analysis of the socio-economic background of the selected seasonal migrant laborers has helped to explain the situational factors at the place of origin which make them to migrate. The specific focus of the paper is to understand the socio-economic background of migrant labourers and it is well pronounced by this study that the social and economic exclusion in the native is the main reason for agricultural labour migration.

Table .1 .Age of the labourers

Age	Frequency	percent
11-20	13	13.0
21-30	32	32.0
31-40	35	35.0
41-50	20	20.0
TOTAL	100	100.0

Table 1 has classified these labourers on the basis of age. As shown in the table it is middle age group which is showing more inclination towards migration to improve their economic status.32% of labourers are 21-30 age group, 35%of labourers are 31-40 age group and other remaining part fall in low and higher age group. It is clear from the table that the migration is very pronounced in the highly productive age group ie 20-40 years

Table.2. Male and Female Ratio.

GENDER	FREQUENCY	PERCENTAGE
FEMALE	32	32.0
MALE	68	68.0
TOTAL	100	100

The data has been classified on the basis of gender also. And it is men who are more migratory in this group. And the 32% of female population is normally the dependent wife who follows husband to his working place. In most of the cases they are also joining the hands of their husbands to improve the family income and they expressed their willingness to work in an alien place than in their native.

Table .3 Cateogary wise Migrant Labourers

CATAGEORY	FREQUENCY	PERCENTAGE
2A	34	34.0
2B	13	13.0
3A	1	1.0
3B	1	1.0
CAT 1	11	11.0
SC	18	18.0
ST	22	22.0
TOTAL	100	100.0

The result shows the socio – economic conditions of the migrant labourers, table 3 refers the category wise migrated laborers and their percentage. According to this table the migrated laborers from north Karnataka has been classified into SC and STs, OBCs and others and it is very clear that out of the total more than 40% are SCs and STs ,34 %belong to 2A(kuraba) . This clearly shows that the majority of the poor agricultural labourers, who migrate for their livelihood, are from this marginalized group.

Table .4 Educational levels of migrant labourers.

EDUCATION LEVEL	FREQUENCY	PERCENTAGE
ILLETRATE	62	62
PRIMARY/HIGHER PRIMARY	25	25
HIGH SCHOOL	13	13
TOTAL	100	100

Education is very crucial for inclusive growth and this has been tested in this research paper and as expected the number of illiterates is very high (62%).25%of the labourers are having higher primary school level and the maximum level of education among these people is high school level(13%).This works like a vicious circle for these people. They are poor and are not able to get good education and they are not getting good education because they are poor.

Table 5 working status of migrants

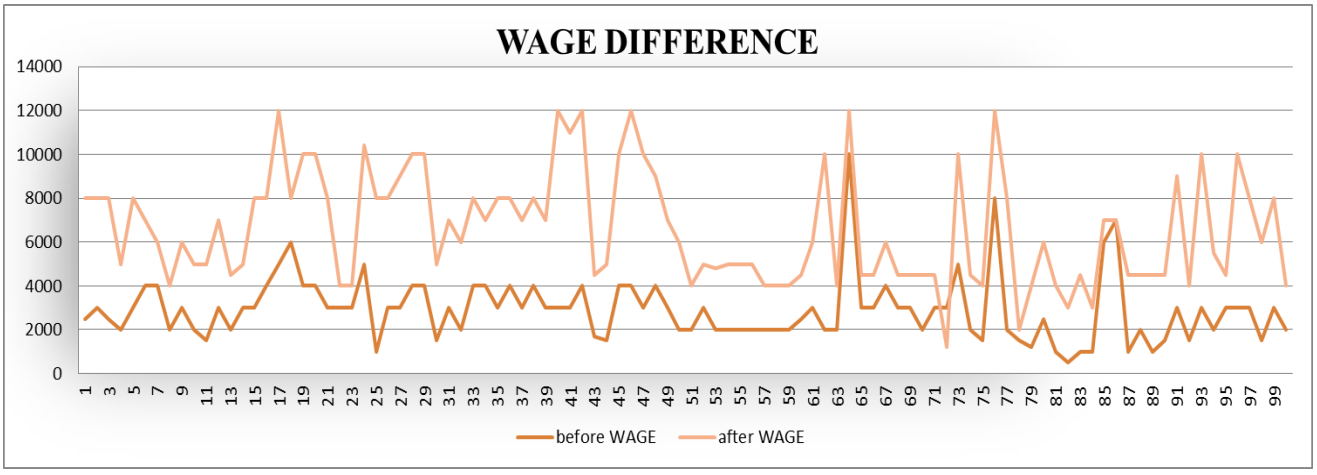
Status	Frequency	Percent
HELPER	4	4.0
LABOUR	88	88.0
MASON	8	8.0
Total	100	100.0

Table .4 Educational levels of migrant labourers.

Above table shows that 88%of migrants are working as labourers, they are unskilled hence they draw lower wages compare to mason and other workers who are working in construction fields.

Table 6.Paired Sample T Test

MEAN	Std DEVIATION	Std ERROR MEAN	95%CONFIDENCE INTERVAL		T	Df	Sig(2-tailed)	Table value
			Upper	lower				
-4110.000	4309.620	430.620	-4965.122	-3254.878	9.537	99	.000	1.98



Above Table6 refers to the wage earning status of the migrant labourers before and after their migration from north to south Karnataka. As shown above, the table value is greater than calculated value (9.537> 1.984).therefore the null hypothesis is

rejected. Rejecting null hypothesis shows that the test is statically significant. There is a significant difference between income level of the migrated labourers before and after their migration. The income has actually increased. This type of migration not only helped to improve the standard of living of the migrant labourers, but also made them economically and socially included as majority of them belongs to the marginalized communities.

III. Conclusion

The above study helps us to make some observation as below.

The migrant labourers from North Karnataka are becoming the main labour source to the construction sector in the cities and the construction works of the cities are pulling these labourers because of high wages. Migrated labourers are coming to southern region in good number for employment to fulfilling their financial as well as social needs. Most of the labourers have own land holding but they find it very difficult to survive because of this adverse environment in agriculture sector, Therefore they migrate. Since majority of these migrant labourers have come from poor background and low socio economic status, the migration has helped them to improve not only their financial status but also their educational, social status. In this way they felt that the migration has helped them to get included in the development process.

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Recorded Distribution of Earthworms of the Family Octochaetidae In Dakshina Kannada District, South West Coast, Karnataka

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Abstract- A systematic survey on earthworm species diversity from Dakshina Kannada district, Karnataka state , India, has been conducted for the first time between January 2007 to December 2008. The study constitute mainly from Mangalore, Bantwal, Belathangady, Puttur and Sullia talukas. Habitat such as Banana plantation, Cashew plantation, Areca plantation, Vegetable garden, paddy fields were surveyed. Morphometric details of all the earthworms collected in the study area were recorded and species were identified . The study has revealed total of 11 species belonging to the family Octochaetidae in the order Haplotoxida. Species distribution pattern, their richness and habitat specificity have been studied and discussed in the paper.

Index Terms- Earthworms, Distribution, Octochaetidae, Dakshina Kannada, South West coast, India.

I. INTRODUCTION

Earthworms are important soil invertebrates belonging to the Phylum Annelida and Class Oligochaeta. Since long earthworms have been known as "Farmer's friend", "Nature's best fertilisers" and "Intestine of earth". Earthworms includes 3 orders, 4 suborders, 7 super families, 27 families and 8 sub families. There are about 5575 species of megadriles in the world [1]. Goto and Hatai, 1899[2], reported earthworms of Japan., Zoogeography and ecology of earthworms. Carpathian Mountains in Poland has been reported [3]. Reynolds (1994a)[4] and Reynolds *et al.* (1995b)[5], recorded earthworms from Bangladesh. Reynolds 1995[6] reported the status of exotic earthworm systematic and biogeography in North America. Distribution of earthworms in the north west of Iberian peninsula has been recorded [7]. While Reynolds and Wetzel (2004b, 2008)[8-9] reported all earthworms in North America including Mexico, Bermuda, Hawaii and Puerto Rico. Earthworms and their distribution in New Zealand has been reported [10]. Terrestrial earthworms of Singapore have been investigated by [11]. Earthworms in relation to soil property in Mexico has been studied by[12]. Biodiversity of earthworms of Pakistan have been reported by [13]. Diversity and distribution of terrestrial earthworms from Thailand were recorded by [14].

The earliest record on Indian earthworms was done by [15] from western Himalayan region. A comprehensive checklist of earthworms of Indian subcontinent was prepared by[1]. Even though many parts of the country has not been explored for the study of earthworms many areas . Taxonomic work on Indian earthworms have been carried out by[16, 17, 18; [19] ; [20]; [21]; [22]; [23]; [24]; [25]; [26]. Dhiman and Battish, 2006 [27], reported the habitat and taxonomic characters of some earthworm species of the Punjab. Checklist of 51 earthworms of Western Himalaya was listed by[28]. The earthworm diversity of the Western Ghats is very fragmentary [29]; [30, 31, 32, 33, 34; [35]; [36], [37]; [24]. Diversity and distribution of earthworm in Uttarakhand, was done by [38]. However , these efforts have yielded several endemic species of earthworms from different parts of the Western Ghats. However, there is a very limited data on diversity analysis including the species distribution pattern and abundance from different regions of Karnataka in general and D.K. district in particular. Terrestrial earthworms of Singapore have been investigated by[39]. Blakemore, 1994[40] compiled a list of about 1600, mainly ecological reference for the period 1970-1990. Ghafoor and Qureshi, 1999 [41] listed the fauna of a few localities in Pakistan.

There are only few studies pertaining to the species diversity, distribution pattern, habitat preference, endemic and threat status in India. Eastern Himalayas [42]; [43]; South India[44], [45]; Andamon and Nicobar islands[46], [47], [20], [48], [49], [50], [28] and [27]. Batish and Dhiman, 2002 [51], reported the habitat and taxonomic characters of some earthworm species of Punjab. Earthworm population dynamics was studied in a cultivated soil in central Himalayan Tarai by [52]. Distribution pattern of earthworm fauna in Pandicherry region and its population densities were studied by [53]. Earthworms of Dakshina Kannada district of Karnataka state have not been investigated systematically [20]; [37]; [26]; [54].

In recent years, the diversity of Indian earthworms has been mainly studied by [16]. He revised the Indian members of the family Octochaetidae in the publication 'Fauna of India' providing illustrated descriptions of 154 taxa including 6 new genera and 16 new species. Begum and Ismail, 2004, [55] collected 5 species of earthworms belonging to family Octochaetidae, the genera *Dichogaster* and *Octochaetona* in around Chennai, Tamil Nadu. The knowledge on the earthworm fauna of India has also been enriched by [56], [57], [58], [28]. Kathireswariet et al., 2005 [59], reported about 19 species of earthworms of Octochaetidae and present study includes *Celeriella duoedecimalis* and *Hoplochaetella* suctoria from Tamil Nadu. *Dichogaster affinis* (Michaelsen, 1890 [60], is a cosmopolitan earthworm widely distributed in the tropical and temperate regions around the world [61]. It has been reported from India [62], Burma (= Myanmar)[63]; [62], Thailand [64],

[62], Cambodia, Laos, Vietnam [1], Hainan Island [65], Sumatra, Flores [66], Australia [67], New Caledonia [62], Pacific Islands [61], Mexico [68], Central America, Brazil, Africa, Madagascar [62], and Canary Islands [69]. Shen, et al., 2008 [70] recorded *Dichogaster affinis* as a new record from the Centro Western Taiwan.

II. STUDY AREA

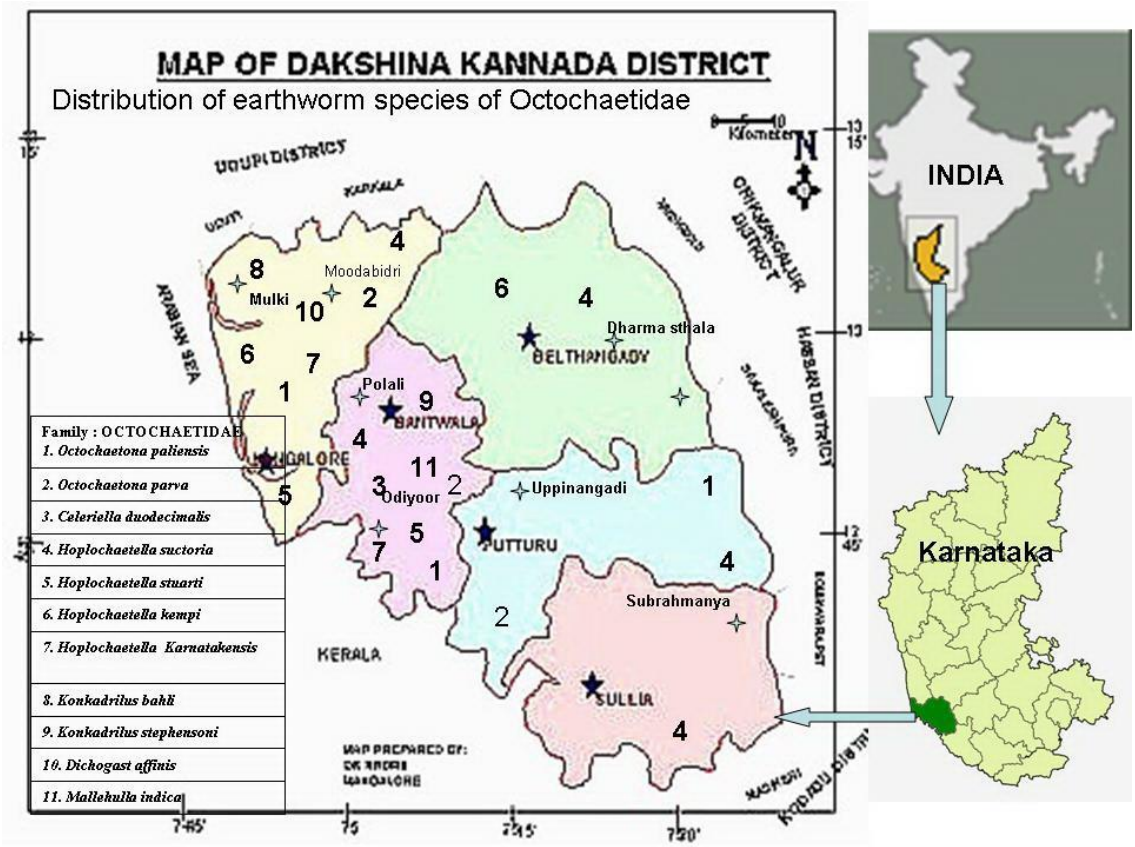

Fig. 1 Map of study area

Dakshina Kannada is an important district of Karnataka state situated on the western coast of India . It is long narrow strip of territory and from east to west it is broken low plateau, which spreads from the western ghats to the Arabian sea. Dakshina Kannada district has an area of 4866 square kilometer which stretch from 12^{o} 57' and 13^{o} 50^{1} north latitude and 74^{o} & 75^{o} 50^{1} east longitude. The district is divided in to 5 taluks Mangalore, Bantwal, Belthangady, Puttur and Sullia. It is bordered by Udupi District to north, Chikkamangaluru district to north east and Kasaragod district in Kerala to the south. The Arabian sea bounds it on the west. Mangalore is the head quarters and chief city of the district(Fig.1). The climate of the district shares the wider climatic pattern of the other West Coast districts of India. It is characterized by excessive humidity (78%) during the greater part of the year.

III. MATERIALS AND METHODS

A systematic earthworm species diversity survey was conducted at regular interval between January 2007 to December 2008 in the study area. Habitat such as coconut plantation, vegetable garden, areca plantation, banana plantation, cocoa and rubber plantations, flowering gardens and few lentic and lotic water bodies have been selected for earthworm species collection. Sampling were done in triplicate using the quantitative modified hand sorting standard methods of surface 30x30cm area. Later, soil was excavated up to 30 cm depth in each sampling point and available earthworms were collected. Specimens were fixed in 30% alcohol for about 2 minutes for anesthetizing and then transferred to 10% formalin solution for permanent preservation. Earthworms were dissected out immediately after alcohol treatment to study the internal anatomical features for identification. The specimens were deposited in the department museum. Earthworms were identified with the help of monographs and other available literature on the subject [33][62][17] and [1].

IV. RESULTS AND DISCUSSION

Earthworm survey conducted in 5 different taluks of Dakshina Kannada District revealed occurrence of 5 genera and 11 species belonging to family Octochaetidae collected from

different habitats such as forest litter, Banana, Areca, Cashew plantations, vegetable gardens and edges of rivers. Species such as *Octochaetona paliensis, O. parva, Celeriella duodecimalis, Hoplochaetella suctoria , H. stuarti , H. kempi , H. Karnatakensis , Konkadrilus bahli, K. stephensoni, Dichogaster affinis* and *Mallehulla indica* were collected from the study area and comprises 7.14% species (154 species Indian Octochaetids-Julka, 1988 [17]. Systematic seasonal data has shown that in Mangalore, Belthangady and Bantwal taluk , the density density of earthworms was found to be very rich . *Octochaetona paliensis* and *Octochaetona parva* are more abundant in agricultural habitat of both Mangalore and Bantwal taluk. *Celeriella duodecimalis* collected from residential area of Bantwal taluk only. *Hoplochaetella suctoria* and *Hoplochaetella stuarti* were abundant in all 5 taluks collected from the habitat such as vegetable gardens and garden leaf litter. *Hoplochaetella kempi* were abundant in banana plantation of Belthangady taluk . *Konkadrilus bahli* was collected from paddy filed of Mangalore and Belthangady talukas and *Konkadrilus stephensoni* was collected from cashew plantation and manure heap only from Bantwal taluk. *Mallehulla indica* was abundant in garden leaf litter and cashew plantation of Mangalore and Puttur taluks. *Dichogaster affinis* was collected in areca nut and coconut plantations of Mangalore and Puttur taluks.

Julka, 1988 [17], reported 18 species of earthworms belonging to the genera *Hoplochaetella* from different places of India and Blakemore, 2006 [1] based on work of Stephenson, 1923 [33], Julka, 1988 [17], Kathireswari et al., 2005 [59], listed 19 species of Hoplochaetella. Present study recorded 4 species such as *H. suctoria, H. staurti, H.kempi* and *H.karnatakensis.* Of these *H. suctoria* has been reported from Goa and Karnataka (Moodabidri) and *H. staurti*, recorded from Tamil Nadu and Nandi Hills of Karnataka. *H. suctoria* and *H. staurti* are identical in appearance of suckers but clitellum is indistinct in *staurti*. Likewise spermathecae is polydiverticulate in *staurti* and *suctoria* but is bit shorter in *suctoria.* Two new species, *bahli* and *lavellei* of *Hoplochaetella* were also reported by [71]. Six species of *Konkadrillus* reported by [17] and [1], from India. Present study also recorded *K.bahli and K. stephensoni*. *K.bahli* which has been also reported from Goa and Karnataka and *K. stephensoni* recorded from Karnataka (Kotegehar, Tirthahalli, Castle rock). Two new species, *K. shimogensis* and *K. gatesi* reported by [71]. 15 species in the genera *Octochaetona* were recorded by Julka, 1988 [17] and included in the check list prepared by Blakemore, 2006 [1] from India. Present study reported 2 species namely *Octochaetona paliensis and O. parva* which has been reported earlier from Andhra Pradesh (Nellore, Ongole). Julka, 1988 [17] reported 7 species of earthworms belonging to genera *Celeriella* from Tamil Nadu, Andhra Pradesh and present study recorded *Celriella duodecimalis*. About 6 species of *Dichogaster (Diplothecodrilus)* were reported from India[17], from Bangladesh[72], America [73] [1], Tamil Nadu [24], and the present study reports *Dichogaster afjinis* from south India. In the genus *Mallehulla* only one species *Mallehulla indica* was reported from Karnataka [37] and Maharashtra[17]. The same species has been recorded in the literate soil with pH 6 under decaying leaves of *Mangifera indica* and *Colocasia s*p. at Bantwal taluk.

V. TAXONOMY

Octochaetona paliensis **(**Stephenson, 1920)(Fig. 2).

Octochaetona paliensis Stephenson, 1920 ; *Octochaeteus phillotti* Michelsen, 1907 ; *O. paliensis* Stephenson, 1920; *O. paliensis var riparius* Stephenson, 1920; *O.ganeshe* Stephenson 1923; *O. paliensis var riparius* Stephenson, 1923; *O. phillotti* Stephenson,1923; *O. paliensis Gates*, 1962.

Diagnosis: *Length*: 92-110 mm; *Width*: 4-5 mm; *Segments*: 129-198 with much secondary annulation in pre-clitellar region after 5; *Colour*: unpigmented ; *Prostomium*: open epilobous; *Setae*: lumbricine**,** 8 per segment; *Clitellum*: annular, bright yellow orange brown in 13-17 segments, setae retained, furrows obscured; *Male pores*: a distinct bilateral folds in a circular hollow cavity at ½17-½19 regions, probably on 18, in seminal grooves which run vertically from slight prostatic porophores on 17 and 19; *Female pores*: paired anterio-ventral depressed groove on 14; *Spermathecal pores*: two pairs, intra-segmental, mid-ventral in 8 and 9 in small co-joined pad-like papillae; *Spermathecae*: clavate ental diverticulum; *Testes* and *male funnel* : free in 10 and 11; *Nephridia*: numerous micro mesonephroid in each segment; *Genital markings*: median paired on 18; *Caecae*: absent. *Typhlosole*: in 22 - 23 to 84-93.

Habitat: Agricultural - banana plantation and residential habitats-house hold area and fforest leaf litter.

Distribution: *Mangalore*- Moodabidri; *Puttur*-Puttur. Earlier Rreported from Madhya Pradesh, Maharasthra, Hyderabad , India (Julka, 1988) [17], Rajasthan, India (Triparthi and Bhardwaj, 2004) [74]. This is the first record from Karnataka.

Remarks: Octochaetids are referred to Monogaster (African), Octochaetona (Indian), Octochaetus (Australia/New Zealand) [75].

Recorded months: June to August .

Octochaetona parva (Gates, 1945).

Octochaetoides parvus Gates, 1945; *Octochaetona parva* Gates, 1962 .

Diagnosis: *Length*: 70-80 mm; *Width*: 3-5mm; *Segments*: 80-88; *Colour*: unpigmented; *Prostomium*: open epilobous; *Setae*: lumbricine, 8 per segment; *Clitellum*: bright yellow orange, annular: 13-17, setae retained, furrows obscured; *Male pores*: a circular hollow from ½ 17 - ½ 19; probably on 18, in seminal grooves which run vertically from slight prostatic porophores on 17 and 19; Male genital field indistinct; *Female pores*: paired anterio-ventral depressed groove on 14; *Spermathecal pores*: two pairs: intra-segmental, mid-ventral in 8 and 9 in small co-joined pad-like papillae; *Spermathecae*: clavate ental diverticulum duct shorter than ampulla; *Testes* and *male funnel*: in 10 and 11; *Seminal vesicles*: in 11 and 12; Nephridia: numerous micro mero-nephridia in each segment; *Genital markings*: unpaired on 20/21/22; *Caecae* and *Typhlosole*: indistinct.

Habitat: Agricultural -banana plantation and residential habitats - vegetable gardens (Ladies finger)

Distribution: *Mangalore*-Moodabidri; *Bantwal*-Adyanadka, Arikepdavu, Saardka; *Puttur*-Puttur. Earlier Recorded from Andra Pradesh, India (Julka, 1988) [17]. This is the second record from India. Endemic to India.

Recorded months: June to October.

Celeriella duodecimalis Michelsen, 1907.

Celriella duodecimalis Michelsen, 1907; *Spenceriella duodecimalis* Stephenson, 1923; Stephenson, 1924; *Celriella duodecimalis* Gates, 1958.

Diagnosis: *Length*: 82-160 mm; *Width*: 2.5- 3 mm; Segments: 119-127; *Colour*: dorsal dark brown and ventral pale; *Prostomium*: open epilobous; *Setae*: numerous, lumbricine; *Clitellum*: annular in ½ 13-17; *Male pores*: minute, combined male pore and prostatic pores, discharging at the centres of paired, spheroidal porophores on the 18; *Female pores*: one pair in between aa line on 14; *Spermathecal pores*: minute in 7/8. *Spermathecae*: paired in 8, with a digitiform ectal diverticulum which is three-fourth as long as combined length of the duct and ampulla; *Testes* and *male funnels* : in 10 and 11; *Seminal vesicles*: racemose type; *Genital markings* : absent; *Caecae* and *Typhlosole* : indistinct.

Habitat: Residential habitat- flower garden soil.

Distribution: *Bantwal*-Alike, Vittal. Reported earlier from Tamil Nadu, Andra Pradesh, India (Julka, 1988 [17]; Kathireswari et al., 2005 [59]. First record from Karnataka.

Recorded months: June.

Hoplochaetella suctoria Stephenson, 1917

Hoplochaetella suctoria Stephenson, 1917; *Erythraeodrilus suctorius* Stephenson, 1923; *Hoplochaetella suctoria* Gates, 1940.

Diagnosis: *Length*: 140-210 mm; *Width*: 6-8 mm; *Segments*: 119-145; *Colour*: dorsal dark brown and ventral pale; *Prostomium*: open epilobous; *Setae*: perichaetine, numerous; *Clitellum*: annular, in 13-16; *Male pores*: combined male pore and prostatic pores minute quadriprostate on 17/18 and 18/19; *Female pores*: on 14; *Spermathecal pores*: minute, 2 pairs on 8; *Spermathecae*: 2 pairs each with a circle of 15-20 ventrally directed adherent to the duct, digitiform diverticula; *Genital markings*: without central aperture on 8 and 9; *Testes* and *male funnels*: in 8 and 9, enclosed in unpaired sacs, formed by the peripheral union of the septa 9/10/11/12; *Seminal vesicles*: in 9,10 and 12; *Vasa deferentia* : enclosed into ejaculatory bulbs before opening into the prostatic ducts; *Caecae*: absent; *Typhlosole*: in 22-24 to 118.

Habitats: Forest -leaf litter, agricultural -banana plantation, and residential habitats- vegetable gardens(Ladies finger)

Distribution: *Mangalore*- Konaje , Moodabidri ; *Bantwal*- Bairikatte, Kanathadka, Kanyana. Reported earlier from Karnataka and Goa, India [17]. Probably endemic South Indian species .

Recorded months: January to December.

Hoplochaetella stuarti **(**Bourne,1886).

Perichaeta stuarti Bourne, 1886; *Hoplochaetella stuarti* Bourne, 1887; Beddard, 1890; Michelsen, 1900; Stephenson,1923; Gates, 1940.

Diagnosis: *Length*: 100-162 mm; *Width*: 5- 6 mm; *Segments*: 100-119; *Colour*: dorsal dark brown colour ventral pale; *Prostomium*: open epilobous, open tongue; *Setae*: numerous – perichaetine; *Clitellum*: annular with clear segments, ½ 13-16; *Male pores*: combined male pore and prostatic pores minute quadriprostate on 17/18 and 18/19; *Female pore*: on 14; *Spermathecal pores*: 2 pairs on 7 and 8 and minute; *Spermathecae*: polydiverticulate**,** 2 pairs each with a circle of 15-22 glove shaped diverticula, each diverticula with 6-12 digitiform seminal chambers; *Testes* and *male funnels* in 10 and 11, enclosed in unpaired sacs, formed by the peripheral union of the septa 9/10/11/12; *Genital markings*: indistinct; *Caecae*: 4 pairs, dorsolateral in 25; *Typhlosole*: located on 22-24 to 84-86.

Habitat: Agricultural -banana plantations, and residential habitats-garden leaf litter.

Distribution: *Mangalore*- Konaje, *Bantwal* - Kanathadaka. Kanyana. Reported only from andi hills, in Karnataka and Yercaud, in Tamil Nadu , South India [17];[59]).

Recorded months: June – October .

Hoplochaetella kempi Stephenson, 1917.

Hoplochaetella kempi Stephenson, 1917; *Erythraeodrilus kempi* Stephenson, 1923*; Hoplochaetella kempi* Gates, 1940; Chapman, 1940.

Diagnosis: *Length*: 75-200 mm; *Width*: 5-6 mm; *Segments*: 98-120; *Colour*: dorsal dark red; *Prostomium*: open epilobous, tongue open; *Setae*: Perichetine numerous (39-79); *Clitellum*: annular type in 13-16; *Male pores*: combined male pore and prostatic pores minute quadriprostate on 17/18 and 18/19; *Female pores*: on 14; *Spermathecal pores*: minute, 2 pairs on 8; *Spermathecae*: 2 pairs each with a circle of 15-20 ventrally directed adherent to the duct, digitiform ental diverticula; *Testes* and *male funnels*: in 10 and 11 enclosed in unpaired sacs; *Vasa deferentia*: enlarged into ejaculatory ducts. *Genital markings* : oval unpaired with out central aperture lateral to male pore lines; *Caecae*: absent.; *Typhlosole:* in 22/24 to 75/99.

Habitat: Forest-leaf litter, agricultural -banana plantation and residential habitats- garden leaf litter.

Distribution: *Mangalore*-Moodabidri.; *Belthangadi*-Ujire, Bangadi, Kakkinje, Laila, Madantyar, Guruvayana kere, Punjalakatte, Ballamanja. Reported earlier from Talewadi, Moodabidri, Karnataka, India [17].

Recorded months: July to October.

Hoplochaetella Karnatakensis Julka, 1983.

Hoplochaetella karnatakensis Julka, 1983

Diagnosis: *Length*: 70-80 mm; *Width*: 3-4mm; *Segments*: 99- 103; *Colour*: dorsal dark brown, ventral pale; *Prostomium*: open epilobous; *Setae* : perichaetine, numourous; *Clitellum*: annular, ½ 13-½ 16; *Male pores*: combined male pores and prostatic pores minute quadriprostate on 17/18 and 18/19 at centre of depressed oval porophores; *Female pores*: on 14; *Spermathecal pores*: minute, 2 pairs on 8 and 9; *Spermathecae*: 2 pairs each with a circle of 15-20 ventrally directed adherent to the duct, digitiform diverticula; *Testes* and *male funnels*: in 10 and 11, enclosed in unpaired sacs; *Seminal vesicles*: in 9,10 and

12, *Vasa deferentia*: enlarged into ejaculatory ducts; *Genital markings* : single without central aperture on 19; *Caecae*: absent; *Typhlosole* : 13-85.

Habitat: Residential habitats-areca plant pit.

Distribution: *Mangalore*- Konaje; *Bantwal*- Alike, Bairikakatte. Reported earlier from Kemmengundi, in Karnataka, India [17]. Endemic to India.

Recorded months : July to October.

***Konkadrilus bahli* (**Soota and Julka, 1972).

Konkadrilus bahli (Soota and Julka, 1972).

Diagnosis: *Length*: 110-140 mm; *Width*: 3mm; *Segments*: 240-260; *Colour*: pinkish orange; *Prostomium*: closed epilobic; *Setae*: lumbricine, 8 per segment; *Clitellum*: annular, ½13-17; *Male pore*: minute , on 18; *Seminal grooves* : median slightly concave between setal arcs of 17 and 19; *Female pores*: paired on 14, anteromedian to a line; *Spermathecal pores*: large, transverse slit in 7/8/9 at ab line; *Genital markings*: oval, paired on 17-19; *Spermathecae*: shortly stalked, spheroidal, ental diverticulum, duct longer than ampulla. *Genital markings*: oval, paired in 15/16/17, 19/20-23/24 at aa line; *Testes* and *male funnels*: in 10 and 11; Caecae: absent; *Typhlosole*: in 20-21 to 75.

Habitat: Agricultural - paddy field , near edges of river and residential habitats-banana plant pit.

Distribution: *Mangalore*-Mulki , Moodabidri . Reported earlier from Karnataka and Goa [17].

Recorded months: July to October.

***Konkadrilus stephensoni* (**Soota and Julka, 1972).

Konkadrilus stephensoni Soota and Julka, 1972; *Howascolex stephensoni* Soota and Julka, 1972.

Diagnosis: *Length*: 90mm; *Width*: 3mm; *Segments*: !40-156; *Colour*: pinkish orange; *Prostomium*: closed epilobic; *Setae*: lumbricine, 8 per segment; *Clitellum*: annular, ½ 13-16; *Male pore*: minute, median on 18; *Female pores***:** paired on 14 anteromedian; *Spermathecal pores*: minute, transverse slit on 8-9 or intersegmental in 7/8/9, at b line; *Spermathecae*: shortly stalked, spheroidal, ental diverticulum, duct longer than ampulla; *Testes* and *male funnels*: in 10 and 11; *Genital markings*: oval, paired.17-19; *Caeca*: absent; *Typhlosole*: 22-21 to 71-96.

Habitat: Agricultural -cashew plantation and residential habitats- manure heap.

Distribution: *Bantwa*l- Katukukke, Adyanadka. Reported earlier from Karnataka and Goa [17].

Recorded months: June – October.

***Dichogaster* (*Diplothecodrillus*) *affinis* (**Michelson, 1890).

Dichogaster affinis Michaelsen, 1890; *Benhamia affinis* Michelesen , 1890; *Benhamia mexicana* Rosa, 1891; *Benhamia floresiana* Horst, 1893; *Dichogaster affinis* Michelesen, 1900; Stephenson , 1917, 1923, 1931b; Gates, 1942, 1958, 1961,1972; Easton 1984; Talavera, 1992: Hendrix and Bohlen 2002; *Dichogaster sinuosus* Stephenson , 1931a, 1931b; *D. sinicus* Chen, 1938. (= *Dichogaster sinensis* Chen, 1938).

Diagnosis: *Length*: 84 mm; *Width*: 2.5-3mm; *Segments*: 110- 150; *Colour:* pigmentless but anterior appears pinkish red; *Prostomium*: closed epilobus, v shaped notch; *Setae*: lumbricine, 8 per segment, small closely paired on ventrum; *Clitellum*: saddle-shaped, on13-21; *Male pores*: in tumid seminal grooves on 18 which are on vertically from raised prostatic porophores on 17 and 19; *Female pores*: paired just anterior to setae in raised pad on 14 which reaches to 13/14-14/15; *Testes* and *male funnels* : unpaired sacs in 10 and 11; *Seminal vesicle*s: reduced in 11 and 12; *Spermathecal pores*: two pairs in 7/8 and 8/9, medio-ventral, in line with setae on ab. *Spermathecae*: two pairs, small each with wide duct bearing mid length on anterior wall, a shot –stalked bulbous iridescent diverticula and terminating in a spherical or deformed yellowish ampulla; *Prostates*: 2 pairs in 17 and 18; *Genital markings*: not seen; *Caecae* : absent ; *Typhlosole* : in 21 to 68.

Habitat: Agricultural -arecanut plantation, coconut plantation , near edges of small streams and residential habitats-banana plant pit.

Distribution: *Mangalore*- Surathkal, Moodabidri. Reported earlier from Myanmar [62], [76]; Karnataka, Arunachala Pradesh, Kerala, in India, Sri Lanka, Myanmar, Thailand [17], Australia [40], Florida [77], Guadeloupe [78], Tamil Nadu [24], Taiwan [70], Mexico [9], Nicaragua [79].

Recorded months: June – October .

Mallehulla indica (Julka and Rao, 1982)(Fig.3).

Mallehulla indica Julka and Rao, 1982 .

Diagnosis: *Length*: 50-130 mm; *Width*: 2. 5- 4 mm; *Segments*: 100-112; *Colour*: dorsal brown colour, ventral pale; *Prostomium*: closed epilobous; *Setae*: perichaetine, numerous ; *Clitellum*: annular , ½ 13-½ 16; *Male pores*: paired in seminal grooves on 18 prostatic pores paired on 18-19; *Seminal grooves* : slightly concave between setal arces of 17-19; *Female pore*: single median on 14; *Spermathecal pores*: paired, small transverse slits in 7/8/9; *Spermathecae*: in 8 and 9, with a small ental diverticulum; *Testes* and *male funnel* : in unpaired ventral sacs in 9 and 12, 4 pairs of penial setae are clearly visible and ornamented; *Genital markings*: absent; *Prostate* : paired in 17 and 19; *Caecae*: absent; *Typhlosole*: in 27-30 to 44-54.

Habitat: Forest- leaf litter, agricultural-cashew plantation, and residential habitats- garden leaf litter .

Distribution**:** *Bantwal*- Katukukke, Adyanadka. Reported earlier from Maharashtra, India [17].

Remarks : Type locality. Recorded from Moodbidri, Tirtahalli, Kotegehar, Udupi and Venoor , Mercara in Karnataka [37].

Recorded months : June – November .

VI. REPRESENTATIVE EARTHWORM SPECIES

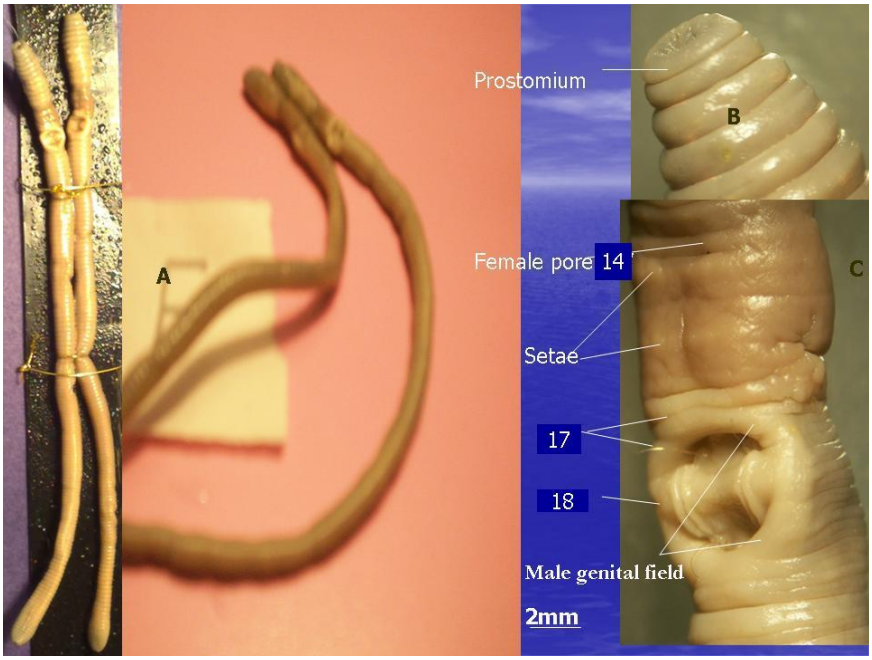

Fig.2. *Octochaetona paliensis*: A. External morphology B. Preclitellar region C. Clitellum and male female genital fields.

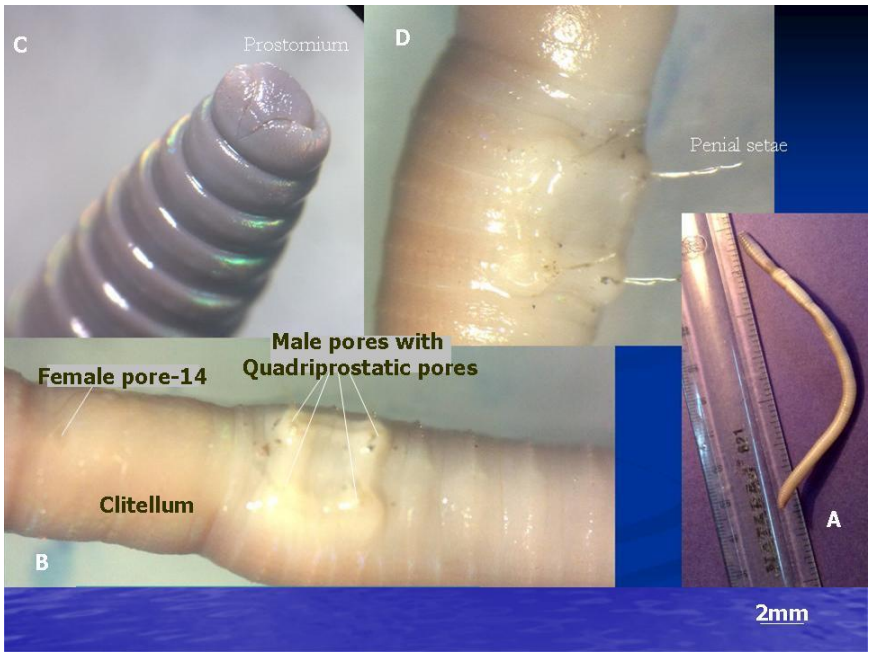

Fig. 3. *Mallehulla indica*: A.External morphology B. Preclitellar region C. Clitellum and male genital field with female pore. D. Penial setae.

ACKNOWLEDGEMENTS

The authors wish to thank the Chairman, Department of Applied Zoology, Mangalore University for the facility and the Chairman, Sri Sathya Sai Loka P.U. College, Alike, Bantwal Taluk, Dakshina Kannada District. Karnataka state. India

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The Emergence and Impending of Digital Design in Architecture

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Abstract- The paper introduces and discusses current developments in architectural discourse, design theory, digital design models, techniques and their relations to design pedagogy. The evolution of design knowledge in architectural theory and praxis is explicated and its implications for required changes in design education are presented. The theoretical influence of architectural concepts is presented through historical references in digital architecture. This structure of design concepts is proposed as a medium of design education. An experimental design studio on: 'Design as research: the exploration of digital architectural concepts' is presented as a pedagogical framework for educating the digital architect and a series of research and design programs carried out in an experimental design studio demonstrates this framework. Digital architectures are profoundly changing the processes of design and construction. By integrating design, analysis, manufacture and assembly of buildings around digital technologies, architects, engineers, and builders have the opportunity to reinvent the role of a "master-builder" and reintegrate the currently separate disciplines of architecture, engineering and construction into a relatively seamless digital collaborative enterprise, thus bridging "the gap between designing and producing that opened up when designers began to make drawings.

Index Terms- digital architecture, digital design theory, digital design media, digital design knowledge, education and pedagogy

I. INTRODUCTION

Regardless of what might be the particular formal vocabulary, syntactical and formal knowledge is strongly accepted as a foundation of design pedagogy in architecture. Beyond the exploitation of digital media as tools, the relation between digital design and digital design models as a form of architectural knowledge has begun to emerge as a significant ideational resource for design and design education. Theoreticians have attempted to define paradigmatic approaches in architecture based on the ideational impact of digital technology. As a result of the growth of a new knowledge base beyond the skill set of the digital designer, architecture as a design discipline has become rich in ideas, changing and a unique body of conceptual content. A recent research reported on the cultural process of the emergence, migration, and crystallization of new conceptual structure over the past decade under the influence of digital design demonstrating how concepts whose theoretical source is digital design are beginning to occupy a central role in current architectural language and discourse. The explication and ideation of this conceptual content of digital design is another import agenda for digital design education in architecture. Certain of these concepts are in direct contradiction with formalist approaches of syntactical and formal knowledge. The search for new educational frameworks is due to the pedagogically unique impacts of digital design. Various researchers and educators have begun to address the need to integrate digital design in architectural design education investigating various forms of pedagogical agenda. Design computation and digital design had an influence on the development of theoretical; computational and cognitive approaches by various researchers as a foundation for design education and pedagogy.

Following this basic assumption that change in the professional culture of architecture is substantive in that it transcends stylistic agenda, it has now become important to re-consider certain of the existing theories of design and education. Concepts such as design thinking have in the recent past been part of a powerful cognitive model of design. The term designerly ways of knowing is particularly significant, since it also introduces the notion of knowledge in design and what this might imply with respect to new approaches of digital design education.

II. REPRESENTATION

A suitable working definition of what a representation is and what it does can be derived from Ref. w6x. According to this definition, a representation is a formal system for making explicit certain entities in a transparent manner, i.e., together with an explanation of how the explicitness is achieved. The product of a representation, as applied to a specific entity, is a description. Familiar examples of representations include Roman and Arabic numerals _decimal or binary.. Fig. 1 contains alternative descriptions of the number 17 produced by different representations. In each of these representations, a number is described on the basis of a finite set of symbols and a rule systems for composing a description from the symbols. Arabic decimal numerals use the following set:

S s_0,1,2,3,4,5,6,7,8,94 . These symbols are correlated to a number in the following manner of positional notation: *n) 10nqn) 10ny1q. . .qn) 101 n n*y1 1 q*n) 100´n, n . . . n n* . 0 *n n*y1 1 0

For example:
1)101q7)100´17.

Arabic binary numerals make use of a smaller set of symbols and corresponding decomposition rules:

S s_0, 14, B *n) 2nqn) 2ny1q*. . .q*n*)21 *n n*y1 1 q*n*)20´*n* ,*n* . . . *n n* . 0 *n n*y1 1 0

For example:
1)24q0)23q0)22q0)21q1)20s10, 001.

Architectural representations are essentially similar in structure. They consist of symbols for spaces andror building elements, relations between the symbols and correspondence rules for mapping the symbols and their relationships to the subject of the representation. Fig. 2 depicts the symbols of a basic set of building elements. The set is sufficient for

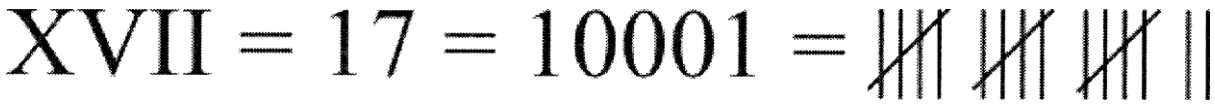

Fig. 1. Alternative representations of a number.

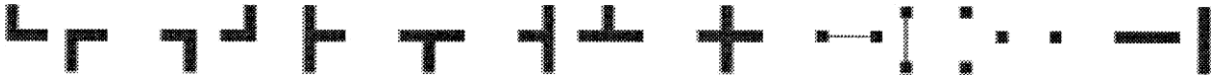

Fig. 2. A basic set of symbols for floor plans.

describing orthogonal floor plans, such as the one in Fig. 3, as two-dimensional arrays comprising generic building elements w5x. The choice of symbols relates to the constraints of the symbolized entities. These constraints are, in turn, reproduced in the representation. In the example of Figs. 2 and 3, there are specific expectations concerning the type of linked wall corners and junctions _the first nine symbols in Fig. 2. These expectations can be used to evaluate and control the syntactic correctness and integrity of a description. They can also be used to recognize the spaces in a floor plan w5, 7,8x. Computational representations of architectural designs generally concentrate on these two types of symbols, building elements and spaces, i.e., the 'solids' and 'voids' of architectural composition. Most generative systems concentrate initially on the relative arrangement of spaces and subsequently on the positioning of building elements which bound the spaces w9, 10x. Other systems have focused on the coordination of the resulting dual network of building elements and spaces w11, 12x.

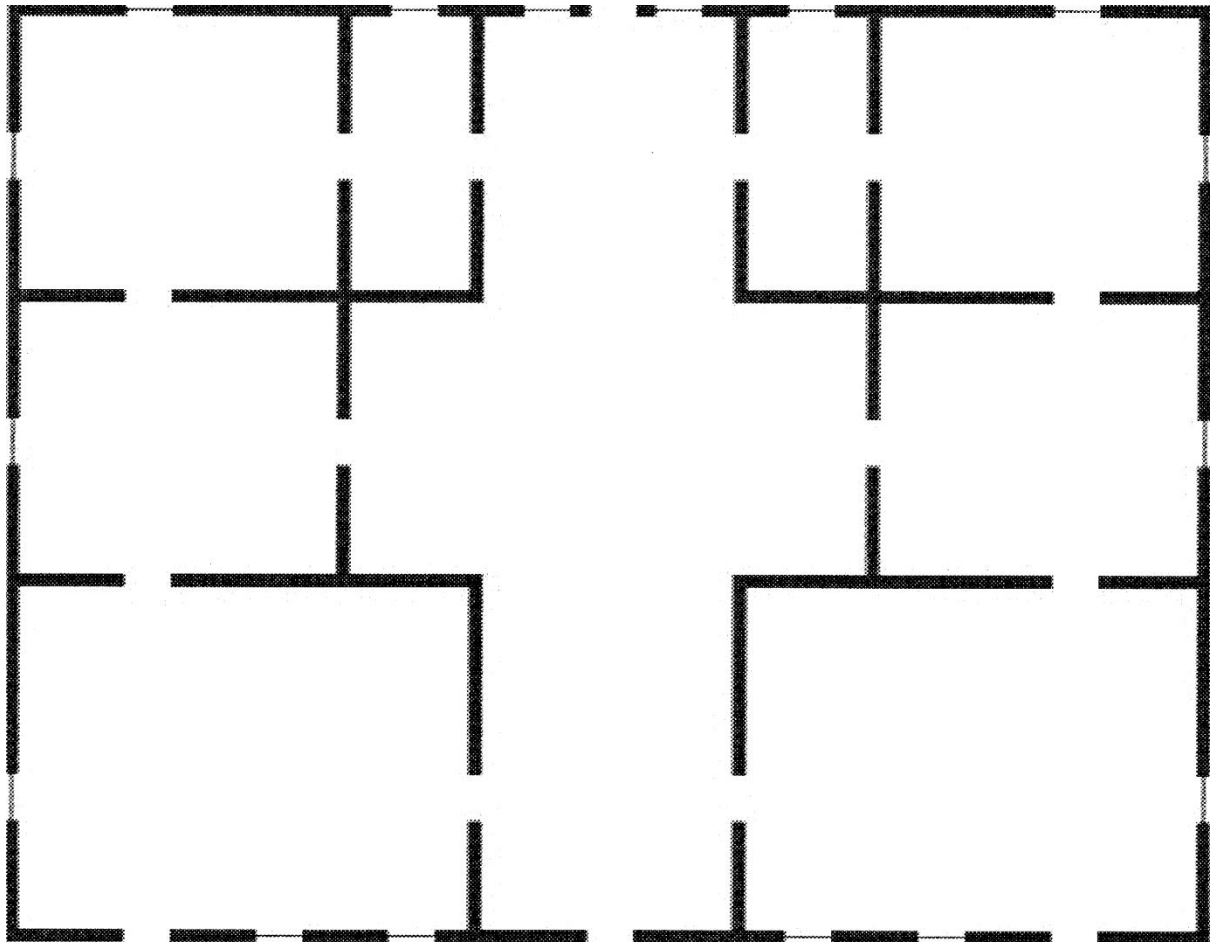

Fig. 3. Floor plan created with the symbols of Fig. 2.

III. DEVELOPMENTS IN DIGITAL DESIGN

One of the toughest exercises in design computing is predicting future developments. The race for more computational power, the availability of increasingly more worthwhile computer programs and improvements in operating systems are just a few of the factors which make the projection of current technical aspects rather futile. To a lesser degree, this also applies to approaches and methods, especially those aspects that are inescapably constrained by technical opportunity, such as human–computer interaction.

All that remains is fundamental issues that should guide technological development.

Probably the most significant fundamental issue for architectural visualization is representation. Current visualization problems are posing a wide spectrum of questions concerning our representational assumptions. Rather than adapting design representations to the requirements of these problems, we should attempt to arrive at a unifying theory of representation capable of dealing with such problems in a systematic, consistent manner. The main objective of this theory should be other than the current goal of increasingly higher levels of photorealism: the inclusion of modelling and analytical facilities that support and enhance the architect's intuitive creativity without prescriptive or proscriptive restrictions.

IV. EXPLORATION OF DIGITAL MODELS, METHODS AND DESIGN CONCEPTS

The digital design studio is experimental in the sense that it encourages research-oriented study. This is treated as a bottom-up process, one can explore processes that can organize a set of ideas and rules that can than modify the process by selecting alternative methods and techniques of exploration. Each of the following projects was developed by exploiting digital models and techniques that suited the theoretical and conceptual content of the project. In each a conceptualization of 'digital material' and a unique digital model or digital technique appropriate to the material concept was employed.

The didactic process consists of the following four basic steps: -

Conceptualize and define a specific type of 'digital material'. Digital material can be defined as an organizational structure, or pattern, of a certain material.

- Define a specific digital design model related to formation, generation, or performance, or relationships of such models.
- Select a context that can best demonstrate the behaviour and applicability of the 'design material' in relation to principles related to formation, generation or performance.
- Develop and present a taxonomy (related to digital architecture) that can be used to describe the digital architectural design thinking processes.

All work is in the form of multiple short exercises which are finally produced by each student as a research report including the conceptual vocabulary.

These experimental projects explore the intersections between methodologies techniques, representational modes, etc. underlying the integration between digital media and the conceptual. They also explore resulting new geometries related to particular forms such as topological surfaces and responsive network structures that are related to the given materials.

V. CONTINOUSLY EVLOVING TOPOLOGICAL VOCABULARIES

The following research explored the concept of hyper continuity as an expression, a linear evolving topological vocabulary of form. It accommodates the complexity of topology and attempts to apply topology that maintains the same relations along a linear development. The application involves the study of such design methods and techniques in order to develop a national boundary. In this case, the boundary is conceived of a continuous set of diverse functional spaces for collaborative activities of the neighbouring countries. Changing requirements along the boundary create a constantly changing condition of context and program along the otherwise continuous design of the boundary. Acting together, both performance-based technique and the definition of programmatic parameters produced a concept: a 'functional boundary', that is, hypercontinuity of surfaces and volumes, and heterogeneity. This approach relates to the generic problem of complex program and changing conditions. Heterogeneity has replaced the instantiation of a particular standardized, modular structure as is currently routinely applied irrespective of complex changes of program and conditions.

VI. A MOBIUS MODEL OF CONTINUITY

In comparison to the digital model of topological geometry studied in the first research, the following design project explored a topology of the Mobius Ring; named after August Fernando Mobius (1790e1868). It is characterized as an infinite spatial topology; without definition of inside and outside. In this project these characteristics are employed in order to create a blurring of the conditions of inside and outside, horizontal and vertical employed as an architectural space. These studies were then utilized to be explored in an architectural project.

VII. GENERATIVE DESIGN BASED ON MORPHOLOGICAL PRINCIPLES

The conceptualization here is based on a study and analysis of the morphological principles of woven textiles. This woven material created an indeterminate range of heterogeneous folded profiles that were versions of folding and weaving principles. The formation principles of the woven materials were exploited to generate the structure. These profiles evolved to enable spatial, structural and environmental envelope functions within the woven matrix.

The design transformations are defined by a set of syntactic rules related to morphological principles. The diverse matrices were transformed with respect to their solar protective (sun-shading) potential.

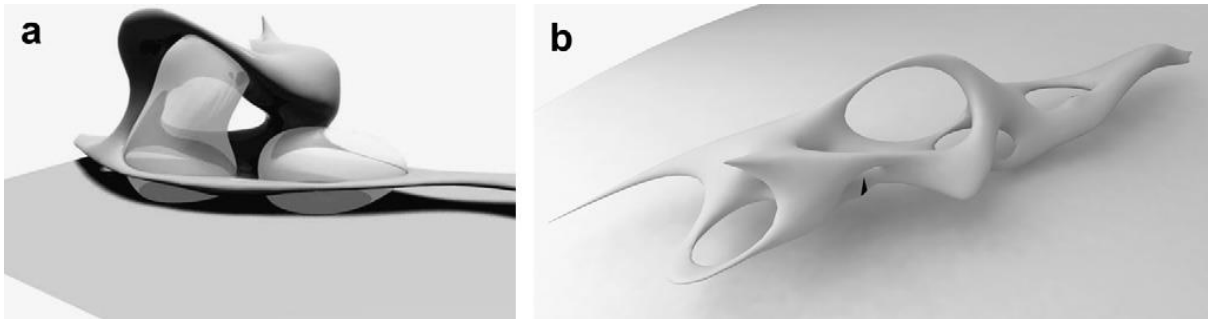

Figure 4. Topological design of a continuously evolving boundary

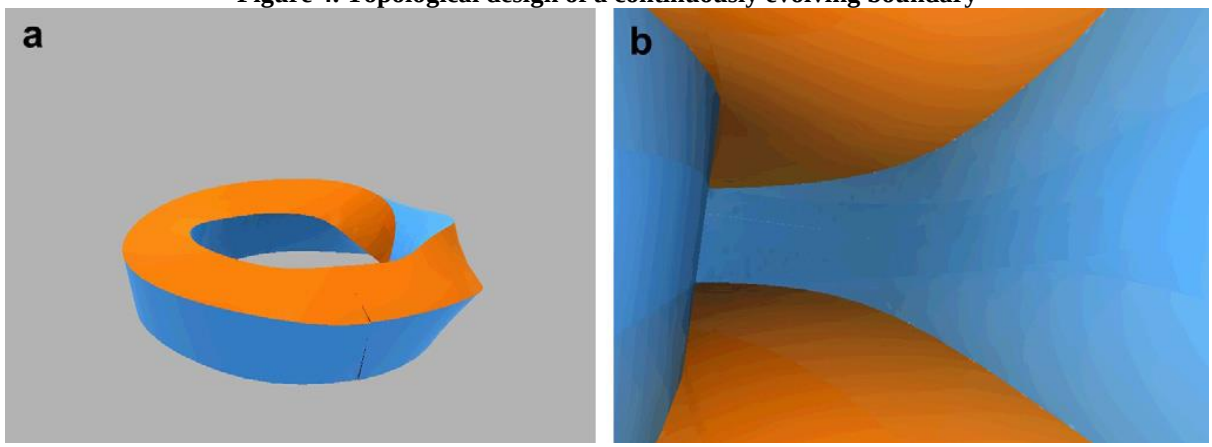

Figure 5. Spatial explorations of Mobius-based digital models

VIII. DIGITAL ARCHITECTURE AND THE CHALLENGE OF A NEW PEDAGOGY

As a result of these experiences we have encountered new orientations to the explication of the judgmental aspects of design as per formative and generative factors. The student has become adept at juggling the multiple forms of data and images that are represented in digital design environments. Far beyond Scho¨ n's characterization of visual reasoning as a 'dialogue with the materials of the problem' and 'backtalk' from visual images, the digital and compound processes of formation, generation and performance of 'digital material' creates a completely novel view of design that may even justify the uniqueness of the term, digital design thinking.

Architectural thinking has been presented as non-typological and nondeterministic in supporting and preferring the differentiated over the generic and the typological. We have explored new forms and relationships between the designer, process and information establishing new approaches to design. Integration of techniques, such as parametric formation, etc. has provided novel venues for design exploration. These models have demonstrated the growing impact of digital design media as a mediator between content and skill. With respect to certain of the root concepts of conventional design theories, the implications of these transformations of traditional didactic principles, as we believe, have demonstrated significant implications for the field of architecture and design education.

Root concepts in design theory such as representation, typologies, and other principles of the visual literacy school of design pedagogy are transformed. Instead concepts such as morphogenesis, generative and performance-based design, materialization and production are introduced. A schema of four paradigmatic models presents an interpretation of digital design in which the methodological characteristics of these paradigms have been formulated relative to theoretical concepts of design and design thinking. These models include formation, generation, performance, and performance-based generation. These four processes become the underlying logic of digital architectural design in which digital models can be applied to architectural content and design tasks.

IX. CONCLUSION

As digital design media become more multifaceted and more demanding with respect to knowledge of many types of software, knowledge of scripting languages, and the management and maintenance of complex data models, there will be a need to educate a new generation of digital design experts. The thought of the designer as digital tool-maker reflects both the potential for modifying digital design media as it does the necessity for specialist knowledge needed to operate such media. So presently the idea of a class of 'digerati', or digital literati as advanced digital systems designers appears to be an accurate description of the contemporary situation.

Beyond any doubt digital design appears to be a mainstream marvel, and the theory of digital design appears to be one of the most active and significant subjects of theoretical discourse today. Our approach to fitting the digital and the theoretical has dealt with the problem of any new instruction: beginning with a new classification for digital architectural theory. This has occurred in order to create the theoretical foundations of new

processes of design that, in turn, are transforming our accepted traditional models and logic of design.

Together with the accompanying technological and media developments, the foundations of architectural education appear to be in need of a make-over from the bottom-up.

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Quantitative EEG Analysis Technique for Computerized Digital Brain Signals

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Abstract- Quantitative EEG (QEEG) analysis techniques can provide additional measurements or displays of digital EEG signals. Several QEEG techniques commonly called EEG Brain Mapping include topographic displays of voltage or frequency. Many technical and clinical problems interfere with simple clinical application. Traditional EEG artifacts can appear in unusual and surprising ways, and new artifacts can be caused by the data processing algorithms. A brain map based on EEG signals shows the potential distribution over the entire scalp. Abnormal activity such as epileptic form spikes or sharp waves may be overlooked, considered arte factual or misinterpreted. The computer may score as abnormal some EEG activity known to have no clinical importance. Interpolation is a mathematical technique workings with these large arrays of number are used to do filtering, frequency and amplitude analysis and color mapping. This approach is called quantitative EEG, because it's different from the traditional approach, which doesn't make any measurements on the tracings; instead, it relies on qualitative assessment or overall appearance of the patterns of waves. A brain map is a picture over the entire scalp so that the potentials around the electrodes need to be calculated. The interpolation should calculate as accurate as possible. This means, that the value calculated by the interpolation should match the real value as good as possible.

Index Terms: EEG Signals, Brain mapping samples, Electro diagnostic instruments, Interpolation techniques, etc.

I. INTRODUCTION

QEEG is the mathematical processing of digitally recorded EEG in order to highlight specific waveform components that transform the EEG into a format or domain that indicate relevant information or associate numerical results with the EEG data for subsequent review or comparison. Signal analysis is the quantitative measurement of specific EEG properties or transformations of the raw, digitally recorded EEG signal into numerical parameters other than the traditional amplitude versus time. Source analysis is a form of mathematical analysis in which the recorded EEG values are analyzed. Frequency analysis converts the original EEG data into a representation of its frequency content. The magnitude corresponds to the amount of energy that the original EEG possesses at each frequency. Topographic EEG displays can present visually a spatial representation of raw EEG data. The parameter under study is mapped onto a stylized picture of the head or the brain. In order to use the superior power and flexibility of the computer to store and to analyze the EEG signals, analog-digital converter is needed. Essentially, it is an electronic device that takes a continuously variable wave and transforms it to a list of binary numbers (each binary number being a measurement of the wave's amplitude at regular time intervals. These measurements are called samples, so the whole process is also named sampling). Sampling is performed at a high speed (100 to 200 times per second), and the resulting binary numbers are stored onto the computer's disk. Each channel of EEG has its own separate DAC process, in parallel with the others, and this proceeds in real time. Once all the numbers which were recorded along a period of time are inside the computer, special software programs are used to display the waves in the video screen, print it out, etc.

II. APPROACH AND METHODS

The future of quantitative EEG for clinical applications lies, undoubtedly, in the coupling of digital methods of signal analysis and of image processing. EEG Brain map can be used for a more accurate way of source localization. To properly calculate the location of the source, the brain map should be accurate as possible. Although a brain map, based on measurements are done, only few electrodes are placed and a large part of the brain map is reconstructed from the measured values.

To reconstruct the values between the electrodes, use is made of interpolation techniques. These are mathematical techniques to calculate the most possible value between the electrodes based on the value on the electrodes and distance of these electrodes.

Interpolation technique

Interpolation is a mathematical technique to recreate data on points where no measurement has been done, based on the measurement that has been done in the places of surrounding them. Using a mathematical formula, the value on a specific space is calculated as a function of the surrounding measured values and the distance of these measurements are shown in Figure 1. The interpolation is used in brain mapping because there is only a limited number of electrodes where the measurements take place. A brain map is a picture over the entire scalp so that the potentials around the electrodes need to be calculated. The interpolation

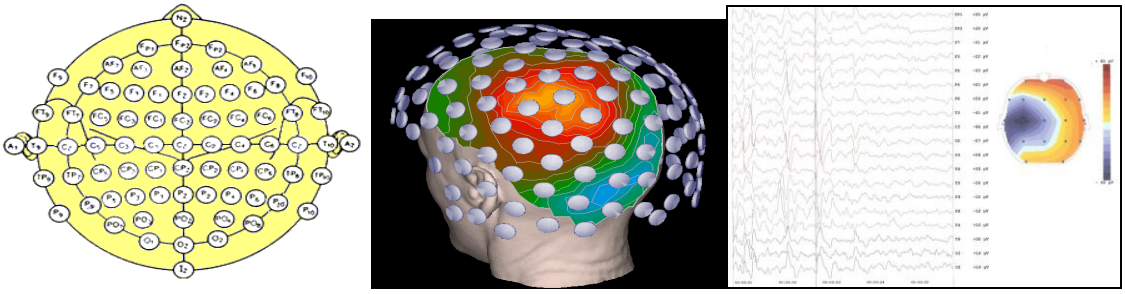

Figure 1.Electrode placement and normal EEG Brain mapping waveforms

should calculate as accurate as possible. This means, that the value calculated by the interpolation should match the real value as good as possible. Since the potential distribution over the scalp is smooth, the interpolation should give smooth results as well. The potentials measured on the scalp are generated by the brain. This generation can be modeled as the generation of an electrical field by several dipoles. To determine the direction and place of the dipoles accurately, the maxima and minima in the picture should be positioned as exactly as possible.

K nearest Neighbors interpolation

The K-Nearest Neighbors interpolation is based on the measurements closest to the point where the values should be calculated. The K is replaced with the number of nearest measurements used. If it is based on the three measurements, it is called 3 nearest neighbor's interpolation. The interpolation formula is given in equation 1.

$$v(P) = \frac{\sum_{i=0}^{k} v(P_i) d_i^{1-m}}{\sum_{i=0}^{k} d_i^{1-m}} \quad (1)$$

The K is the number of nearest neighbours, **v(p)** is the result of the interpolation with p the place where the interpolation takes place. **V(pi)** is the potential of the electrode with **pi** the place of the electrode and **di** is the distance between p and pi. The order of the interpolation is determined by 'm' and is usually 2 or 3. A higher order will cause a smoother interpolation. For brain maps, the interpolation takes place for each pixel in the area of the scalp projection. To demonstrate the effect of the order of the interpolation a simple situation is chosen with k=2. For this example of the interpolation of 2 instead of 3 dimensional, the principle will stay the same. The horizontal axis shows the place and the vertical axis potential.

As can be seen in Figure 2, the nearest neighbor interpolation has some characteristics that are specific for this type of interpolation. The first thing that can be seen that extra interpolation (calculation not between other values but outside the measurement) with this method is impossible. Every point at the edge of the area still has K nearest neighbour, but they are all on one side of the point where the interpolation takes place. Second, the middle line is straight. When the 2 middle potentials are higher than the outside potentials, it is logical to expect the highest value somewhere between the middle electrodes. Would this have been a 3-nn interpolation, the middle line would have been bent downward, because one of the outside electrodes is included in the calculation, instead of upward what is expected from the potential on the electrodes. In Figure 2, this characteristics is closely connected to another one, namely that the global extremes will always be on the electrodes. This can easily be proven. It is obvious that one of the electrodes has the highest potential and that the others have a lower value. The interpolated value will always be between the highest and lowest value of the nearest neighbors and thus the highest value will be on the electrode. If for one point in the interpolation all the nearest neighbors have the same potential and this is the highest potential, the interpolation will also have the same potential. It will never be higher. The same holds for the lowest value. Increasing the numbers of neighbors (K) in the calculation will result in a smoother picture at the cost of detail. When not all electrodes are taken into account (that is, measurements with 20 electrodes and K<20), there is also the problem of the discontinuities. In Figure 2, Pixel a, b and c are another because that is nearer.

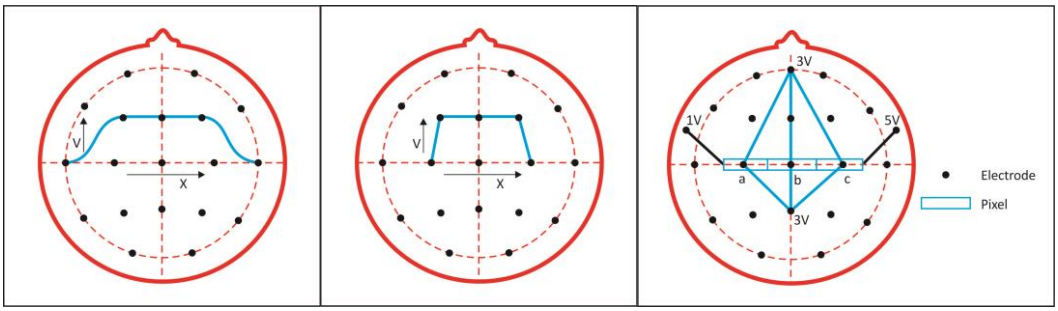

Figure 2 Interpolation methods

Image projection with brain mapping

The result of the measurement and interpolation is an image in which, one way or another, image and color image. The colors are that human psychology interprets colors in different ways and is easily mislead by them and that the small amount of colors will result in re-use of colors. The higher the value, the lighter the grey and lower the value the darker the grey. The most important reason to choose colors instead of grey scale images, because they are not very clear when only grey is used. In a color image the extreme are better visible.

III. EXPERIMENTAL METHODS

EEG is a measurement of the electrical activity of the brain and recorded with the use of electrodes that are placed on the scalp as shown in Figure (4.8). To get a better idea of the source of the signals, a brain map is made. This is a visualization of the measurements of the source of the signals, a brain map is made. This is a visualization of the measurements and shows the distribution of the measured values over the scalp. The images give an idea of the active and less active regions of the brain. A brain map can also be used for accurate way of source localization. The active area in a brain can be modeled as a dipole. A dipole causes an electrical field and the projection of this electrical field on the scalp can be measured. This electrical field is for other source of the signals that are measured with the EEG recording. To properly calculate the location of the source, the brain map should be as accurate as possible. Although a brain map is based on measurements, only at few places the electrodes are placed and a larger part of the brain map is reconstructed from the measured values. Brain mapping is a way to visualize brain activity as shown in Figure 3. For this measurement, two or more electrodes are placed on the scalp, and they measure the potential between these locations. The size of these signals are very small (micro volt) and the signals look like noise. In Figure 3, the QEEG recordings are not written down the paper, but the measurement is immediately digitized and stored on a digital medium. This not only improves the accuracy but more important in this case, it makes it very easy to prepare the measurement ways of analysis Figure 3.

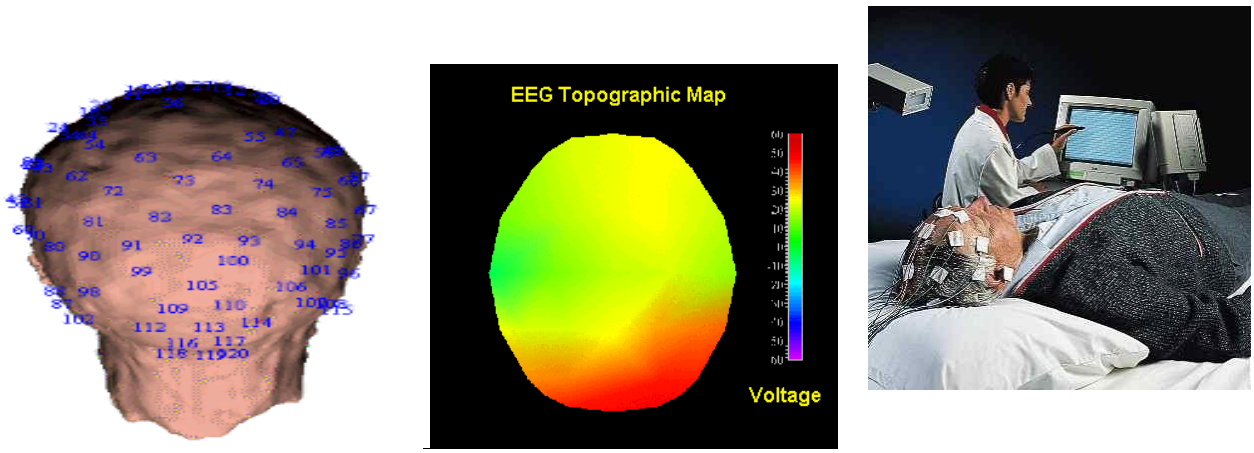

Figure 3 EEG recording and topographic map

It is clear, that a, measurement with electrode is local. This means that the only values that are known are those at the position of the electrodes. The logical way to improve resolution (the spatial accuracy of the measurement) is to increase the number of electrodes. Another method to improve the resolution is interpolation. This method tries to reconstruct the values between the electrodes based on some mathematical calculation. This is possible because of the smearing effect. It should be noted, that interpolation is never been able to reconstruct the real situation other than by coincidence. It is not able to create data and it can only guess at the real value at a given position. Therefore the most important thing to do should be to use as much electrodes as is practically possible, and which are placed in a way that allows optimal recalculation of the values at the places where no measurement take place. For this, the electrode should be placed in a way that the distance between they are almost equal. The international standard for the electrode position is called 10-20 system and uses 19 electrodes.

For this system, the head is regarded as a sphere. It is possible to place extra electrodes or to have the electrodes on the position other than those described in the 10-20 system. Electrodes that are at slightly other positions than described (it is not always possible to place an electrode at a specified place) are marked with ‘a’ for ‘1’ and with’ a’ for ‘2’ cm that can be the distance to the position they should have been placed according the 10-20 system. The accuracy of the brain map is determined by the accuracy of the interpolation technique used. To measure the accuracy of the interpolation, the interpolated value and real value should be known. A way to accomplish this is by interpolating on the place of an electrode, since the potential at that place is known. The interpolation takes place without the value measured at the place of the electrode.

Statistical accuracy measurement with variance

To determine the accuracy of the interpolation, the variance is calculated with the following formula

$$var(x) = \frac{1}{n}\sum_{t=1}^{n}(X(t) - \bar{X}(t))^2 \qquad (2)$$

To calculate the variance for an interpolation, where the difference between the measured value and the interpolated value is relevant, the formula is modified as follows. The average is replaced with the measurement, and the data is replaced with the interpolated value.

$$var(v) = \frac{1}{n}\sum_{t=1}^{n}(v_i'(t) - v_i(t))^2 \quad (3)$$

This type of statistical analysis can give an indication of the expected error. For this standard deviation has to be calculated by taking the square root of the variance.

$$SD(v) = \sqrt{var(v)} \quad (4)$$

The interpolated values will be with 99 % confidence within the interval.

Vi-2.326.SD (v) <v'i<vi+2.326.SD (v) (5)

There is now a fairly accurate estimation of the maximum deviation of the interpolated value in respect to the real value. This, however, is only based on values of specific recording. A simple measurement of two different recordings is used; sample-1 and sample-2.These two measurements are done with the same electrode positions. For reference also the sum of the squared measurements in a recording are also in the table

Table 1 Measurements of two different recording with same electrode positions

Recording	Sample-1	Sample-1	Sample-2	Sample-2
Electrode	Variance	∑(v)2	Variance	∑(v)2
F4	0.372	308.10	0.482	197.10
T3	1.94	2.89	3.74	1.70
02	0.586	216.10	0.586	1.20

Variance and summed squared values of two data files

It can be seen that the accuracy measurements depend on the recordings. Especially the difference of the ratio's between variance and summed squared values is striking. Although sample-1 has a lower variance, the sum of the squared values is higher, so relatively the variance is even lower. Another problem with this type of quality control is that there is no indication on the error that is error. It is impossible to see if all errors are made in one direction, for example if all interpolated values are to low. So calculation of the variance can be used to measure the quality of the interpolation but it can only be used for the same data set. This results in the conclusion that this method is usable for comparison purpose between different interpolation techniques, but isn't suited for detailed research on the errors that are made with the interpolation.

IV. CONCLUSION

The brain maps are calculated from a limited amount of data because the only measurements that are recorded are at the place of the electrodes. All the other values on the scalp should be calculated. This requires are interpolation technique. The K nearest neighbor techniques is the one best fitting the requirements a brain map demands. The result of the K nearest neighbor technique is good, but the interpolated values show a structural deviation from the real values. The deviation depends on the set of data that is used. The brain map will be used for purpose of source localization it is important that the maxima and minimize are located in the right locations, and are not restricted to the locations of the electrodes.

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Effect of Palm Oil Fuel Ash (POFA) on Strength Properties of Concrete

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Abstract- The utilization of pozzolanic materials in concrete construction is increasing, and this trend is expected to continue in the years ahead because of technological advancement and the desire for sustainable development. One of the latest additions to this is Palm oil fuel ash (POFA), a waste material obtained from burning of palm oil husk and palm kernel shell as fuel in palm oil mill boilers, which has been identified as a good pozzolanic material. Palm oil fuel ash which contains siliceous compositions produces a stronger and denser concrete. Effective consumption of POFA in concrete, would decrease the cost of concrete production, could reduce negative environmental effect, and also would solve the landfill problem for the disposal of these wastes.

In this study, the effectiveness of agro waste ash by-product namely palm oil fuel ash (POFA) was developed as an alternative material to replace OPC. POFA cement-based concrete is a concrete produced by integrating POFA as a pozzolan in concrete. This paper will discuss the strength properties of POFA concrete in different replacement level and also compares with control mixture. Concrete specimens containing 10%, 20%, 30% and 40% POFA were made at a water-cement ratio of 0.45. Strength properties such as Compressive strength, Flexural Strength and Split Tensile Strength were studied, and compared with that of concrete containing 100% OPC as control. It is revealed that POFA is an excellent pozzolanic material and can be used as an alternative cement replacement in concrete. It is recommended that the optimum replacement level of OPC by POFA is 20% for a good strength in compressive test.

Index Terms- Palm Oil Fuel Ash, Pozzolanic material, Compressive Strength

I. INTRODUCTION

It is known that there are several causes of global warming, including CO_2 from cement. Approximately 5% of total CO_2 emission is released to atmosphere, with about 0.7–1.1 ton of CO_2 being emitted for every ton of cement production. In order to reduce the amount of CO_2 emission, cement manufactures can help by improving production process. For concrete production, the reduction of cement content in concrete can be achieved by utilization of supplementary cementitious materials such as fly ash, blast-furnace slag, natural pozzolans, and biomass ash. Also, the generation of large quantities of industrial by-products every year by chemical and agricultural process industries has created environmental pollution as well as increasing the expenditure of the industry for disposing this waste. As a result, solid waste management has become one of the major environmental concerns in the world. With the increasing awareness about the environment, scarcity of land-fill space and due to its ever increasing cost, waste materials and by-products utilization has become an attractive alternative to disposal. Use of these materials not only helps in getting them utilized in cement, concrete, and other construction materials, it helps in reducing the cost of cement and concrete manufacturing, but also has numerous indirect benefits such as reduction in land-fill cost, saving in energy, and protecting the environment form possible pollution effects. Further, their utilization may improve the microstructure, mechanical properties of concrete, which are difficult to achieve by the use of only ordinary Portland cement.

One of the potential recycle materials from palm oil industry is palm oil fuel ash. Palm oil is extracted from the fruit and copra of the palm oil tree. After the extraction process, waste products such as palm oil fibers, shells, and empty fruit brunches are burnt as biomass fuel to boil water, which generates steam for electricity and the extraction process in palm oil mills. The result is palm oil fuel ash (POFA), which is about 5%, by weight, of solid waste product. The silica oxide content in POFA can react with calcium hydroxide ($Ca(OH)_2$) from the hydration process which is deteriorated to concrete and the pozzolanic reactions produce more calcium silicate hydrate (C-S-H) which is a gel compound as well as reducing the amount of calcium hydroxide. Thus, this contributes to the strength of the concrete thus produce stronger and denser concrete as well as enhanced the durability of the concrete.

II. LITERATURE REVIEW

During recent decades, many researches have been conducted for the use of agro waste ashes. Some of them are summarized below.

Karim et al., (2011) discovered that the concrete produced using a particular level of POFA replacement achieved same or more strength as compared to OPC concrete. No significant strength reduction of concrete is observed up to about 30% replacement of POFA. Awa1 et al., (2011) investigated that high volume palm oil fuel ash concrete, like concrete made with other pozzolanic materials, showed a slower gain in strength at early age. Safiuddin et al., (2010) reviewed that the use of POFA is limited to a partial replacement, ranging from 0-30% by weight of the total cementitious material in the production of concrete. Indeed, the partial replacement has a beneficial effect on the general properties of concrete as well as cost. Sata et al., (2010) investigated that the

strength development of POFA concretes with w/c ratios of 0.50, 0.55, and 0.60 tended to be in the same direction. At early ages, concretes containing POFA as a cement replacement of 10, 20, and 30% had lower strength development than control concretes while at later age 28 days, the replacement at rates of 10 and 20% yielded higher strength development. Mohammed Warid Hussin et al., (2009) studied concrete replaced with POFA with a water to binder ratio of 0.45, were seen to develop strength exceeding the design strength of almost 60MPa at 28-day. Hussin et al., (2008) discovered that inclusion of 20% POFA would produce concrete having highest strength as compared to any other replacement level. Ahmad et al., (2008) studied that one of the potential recycles material from palm oil industry is palm oil fuel ash which contains siliceous compositions and reacted as pozzolans to produce a stronger and denser concrete. Malhotra et al., (2005) investigated that a pozzolanic material has little or no cementing properties. However, when it has a fine particle size, in the presence of moisture it can react with calcium hydroxide at ordinary temperatures to provide the cementing property. Tangchirapat et al., (2003) reported that the chemical composition of POFA contains a large amount of silica and has high potential to be used as a cement replacement. Sukantapree et al., (2002) have found that POFA can be used in the construction industry, specifically as a supplementary cementitious material in concrete. Hussin et al., (1996) studied the compressive strength of concrete containing POFA. The results revealed that it was possible to replace at a level of 40% POFA without affecting compressive strength. The maximum compressive strength gain occurred at a replacement level of 30% by weight of binder. Tay et al., (1990) investigated that replacing 10–50% ash by weight of cementitious material in blended cement had no significant effect on segregation, shrinkage, water absorption, density, or soundness of concrete.

III. EXPERIMENTAL INVESTIGATIONS

A. Materials Used

A.1 Cement

Ordinary Portland Cement 53 grade conforming to IS: 8112-1939 was used. Its properties are shown in Table 1.

Table 1: Cement Test Results

Sl. No.	Characters	Experimental Value	As per IS:8112 - 1989
1.	Consistency of Cement	32%	-
2.	Specific Gravity	3.15	3.15
3.	Initial Setting Time	50 minutes	>30 minutes
4.	Final Setting Time	460 minutes	<600 minutes

A.2 Palm Oil Fuel Ash (POFA)

Palm Oil Fuel Ash is the product of burning palm oil husk and palm kernel shell in the palm oil mill. POFA obtained from Oil Palm India Limited, Kottayam in Kerala was used in the investigation. The specific gravity of Palm oil fuel ash was 1.65.The chemical composition of POFA was tested at **Department of Mining & Geology, Thiruvananthapuram** and the results is given in Table 2. Figure 2 and 3 shows the Palm Oil Residues and palm Oil Fuel Ash.

Figure 1: Palm Oil Residues

Figure 2: Palm Oil Fuel Ash (POFA)

Table 2: Chemical composition of POFA

Chemical composition	% in POFA
Silica	21.81
Aluminium	2.76
Iron	3.20
Calcium	5.70
Magnesium	3.978
Potassium	3.23
Sodium	0.76
Phosphorus	3.58
Chlorine	0.34
Sulphur	1.28
LOI	2.99

A.3 Fine Aggregate

Natural sand conforming to Zone II with specific gravity 2.62 was used as the fine aggregate. The maximum size of fine aggregate was taken to be 4.75 mm. The testing of sand was done as per Indian Standard Specifications IS: 383-1970. The sieve analysis result is shown in Figure 3.

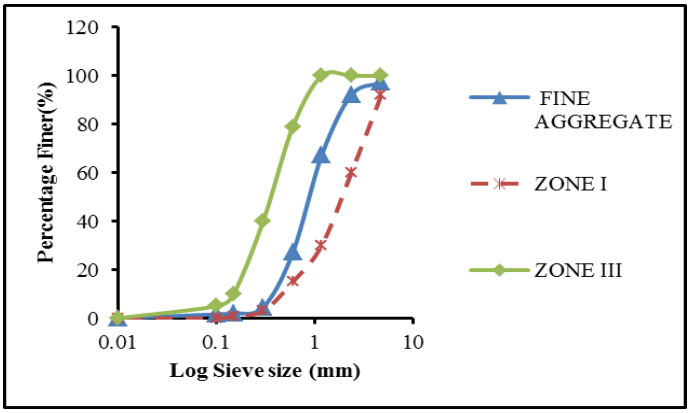

Figure 3: Particle size distribution of Fine Aggregate

A.4 Coarse Aggregate

Coarse aggregate was used with 12mm and 20mm nominal size and specific gravity 2.64, and were tested as per Indian Standard specifications IS: 383-1970 . The sieve analysis result is shown in Figure 4.

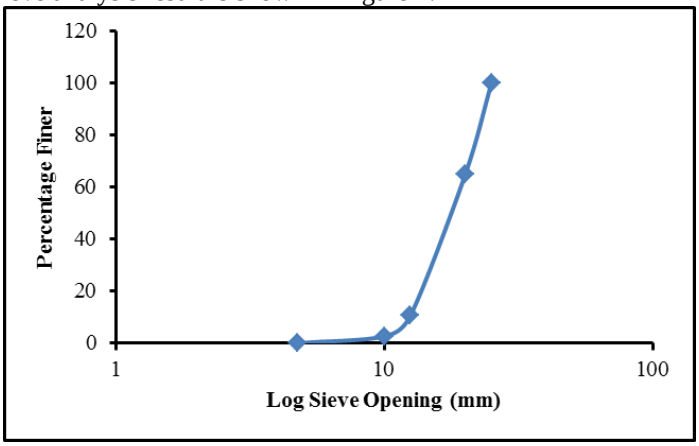

Figure 4: Particle size distribution of Coarse Aggregate

A.5 Water

Fresh potable water, which is free from acid and organic substance, was used for mixing the concrete.

B. Mix Proportion

The concrete mix is designed as per IS: 10262 – 2009 and IS 456-2000 for the normal concrete. The grade of concrete adopted is M30 with a water cement ratio of 0.45. Five mixture proportions were made. First was control mix (without palm oil fuel ash), and the other four mixes contained palm oil fuel ash. Cement was replaced with palm oil fuel ash by weight. The proportions of cement replaced ranged from 10% to 40%. Mix proportions are given in Table 3. The controls mix without palm oil fuel ash was proportioned as per Indian standard Specifications IS: 10262-1982, to obtain a 28-days cube compressive strength of 30 MPa. The ingredients of concrete were thoroughly mixed in a mixer machine till uniform consistency was achieved.

Table 3: Mix proportions

Mixture no.	**C**	**P_1**	**P_2**	**P_3**	**P_4**
Cement (kg/m^3)	437.78	394	350.22	306.45	262.67
Palm Oil fuel ash (%)	0	10	20	30	40
Palm Oil fuel ash (kg/m^3)	-	43.78	87.56	131.33	175.112
Water (lts)	197	197	197	197	197
Sand (kg/m^3)	643.68	643.68	643.68	643.68	643.68
Coarse aggregate (kg/m^3)	1104.36	1104.36	1104.36	1104.36	1104.36

C. Casting and Curing of Specimens.

The 150 mm size concrete cubes, concrete beams of size 100 mm x 100 mm x 500 mm and cylinders of 150 × 300 mm size were used as test specimens to determine the compressive strength and flexural strength and Splitting Tensile Strength respectively. After casting, all the test specimens were finished with a steel trowel. All the test specimens were stored at temperature of about 30^{o}C in the casting room and are demoulded after 24 hours for water-curing. When the test age is reached, they are tested for Compressive strength, Splitting tensile strength and Flexural Strength.

D. Test Procedure

The concrete properties such as Compressive strength Test, Splitting Tensile Strength Test and Flexural Strength Test were performed in accordance with the provisions of the Indian Standard Specification IS: 516-1959.

D.1 Compressive strength Test

This test will provide the breaking strength of the cube which is made particularly for the purpose of testing the compressed concrete compression strength. The compressive strength of the specimen is determined by dividing the maximum load carried by the specimen during the test by the average cross sectional area.

$$\text{Compressive strength} = \frac{Maximum\ load}{Cross\ sectional\ area}$$

D.2 Splitting Tensile Strength Test

This test method measures the splitting tensile strength of concrete by the application of a diametral compressive force on a cylindrical concrete specimen placed with its axis horizontal between the platens of a testing machine. The splitting tensile strength, T can be calculated as follows:

$$T = \frac{2P}{\pi dl}$$

where, P is maximum load at failure
d is average diameter of cylinder
l is the average length of the concrete specimen.

D.3 Flexural Strength Test

Modulus of rupture of concrete is determined by the Flexural Strength Test using a simple beam. The flexural tensile strength or modulus of rupture, f_b can be calculated as follows:

$$f_b = \frac{PL}{bd^2}$$

where, *P* is maximum applied load in kg,
b is average width of specimen at the point of fracture
d is average depth of specimen at the point of fracture.

IV. RESULTS AND DISCUSSIONS

The various aspects studied include the effect on compressive, flexural and splitting tensile strength using palm oil fuel ash in varying percentages as a partial replacement of cement. The results are given below:

A. Compressive Strength

Compressive strength of concrete mixes made with and without palm oil fuel ash was determined at 7 and 28 days. The test results are given in Table 4 and are represented in Figure 6. The compressive strength decreases as the percentage of ash increases. However, for 10% ash added, the compressive-strength development at 7 days was greater than the control samples, and the 28 day compressive strength was nearer to the control samples. As shown in Fig. 4.4, the 28-day compressive strengths for concrete cubes with 0, 10, 20, 30, and 40% replacement of cement with ash decrease from 36.89 MPa to 35.63 MPa, 32.7 MPa, 28.44 MPa, and 23.48 MPa, respectively. As per IS 456 : 2000, the specified characteristic Compressive strength of 150 mm cube at 28 days for a M30 grade concrete is 30N/mm^2. From the results it can be observed that upto 20% replacement of cement by POFA, a compressive strength of 30N/mm^2 can be obtained. When more than 20% is replacing, the compressive strength goes below than targeted strength of 30N/mm^2.

Table 4: Compression behaviour of Palm Oil Fuel Ash Concrete

Mix Type	Compressive Strength (N/mm^2)	
	7 days	28 days
C	28.07	36.89
P_1	29.41	35.63
P_2	27.71	32.7
P_3	23.04	28.44
P_4	18.59	23.48

Figure 5: Compression Test

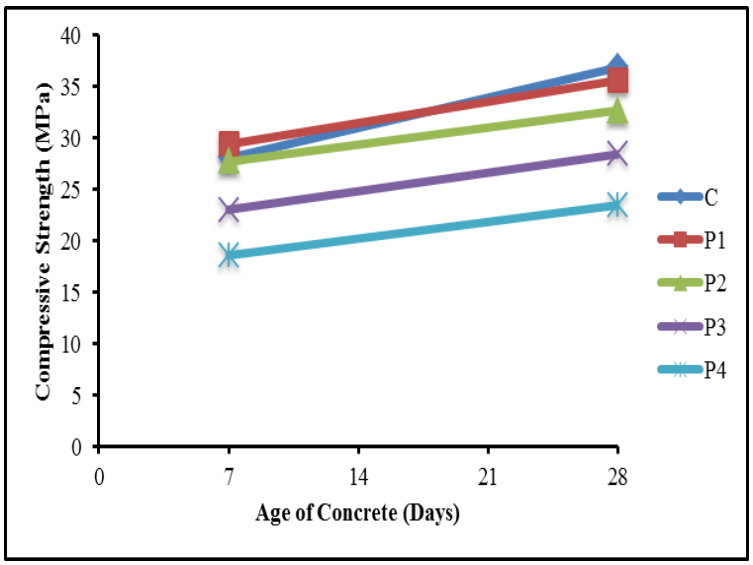

Figure 6: Variation of Compressive Strength with age

B. Splitting Tensile Strength

The results of splitting tensile strength of concrete mixes with and without palm oil fuel ash measured at 28 days are given in Table 5. Test results.indicate that the tensile splitting strength increases as the percentage of the POFA increases from 0% to 10%. However, for 20% ash added, the tensile-strength development was the same as the control samples. When the replacement of POFA is

increased to 30%, strength goes on decreasing. These results are represented graphically below in Figure 8. It is observed that mixes P1 and P2 containing 10% and 20% POFA respectively performed similar to control mixes. Also, it can be inferred that mix P1 contribute to the improvement of tensile splitting strength than others.

Table 5: Splitting tensile behaviour of Palm Oil Fuel Ash concrete

Mix Type	Splitting Tensile Strength (N/mm^2) at 28 days
C	2.62
P_1	2.69
P_2	2.62
P_3	2.33
P_4	1.99

Figure 7: Split Tensile Test

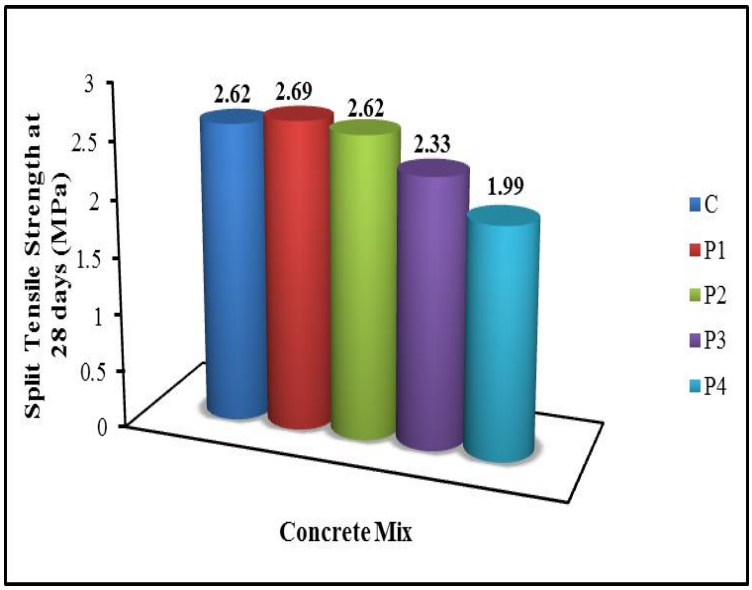

Figure 8: Variation of Split Tensile Strength

C. *Flexural Strength*

The flexural strength test results of palm oil fuel ash concrete are given in Table 6 and shown in Figure 10 respectively. From the results it is well understood that P_2 mix achieved the highest flexural strength. It is seen that 28 day flexural strength of 10% replacement of cement with POFA is similar to that of the control mix. When the replacement proportion is increased to 20%, the flexural strength also increases. But, further increase in proportion of POFA causes a reduction of Flexural Strength.

Table 6: Flexural behaviour of Palm Oil Fuel Ash concrete

Mix Type	Flexural Strength (N/mm^2) at 28 days
C	5.71
P_1	5.71
P_2	6.12
P_3	4.89
P_4	4.28

Figure 7: Flexural Strength Test

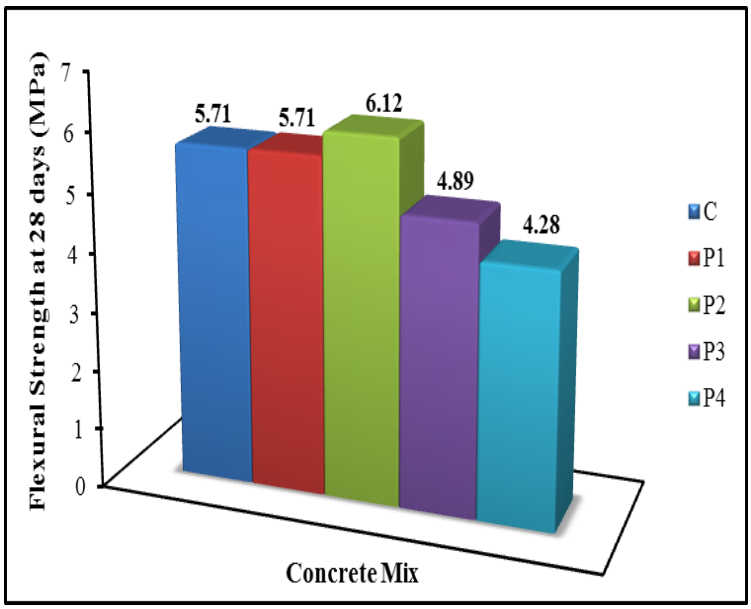

Figure 8: Variation of Flexural Strength

V. CONCLUSIONS

The following conclusions could be arrived at from the study:

- Compressive strength, Splitting tensile strength and Flexural strength of cement replaced palm oil fuel ash concrete specimens were found to be lower than those of normal OPC concrete.
- Results suggest that 20% replacement of POFA could be the optimum level for the production of concrete because strength of concrete reduced gradually beyond this replacement level.
- Palm Oil Fuel Ash used as Cement replacement enables the large utilization of waste product.
- Long-term studies on the development of strength as well as durability aspect of concrete containing POFA have been recommended for further investigation.

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Fault Tolerance- Challenges, Techniques and Implementation in Cloud Computing

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Abstract- Fault tolerance is a major concern to guarantee availability and reliability of critical services as well as application execution. In order to minimize failure impact on the system and application execution, failures should be anticipated and proactively handled. Fault tolerance techniques are used to predict these failures and take an appropriate action before failures actually occur. This paper discusses the existing fault tolerance techniques in cloud computing based on their policies, tools used and research challenges. Cloud virtualized system architecture has been proposed. In the proposed system autonomic fault tolerance has been implemented. The experimental results demonstrate that the proposed system can deal with various software faults for server applications in a cloud virtualized environment.

Index Terms- Cloud Computing; Virtual Machine; Fault Tolerance; Replication

I. Introduction

Cloud computing is a style of computing where service is provided across the Internet using different models and layers of abstraction [4]. It refers to the applications delivered as services [5] to the mass, ranging from the end-users hosting their personal documents on the Internet to enterprises outsourcing their entire IT infrastructure to external data centers. A simple example of cloud computing service is Yahoo email or Gmail etc.

Although cloud computing has been widely adopted by the industry, still there are many research issues to be fully addressed like fault tolerance, workflow scheduling, workflow management, security etc. Fault tolerance is one of the key issues amongst all. It is concerned with all the techniques necessary to enable a system to tolerate software faults remaining in the system after its development. When a fault occurs, which are based on these policies like Checkpoint/Restart, Replay and Retry and so on. These techniques provide mechanisms to the software system to prevent system failure occurrence [18]. The main benefits of implementing fault tolerance in cloud computing include failure recovery, lower cost, improved performance metrics etc. This paper aims to provide a better understanding of fault tolerance challenges and identifies various tools and techniques used for fault tolerance. When multiple instances of an application are running on several virtual machines and one of the server goes down, there is a need to implement an autonomic fault tolerance technique that can handle these types of faults. To address this issue, cloud virtualized system architecture has been proposed and implemented using HAProxy. The proposed architecture also has been validated through experimental results.

The rest of the paper is organized as follows. Section 2 discusses fault tolerance techniques based on their policies. Section 3 presents challenges of implementing fault tolerance in cloud computing. Section 4 identifies the comparison between various tools used for implementing fault tolerance techniques with their comparison table. Section 5 presents proposed cloud virtualized architecture and implementation with experimental results. Section 6 finally concludes the paper.

II. Background

There are various faults which can occur in cloud computing. Based on fault tolerance policies various fault tolerance techniques can be used that can either be task level or workflow level.

2.1 Reactive fault tolerance

Reactive fault tolerance policies reduce the effect of failures on application execution when the failure effectively occurs. There are various techniques Check pointing/ Restart - When a task fails, it is allowed to be restarted from the recently checked pointed state rather than from the beginning. It is an efficient task level fault tolerance technique for long running applications [2].

Replication-Various task replicas are run on different resources, for the execution to succeed till the entire replicated task is not crashed. It can be implemented using tools like HAProxy, Hadoop and AmazonEc2 etc.

Job Migration-During failure of any task, it can be migrated to another machine. This technique can be implemented by using HAProxy.

SGuard- It is less disruptive to normal stream processing and makes more resources available. SGuard is based on rollback recovery [18] and can be implemented in HADOOP, Amazon EC2.

Retry-It is the simplest task level technique that retries the failed task on the same cloud resource [20].

Task Resubmission-It is the most widely used fault tolerance technique in current scientific workflow systems [25]. Whenever a failed task is detected, it is resubmitted either to the same or to a different resource at runtime.

User defined exception handling-In this user specifies the particular treatment of a task failure for workflows.

Rescue workflow-This technique [20] allows the workflow to continue even if the task fails until it becomes impossible to move forward without catering the failed task.

2.2 Proactive Fault Tolerance

The principle of proactive fault tolerance policies is to avoid recovery from faults, errors and failures by predicting them and proactively replace the suspected components other working components. Some of the techniques which are based on these policies are Preemptive migration, Software Rejuvenation etc.

Software Rejuvenation-It is a technique that designs the system for periodic reboots. It restarts the system with clean state [5].

Hadoop [7] is used for data intensive applications but can also be used to implement fault tolerance techniques in cloud enviorment.Amazon Elastic Compute Cloud (EC2) [8] provides a virtual computing environment to run Linux-based applications for fault tolerance.

Proactive Fault Tolerance using Self-Healing- When multiple instances of an application are running on multiple virtual machines, it automatically handles failure of application instances.

Proactive Fault Tolerance using Preemptive Migration-Preemptive Migration relies on a feedback-loop control mechanism where application is constantly monitored and analyzed.

III. Challenges of Implementing Fault Tolerance in Cloud Computing

Providing fault tolerance requires careful consideration and analysis because of their complexity, inter-dependability and the following reasons.

There is a need to implement autonomic fault tolerance technique for multiple instances of an application running on several virtual machines [12].

Different technologies from competing vendors of cloud infrastructure need to be integrated for establishing a reliable system [15].

The new approach needs to be developed that integrate these fault tolerance techniques with existing workflow scheduling algorithms [14].

A benchmark based method can be developed in cloud environment for evaluating the performances of fault tolerance component in comparison with similar ones [21].

To ensure high reliability and availability multiple clouds computing providers with independent software stacks should be used [22] [23].

Autonomic fault tolerance must react to synchronization among various clouds [15].

IV. Tools Used For Implementing Fault Tolerance

Fault tolerance challenges and techniques have been implemented using various tools. Table 1 compares these tools based on their programming framework, environment and application type along with different fault tolerance techniques. HA Proxy is used for server failover in the cloud [13]. *S*Help [12] is a lightweight runtime system that can survive software failures in the framework of virtual machines. It may also work in cloud environment for implementing check pointing. ASSURE [9] introduces rescue points for handling programmer anticipated failures.

Table 1: Tools Used To Implement Existing Fault Tolerance Techniques

Fault Tolerance Techniques	***Policies***	***System***	***Programming Framework***	***Environment***	***Fault Detected***	***Application Type***
Self Healing, Job Migration, Replication	Reactive/ Proactive	HAProxy[13]	Java	Virtual Machine	Process/node failures	Load balancing Fault Tolerance
Check pointing	Reactive	SHelp[12]	SQL,JAVA	Virtual Machine	Application Failure	Fault tolerance
Check pointing, Retry, Self Healing	Reactive/ Proactive	Assure[9]	JAVA	Virtual Machine	Host, Network Failure	Fault tolerance
Job Migration,Replication,Sguard,Resc	Reactive/ Proactive	Hadoop[7]	Java,HTML,CSS	Cloud Environment	Application/node failures	Data intensive
Replication, Sguard,Task Resubmission	Reactive/ Proactive	AmazonEC2[8]	Amazon Machine Image, Amazon Map	Cloud Environment	Application/node failures	Load balancing , fault tolerance

V. Proposed Cloud Virtualized System Architecture And Implementation

5.1 Cloud Virtualized System Architecture

A few techniques currently exist for autonomic fault tolerance in cloud enviorment.Shelp can survive the software faults for server applications running in virtual machine environment [12].There is a need to implement autonomic fault tolerance in cloud enviorment.If any one of the servers breaks down, system should automatically redirect user requests to the backup server. So, the cloud virtualized system architecture has been proposed and implemented using HAProxy.The application availability and reliability can be maintained by using the proposed cloud virtualized system architecture as shown in Figure 1. The server virtualized system consists of VMs (server 1 and server 2) on which an Ubuntu 10.04 OS and database application are running. Server 2 is a backup sever in case of failure. HAProxy is configured on the third virtual machine to be used for fault tolerance. The availability of the servers is continuously monitored by HAProxy statistics tool on a fault tolerant server. HAProxy is running on web server to handle requests from web. When one of the servers goes down unexpectedly, connection will automatically be redirected to the other server.

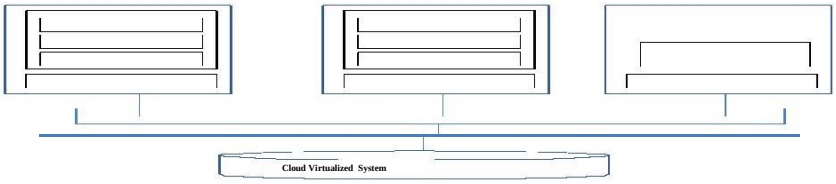

Figure 1: Cloud Virtualized System Architecture

5.2 Implementation and Experimental Results

Fault tolerant system has been implemented using HAProxy and MySQL. HAProxy is used to handle server failures in fault tolerant cloud environment. It provides a web interface for statistics known as HAProxy statistics. Implementation includes two virtual machines as web servers, server 1 and server 2 hosting Apache Tomcat 6.0.32. HAProxy software version 1.3.15.2 is configured on third virtual machine. A simple database application written in Java is installed on the web servers. Xampp for Linux Windows XP (SP2) is used to install MySQL. Data in MySQL is replicated using replication technique for local backup. Replication enables data from one MySQL database server (the master) to be replicated to one or more MySQL database servers. Application can be accessed on any of the web server. Data consistency is also maintained through MySQL replication. The experimental results show that HAProxy can assist server applications to recover from server failures in just a few milliseconds with minimum performance overhead.

Case 1: Figure 2 shows the stats when both the servers are working and green line indicates that the servers are up.

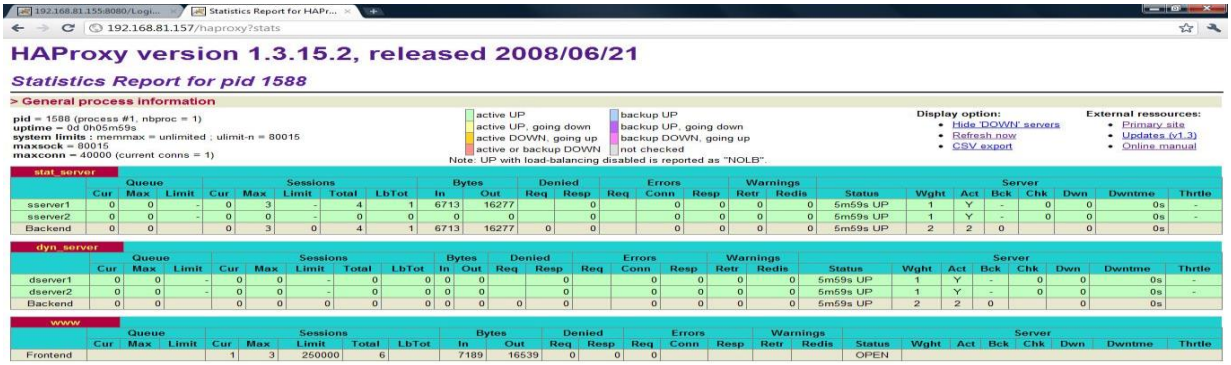

Figure 2: HAProxy Statistics

Case 2: Figure 3 shows the stats when server 1 goes down and server 2 is still up. Red line in this figure indicates that the server is down.

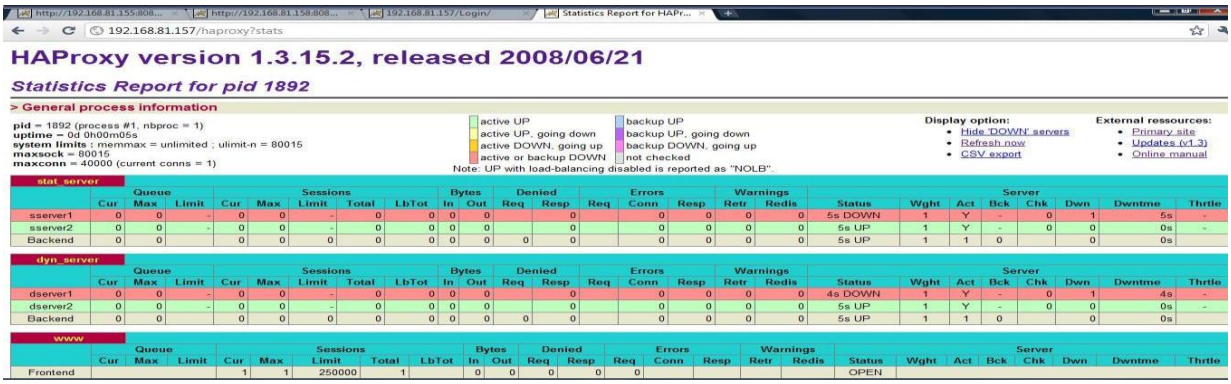

Figure3: Server 1 is down

Case 3: Figure 4 shows the stats when server 2 goes down and server 1 is still up.

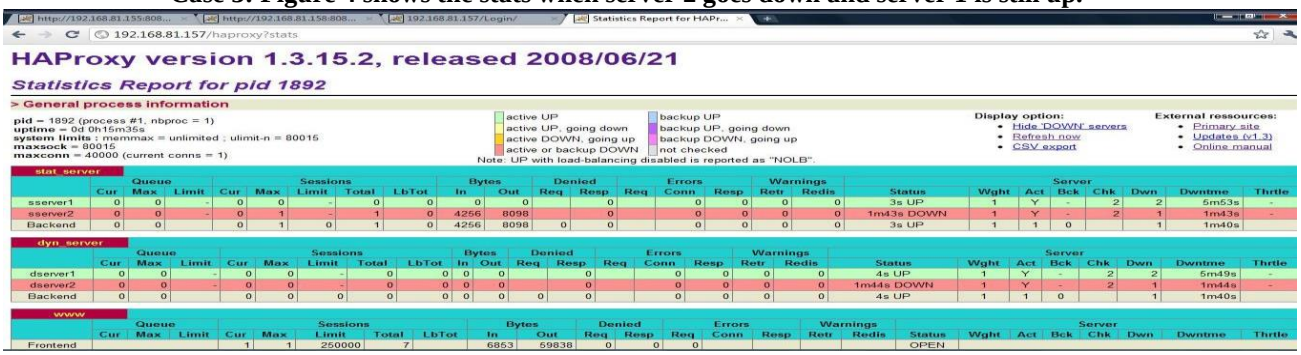

Figure 4: Server 2 is down

Case 4: Replication enables data from one MySQL database server to be replicated to one or more MySQL database servers (the slaves). Figure 5 shows the database table of server 1 using SQLyog and the connection established with server 2 slave.

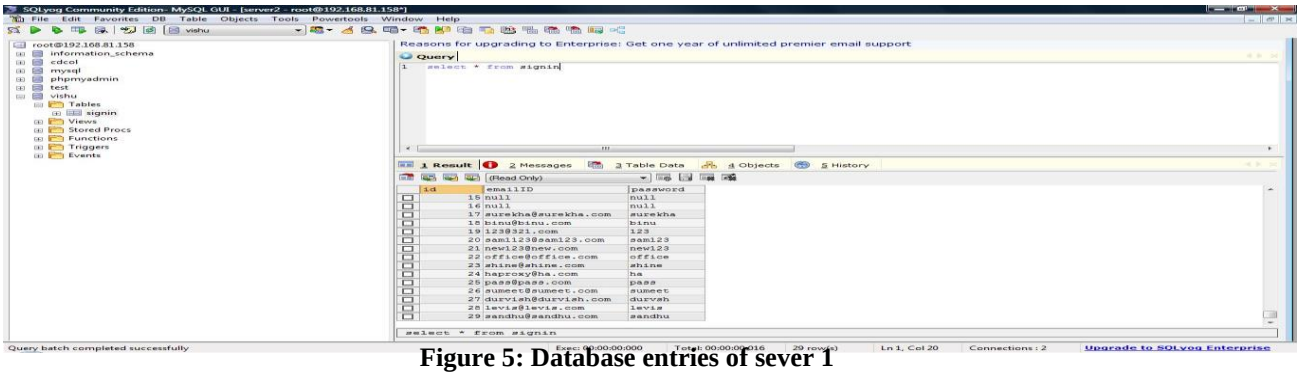

Figure 5: Database entries of sever 1

Case 5: Figure 6 shows the replicated database table of server 2.When server 1 fails data is replicated to server 2.

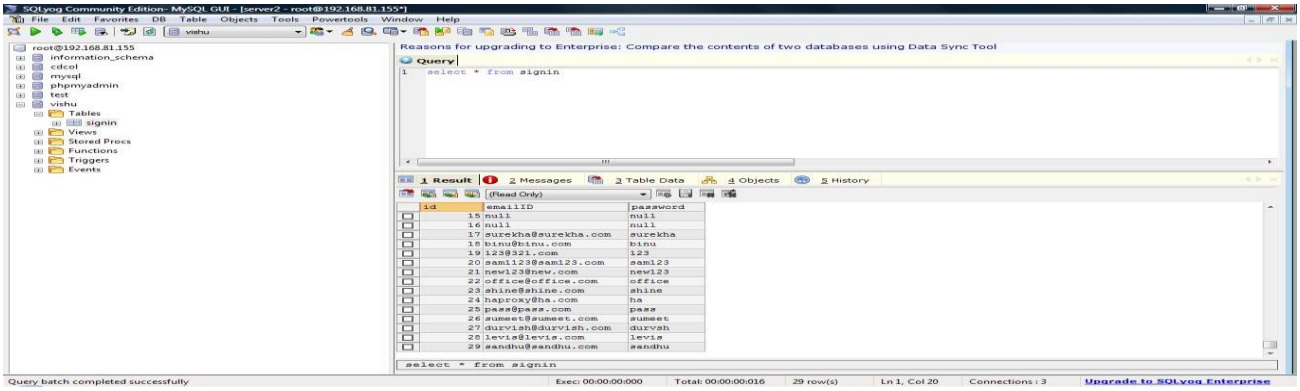

Figure 6: Replicated Database entries of sever 2

VI. CONCLUSION

Fault tolerance is concerned with all the techniques necessary to enable a system to tolerate software faults remaining in the system after its development. This paper discussed the fault tolerance techniques covering its research challenges, tools used for implementing fault tolerance techniques in cloud computing. Cloud virtualized system architecture is also proposed based on HAProxy. Autonomic fault tolerance is implemented dealing with various software faults for server applications in a cloud virtualized environment. When one of the servers goes down unexpectedly, connection will automatically be redirected to the other server. Data replication technique is implemented on virtual machine environment. The experimental results are obtained, that validate the system fault tolerance.

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Formulation and Evaluation of Hydrogel Based Oral Controlled Release Tablets of Simvastatin

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Abstract- Hydrogel based tablets of Simvastatin was formulated using hydropropyl methyl cellulose(different grades), guar gum and carbopal-934-P with the aim to study of release kinetic, to attain a near zero order release and to increase the bioavalability upto 95%. In-vitro dissolution studies were carried out using USP type 2 dissolution test apparatus. The release of drug followed a typical Higuchian pattern. Hydrogel based tablets formulated employing hydropropyl methyl cellulose, guar gum and carbopal-934-P slow release of Simvastatin over period of 12 h and were found suitable for maintenance portion of oral controlled release tablets. Simvastatin release from these tablets were diffusion controlled and followed zero order kinetics after a lag time of 1h[1]. The most successful of the study, exhibited drug release pattern very close to theoretical release profile. A decrease in release kinetics of the drug was observed on

Index Terms- Bioavalability, Carbopal-934-P, Formulation, Guar gum, Hydrogel, Hydropropyl methyl cellulose. Release kinetics study.

I. INTRODUCTION

During the last two decades there has been remarkable increase in interest in controlled release drug delivery system. This has been dua to various factors viz. the prohibitive cost of developing new drug entities, expiration of existing international patents, discovery of new polymeric matericals suitable for prolonging the drug release, and the improvement in therapeutic efficiency and safety achieved by these delivery systems[1]. Now-a-days the technology of controlled release is also being applied to veterinary products also. The basic rationale for controlled drug delivery is to alter the pharmacokinetics and pharmacodynamics of pharmacologically active moieties by using novel drug delivery system or by modifying the molecular structure and /or physiological parameters inherent in a selected route of administration. Hydropropyl methyl cellulose (different grades like HPMC-K-15M and HPMC-K-100M), Carbopal-934-P and natural gum (Guar gum)can be used as matrix materials. The matrix may be tableted by direct compression of the blend of active ingredient and certain hydrophilic carriers or from a wet granulation containing the drug and hydrophilic matrix material[1]. Hypercholesterolemia disease in which normally, about 70-75% of plasma LDL is removed by hepatocytes, by receptor-mediated endocytosis. Cholesterol esters from LDL molecules are hydrolysed in the liver to free cholesterol. The liver is also produced cholesterol by *de novo* synthesis by the pathway involving formation of mevalonic acid by the enzyme (HMG-CoA Reductase). Simvastatin(1S,3R,7S,8S,8aR)-8-{2-[(2R,4R)-4-hydroxy-6-oxooxan-2-yl]ethyl}-3,7-dimethyl-1,2,3,7,8,8a-hexahydronaphthalen-1-yl 2,2-dimethylbutanoate. The 6-membered lactone ring of simvastatin is hydrolyzed *in vivo* to generate the beta,delta-dihydroxy acid, an active metabolite structurally similar to HMG-CoA (hydroxymethylglutaryl CoA). Once hydrolyzed, simvastatin competes with HMG-CoA for HMG-CoA reductase, a hepatic microsomal enzyme. Interference with the activity of this enzyme reduces the quantity of mevalonic acid, a precursor of cholesterol[2]. The resulting decreases in hepatic cholesterol synthesis leads to increased synthesis of high affinity LDL receptors on liver cells and increased clearance of plasma LDL. This causes reduction in plasma LDL cholesterol level. Off various recent techniques for controlling drug release[3], advantages of ease of formulation, better control on release profile of drug and better patient compliance.

II. MATERIALS AND METHODS

Simvastatin was obtained as gift sample from Dr. Reddy's Laboratory, Hyderabad, India. HPMC-K-15M and HPMC-K-100M from Suleb Lab, Baroda. Carbopal-934-P from National Health Care Pvt. Ltd, Nepal. Guar gum was obtained as gift sample from S.D.Fine chemical Ltd, Mumbai. Other materials used were of analytical grade, and procured from commercial sources.

Preparation of Controlled Release Tablets of Simvastatin

All the ingredinents were sieved through sieve number 120. Weighed quantities of drug, polymer, lubricant (Talc and Magnesium sterate) and diluent (lactose) were mixed in geometric proportion using a mortar and pestle. Controlled released tablets were prepared by wet granulation method. Hydroxypropyl methylcelluloses(HPMC-K-100M and HPMC-K-15M), Guar Gum and Carbopol-934-P were used as retardant material for prepartion of tablets[1].

The resultant mixture was wetted with 4% starch paste and granulated then the damp mass was passed through sieve number 10. The wet granules were dried in the oven at 50° C for half an hour. Remaining amount of lubricants were added to the dried granules.

After evaluating the precompression parameters, the lubricated granules were subjected to compression to form tablet with target weight of 300mg using hydraulic press having 10mm diameter flat punches. The hardness of all tablets was maintained

at 6 to 8 Kg/cm². The formulae for various formulatins attempted have been given in table No.1

Dissolution study of controlled release fomulation of Simvastatin

The in-vitro dissolution profile of the designed formulations of controlled release tablets was carried out using USP type II apparatus under conditions specified (temp 37± 0.5°C, 75rpm). Tablets were subjected to dissolution for first two hrs in 0.1 N Hcl, followed by pH 7.4 phosphate buffer for next ten hours till the end of dissolution study. From the dissolution medium withdrawn and replaced 5ml for every 1hour. Absorbance was measured at 238 nm using buffer solution as blank. Results of in-vitro dissolution studies obtained were tabulated and shown graphically according to following modes of data treatment[4].

1. Cumulative Percentage Drug Release V/s Time in Hours.
2. Cumulative Percentage Drug Retained V/s Time in Hours.
3. Higuchi's Classical Diffusion Equation - Cumulative Percentage Drug Release V/s Square Root T.

III. RESULTS AND DISCUSSIONS

In present work an attempt has been made to formulate hydrogel based oral controlled release tablets of Simvastatin using retardants namely Hydroxypropyl methylcelluloses(HPMC-K-100M and HPMC-K-15M), Guar Gum and Carbopol-934-P in different concentration and combinations. The formulation of tablets was done by using wet granulation technique which was found acceptable.

The results of *evaluation studies* can be summarized as follows:

Figure No.1 shows plot of cumulative percentage of Simvastatin release V/s. time for optimized formula. Four polymers were employed with varying concentrations to get promising concentration for Hydrogel based oral controlled release tablets, which can be used for further studies. Formulation F1, F2, and F3 contains Guar Gum, HPMC-K-100M, Carbopol-934-P, and HPMC-K-15M as polymer. Formulation F1, F2 and F3 gave 93.77%, 84.56% and 90.04% of drug release respectively in 12hours of dissolution study performed. It was found that drug release was prolonged to desired level in F1 and F3; but in F2 it was found that drug release was not prolonged to desired level, this may be due to inadequate concentration of polymer and also due to lactose, present in relatively large amount which alter drug release rate mainly by altering the gelation of polymer. Formulation F4 contains HPMC-K-15M and Carbopol-934-P which gave 84.89% of drug release, F5 contains HPMC-K-100M and Carbopol-934-P which gave 88.67% of drug release in 12hours dissolution study. The drug release was found to be not prolonged; this may be due to presence of large amount of lactose. F6 contains HPMC-K-100M and HPMC-K-15M gave 92.78% of drug release in 12hours dissolution of study. The drug release was found to be prolonging this is due to low concentration of polymer level. Formulations F7 and F8 contains Guar Gum and HPMC-K-100M gave 85.25% and 80.11% of drug release in 12hours of dissolution study, this may due to high concentration of polymer level. F9 and F10 gave 85.24% and 90.38% of drug release and F11 contains HPMC-K-100M and PVP-K-30 gave the 91.58% of drug release in 12hours of dissolution study. The mechanism of release may be based on hydration and gelation due to cellulosic nature of polymer at tablet liquid interface. The existence of gel barrier could be expected to drug release by limiting exposure of solid drug to dissolution liquid. The drug release may be due to diffusion controlled and swelling controlled mechanism because of inherent swelling characteristic of hydroxylpropyl methylcellulose. The tablets were found swollen at the end of 12hours indicating a hydrophilic system. Guar Gum, a natural polymer used in formulation, the tablets were found swollen at the end of 12hours dissolution study this may be due to inherent swelling property of gum.

Figure No.2 shows a plot of Swelling index, the graph was plotted between % weight absorption ratio and time.

The best selected formulations are F1, F3 and F6; these plots were found to be linear with correlation coefficient (r) values which are 0.997, 0.995 and 0.995 respectively. But the optimized formula is F1 with the r value 0.997. This linearity indicates that the release of Simvastatin from the tablets have followed nearly zero order kinetics.

Figure No.3 shows plot of Zero order kinetic release graph of optimized formula (cumulative % drug release V/s time) which shows the linear drug release of Simvastatin.

Figure No.4 shows plot of Higuchi's Classical Diffusion Equation graph of optimized formula (cumulative % drug released V/s square root time.

Figure No.5 shows plot of Peppas kinetic model graph of optimized formula (Log cumulative % drug release V/s Log time). Slope (n) value is 1.077.

Figure No.6 shows plot of First order kinetic release graph of optimized formula (Log % drug remaining V/s time).

IV. CONCLUSION

From the finding obtained so far, it can be concluded that,

- Hydroxypropyl methylcellulose (different grades) and Guar Gum is of the total tablet weight is promising concentration for oral controlled release tablets Simvastatin.
- Formulated tablets exhibited nearly zero order kinetics and the release profile was of matrix diffusion type.
- From this study, it is possible to design promising Hydrogel based oral controlled release tablets containing Simvastatin for the treatment of hypercholesterolemia.
- Hydrogel based oral controlled release tablets of Simvastatin also used in reducing heart related disease, heart stroke and with more efficacy and better patient compliance.
- The in-vitro kinetic release obeyed zero order kinetics with mechanism of release was followed by non-fickian diffusion due to more hydrophilic nature of polymer and drug. The increase in concentration of polymer decreases the release of drug.

Table.1: Composition of hydrogel based oral controlled release tablets of Simvastatin

Formulation code	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
Drug	40	40	40	40	40	40	40	40	40	40	40
Guar gum	120	120	80	-	-	-	160	-	-	-	-
HPMC-K100M	40	-	-	-	40	20	-	160	-	-	40
HPMC-K15M	-	-	40	40	-	20	-	-	-	120	-
Carbopol-934-P	-	40	-	40	40	-	-	-	80	-	-
Lactose	70	70	90	90	90	110	70	70	85	70	180
Starch	20	20	-	-	-	-	20	20	-	-	-
MCC	-	-	50	80	80	100	-	-	85	60	-
PVP-K30	-	-	-	-	-	-	-	-	-	-	30
Mg. sterate	5	5	5	5	5	5	5	5	5	5	5
Talc	5	5	5	5	5	5	5	5	5	5	5
Tatol tablet weight	300	300	300	300	300	300	300	300	300	300	300

Figure No.1 % Cumulative drug release graph for optimized formula

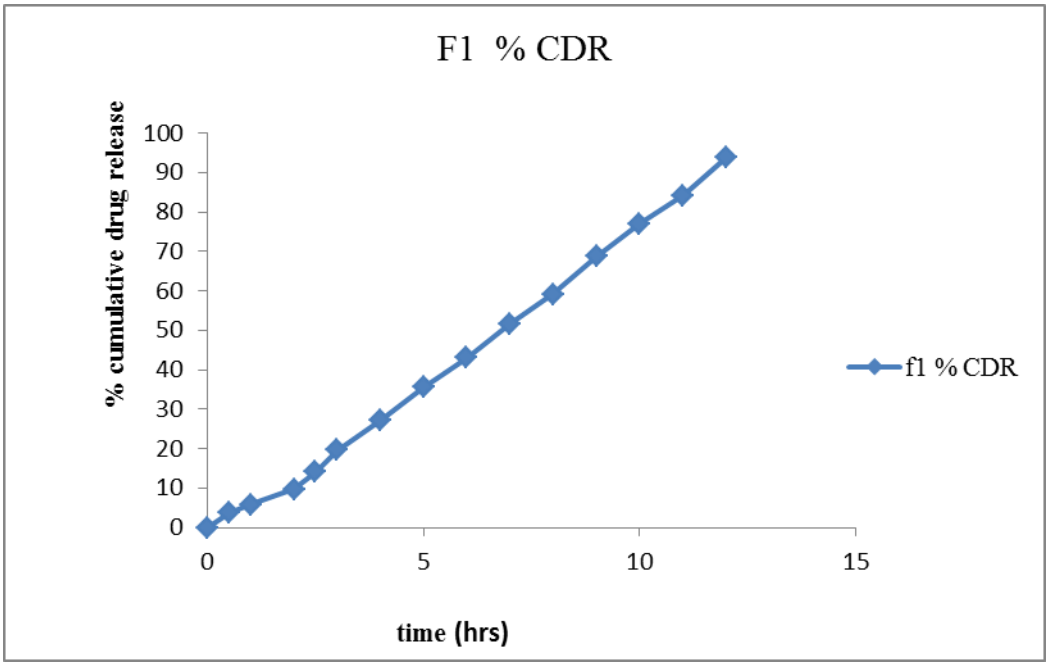


Figure No.2 % Weight absorption ratio graph for optimized formula

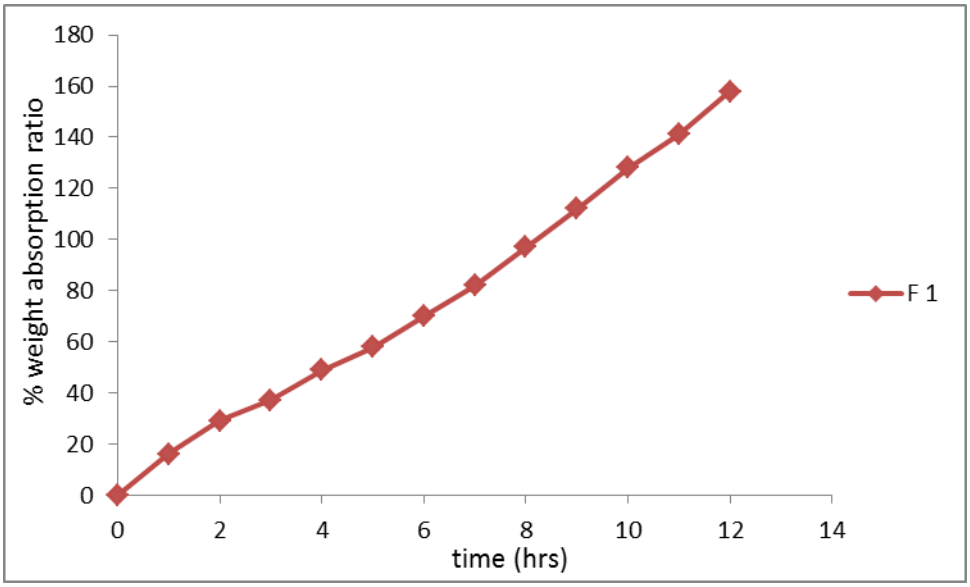


Figure No.3 Zero order kinetic release graph for optimized formula

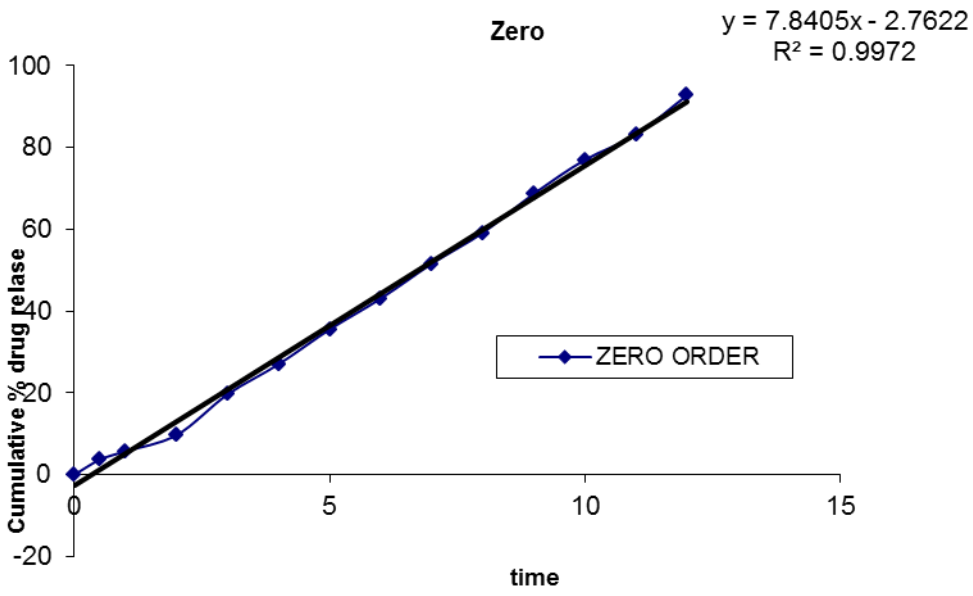


Figure No.4 Higuchi Model graph for optimized formula

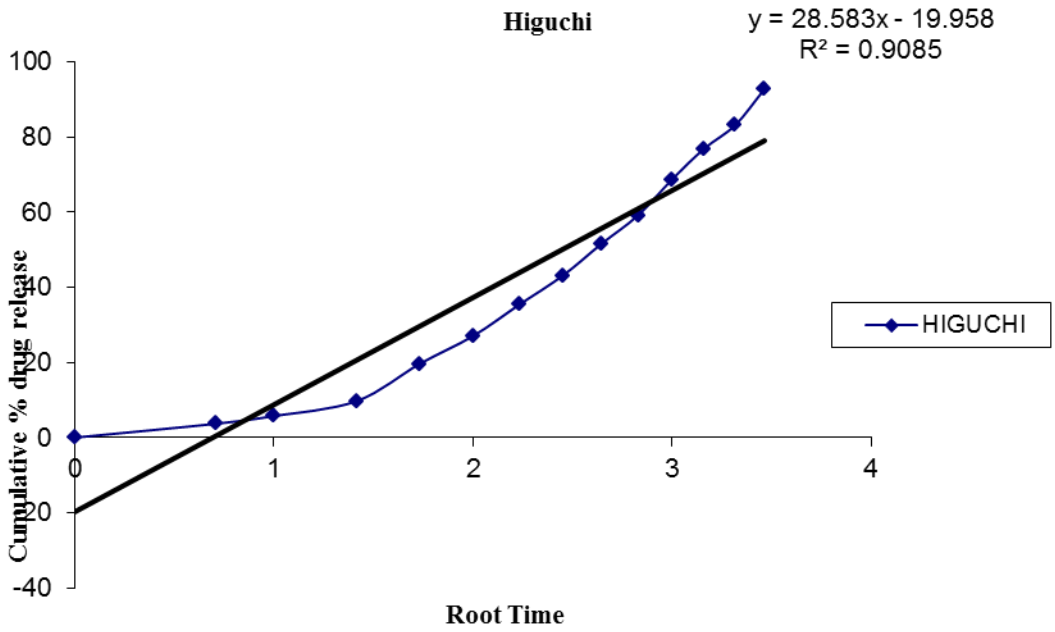


Figure No.5 Korsmeyer Peppas Kinetic Model graph for optimized formula

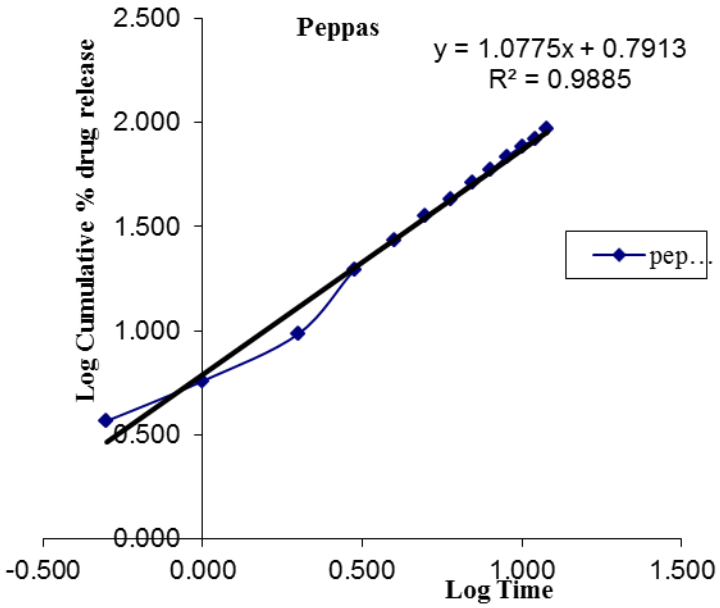
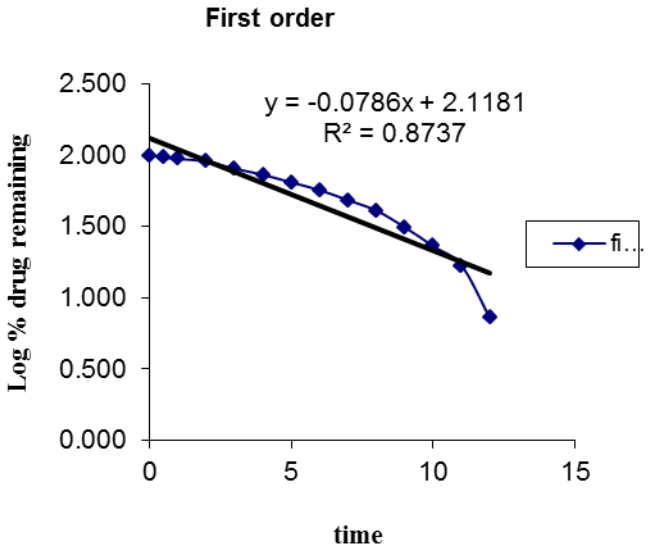


Figure No.6 First order kinetic release graph for optimized formula



ACKNOWLEDGMENT

The authors are thankful to Bright Labs, Hyderabad for providing facilities for analysis of data.

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Fungus Infestation and Survival a Cellular Automata Based Approach to Solving Digital Maze Images

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Abstract- Our research is based on the fungus infestation and survival which is a cellular automata based approach to solving traditional digital maze image. Cellular automata technique is used to describe how the elements of a system combined with each other. Each of the elements of the system is denoted as a cell.

Index Terms- Cellular automata, digital image, Digital image processing, John h. Conway

I. INTRODUCTION

A maze is a network of paths and walls which is represented as a puzzle where one has to find a path from start to destination point. It considers dead-ends point, entry and exists point to get out in and around the maze. This research works on the part of maze solving which is the way of finding a route from source to destination around the maze. Thereare some maze solving methods which is designed for a player inside the maze having no knowledge of the maze whereas others are designed for a player or computer program can see the whole maze once only.

Some well-defined maze solving algorithms are:

Filled dead end algorithm: it is basically designed to solve a maze that fills all dead ends, leaving the correct path blank.

Wall touch algorithm: it uses the concept of left hand or right hand rule. if the maze is connected in a simple way then keeping one hand on the wall and traverse around the whole maze at-least once and at last will reach to destination point.

II. RESEARCH ELABORATIONS:

John h. Conway gave the idea of game of life. He uses three rules to determine next state of cells.

Similarly, Our approach is based on the following steps:

A. Digital image processing:

- A (two-dimensional) digital image is represented as a numeric (normally binary) matrix. The term "digital image" refers to raster images also called bitmap images. The pixels values are stored in computer memory as a raster image or raster map, a two-dimensional array of small integers. These values are often transferred or stored in a compressed form.
- Standard image formats including BMP, GIF, JPEG, and PNG.

Extracting matrix maze from digital maze image

- This Process involves detecting block size of wall/Path zone in digital image.
- Using the block size value, digital image is mapped into a memory matrix image of cells.
- These cells are classified as Wall Cells and Open Cells (Potential Path Cells).
- In our approach, we have classified black zone as wall cell and white zone as open cell.
-

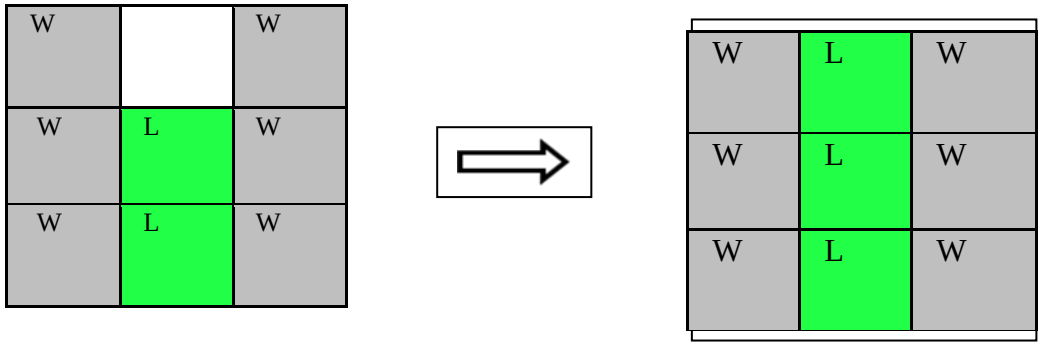
B. Cellular automata(CA):

It is a model which describes how the elements of a system combined with each other. Each element of the system is denoted as a cell. The cells can be describe as:

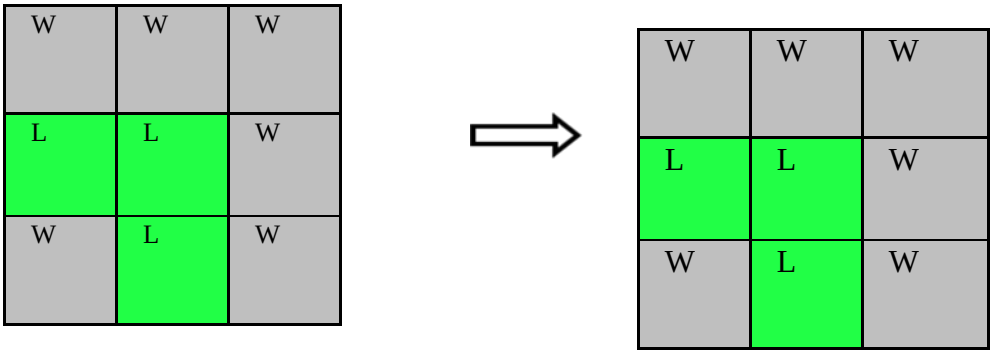
It may be 2-dimensional squares or 3-dimensional blocks or another shape

C. Fungal infestation technique

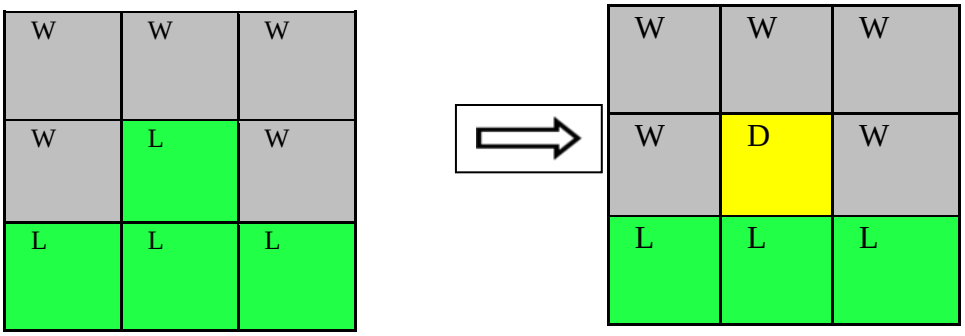
INFESTATION: Living cells having one or more unoccupied cells/zones will infest all of them.



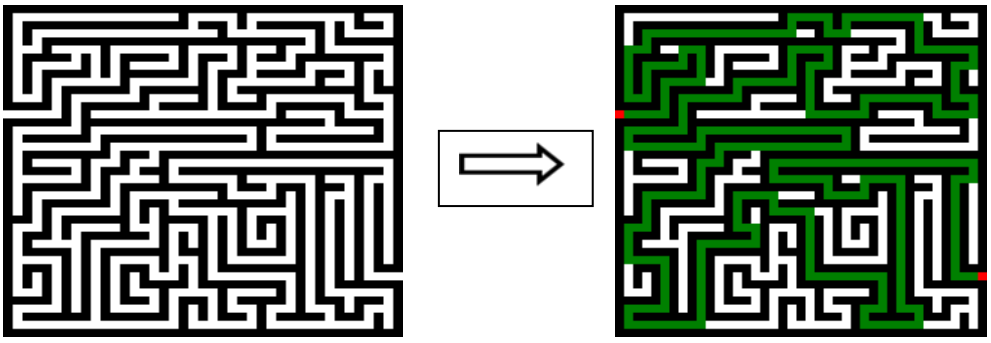
SURVIVAL:A living cell will continue to survive if it has two or more living cell neighbors



DEATH: A living cell will die if it has 3 or more dead + wall cells.



By using above three rules, our solution is in the form of:



Maze solving by Fungus Infestation using CA

- Step 1 :- Digital maze image is read from disk file and loaded into program memory.
- Step 2 :- Image is processed to detect zone block size, and start-finish points.
- Step 3 :- Image is mapped into memory matrix of cells.
- Step 4 :- Rules are applied repeatedly until system enters a stable configuration. i.e no more cell infestation, or death occurs.
- Step 5 :- Living Cells are taken note of and using memory mapping of original image.
- Step 6 :- position of living cells is traced onto original digital image. (living cell projection leads to a path which connects starting and ending point)
- Step 7 :- the traced image is displayed to user as result and then can be saved to disk for future reference.

III. PROS AND CONS

Pros / Advantages

- Faster Computation
- Better hardware utilization
- Selected pixels are processed (cells)

Cons/Disadvantages

- High Level Programming Language and Data Structures Involved.
- Applicable on Digital Mazes Only.
- Current Extraction Phase Limits use of digitally generated maze images only**.**

IV. RESULTS AND FINDINGS

Proposed approach is developed in .net C# technology and 4 sample digital mazes were tested for results.

Image Resolution (pixels)	**Block Size**	**Cell Count**	**Time Taken**
205x205 (42025)	5x5	1681	1.7 seconds
328x328 (107584)	8x8	1681	2.4 seconds
305x305 (93025)	5x5	3721	7.3 seconds
505x505 (255025)	5x5	10201	171 seconds

These results were obtained on a single core processing machine. Over a multiprocessing CA oriented machine these times will be significantly reduced in near proportion to core count.

Estimated Time = extraction time + path cell processing over n iterations + tracing time.

Extraction time includes disk file read, block size detection, memory mapping time.

n is no of iteration after which system enters a stable state. This factor is directly proportional to cell count

Tracing time includes time taken to retrieve active path cell, mapping their actual positions and tracing them onto original image to draw result image.

V. CONCLUSIONS

In a traditional maze wall cell to path cell ratio is usually 3:2. i.e. any traditional digital maze image will have roughly 60% wall pixels and 40% path pixels.

For an image of resolution 256x256, there will be 65536 pixels, for a block size of 4x4 this image can be mapped into cell matrix of 64x64=4096 cells. (~2500 wall cells, ~1600 path cells) And among all potential path cells only 10% to 30% cell contribute to path drawn.

Therefore significant improvement can be achieved by identifying cell type and processing selected cells. This simple idea used in our algorithm reduces processing time to solve digital mazes.

Theoretically a time improvement of 40-50% can be achieved over simple raster scanning algorithms by using our CA based approach to solve traditional digital images. Similar figures are reflected in sample images processed.

Thus it can be concluded that a combination of CA multiprocessing feature and selective cell based processing approach generates faster results.

ACKNOWLEGMENT

I am grateful to numerous local and global peers who have contributed towards shaping this research paper. My sincere thanks to everyone who has provided me with kind words, a welcome ear, new ideas, useful criticism, or their invaluable time, I am truly indebted.

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Draining injected invalid data for efficient bandwidth consumption using authentication scheme in WSN

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Abstract: Wireless sensor is the biggest researching area. Now days most of the applications are working on wireless medium. In wireless sensor network Injecting invalid data attack is very serious threat. If invalid data is stored in sink than due to error decision waste of energy and bandwidth will take place. In this paper presenting a new scheme for wireless sensor network which is help in power optimization and efficient bandwidth consumption base on message authentication code (MAC). This Scheme theoretical and results are helping in the WSN application areas and improves the performance and accuracy through draining the injected invalid data.

***Index Terms*:** Power optimization, efficient bandwidth consumption, MAC, Invalid data, Private Key, WSN

I. INTRODUCTION

In recent years Wireless sensor networks are immensely used in high level and very sensitive application areas such as environmental, surveillance, habitat monitoring and tracking for military. Now we are interact various new applications at the unprecedented level from the help of Wireless sensor networks. Because these are very sensitive areas so we should make sure these networks are highly secured from invalid data attack, security attack and Sybil attacks and detection of these invalid data is very big research challenge. Interconnect large number of sensors node composed a Wireless sensor network through wireless links. If changes in temperature or light occur a sensor node is triggered and create a report which is send to data collection unit through a path, this data collection unit is called SINK.

From Injecting invalid data attack, WSNs may also suffer. If wrong data is stored in the sink than many errors can take place at higher level due to these error decisions as well as a lot of energy will be lost. For example if In weather forecasting temperature sensors or pressure sensor send the invalid information report to the sink then costly resources and precious time will be wasted in the process of forecasting. Thus it is very important to drain the invalid data as precisely as possible in WSNs. If the sink is flooded with all invalid data then as a result of it, immense load will be increased on the sink and vast energy will also be wasted. Due to which the network can be paralyzed very soon. Hence in order to save the energy and bandwidth from being wasted invalid data draining should be performing at very early stage.

To handle this challenge in this paper, we propose a new scheme for draining the invalid data in WSN. High draining probability as well as high reliability provide by this new scheme. Propose a new scheme to draining the injected invalid data with message authentication technique using private key. This proposed mechanism we can discover the invalid data sooner and drained this invalid data. And results show the effectiveness of the proposed scheme.

The paper is organized as follows, Section I: introduce the injected invalid data problem in wireless sensor networks, Section II: network model of wireless sensors. Section III: Shows which functions are achieved by the proposed scheme. Section IV: describe the proposed message authentication scheme for draining the injected invalid data for wireless sensor networks. Section V describes the data flow diagram and algorithm used in this authentication scheme. Section VI is shows the result and performance of this authentication scheme for power saving in wireless sensor networks.

II. NETWORK MODEL

A huge number of sensor nodes and a sink (Sink is an effective data accumulation unit and storage capacity, which is responsible for initializing the sensor nodes and accumulation the data) makes a distinctive wireless sensor network.

Every sensor node has a stationary position. By connecting the sensors we are making the network which leads to the Sink and send the information of triggered event through the sensor nodes. The neighbour node of sink will send the report directly and non-neighbour node will connect via other sensor node to the sink.

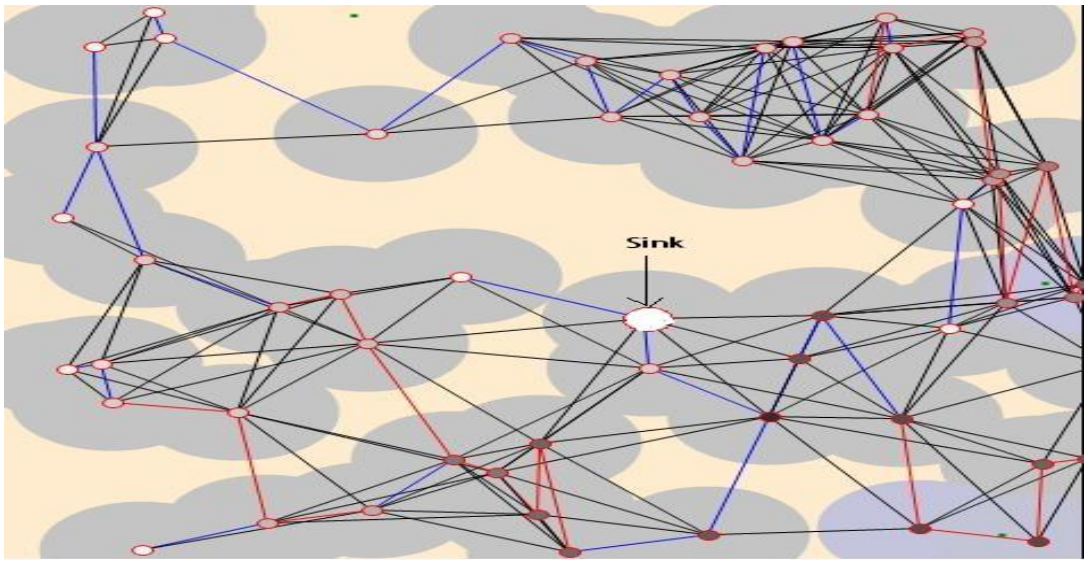


Figure 1: Network model

III. DESIGN GOAL

By develop a new authentication scheme for draining the injected invalid data following desirable objectives will be achieved.

Quickly detecting the injected invalid data
A powerful data storage device is called SINK. A sink is a bottleneck as all authentication tasks are fulfilled at the sink, we detect the invalid data before it reached to the sink because if invalid data reached to the sink then it will occur problems in the high level applications. In this paper we are detecting the invalid data at the source node. To save more energy and bandwidth of entire network, invalid data detected at initial stage.

Accomplish the Draining the Invalid data process.
After the quickly detecting the injected invalid data process we can accomplish the task of draining invalid data.

Accomplish a scheme to save from Gang Injecting Invalid Data Attack
If too many invalid data reached the sink than sink will affected from DoS (Denial of Service) attack. While more than one invalid data or a gang of invalid data aggregate at the source node and attack to the sink than it will be called gang injecting invalid data attack. Due to mobilization the gang injecting invalid data attack is hard to resist and more challenging. And by this authentication scheme we obtain the goal of protecting from gang injecting invalid data attack.

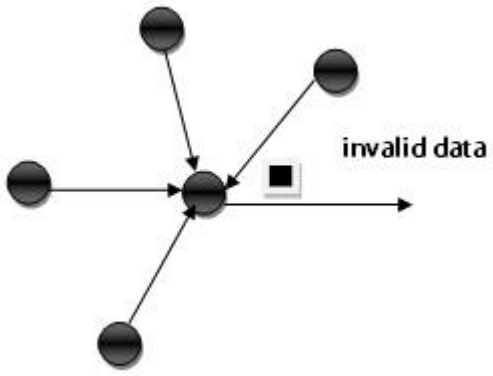


Figure 2: Gang Injecting Invalid Data Attack

IV. PROPOSED AUTHENTICATION SCHEME BASED POWER OPTIMIZATION TECHNIQUE

This technique is use for draining the injected invalid data from wireless sensor network and save the power in WSN. In this technique Message Authentication code is used. Message authentication code (MAC) provides knowledge to the recipient of the message which came from the expected sender and has not been altered in transit.

Let h (.) be a secure cryptographic hash function. A MAC in Z2^n can be considered as a keyed hash [13], and defined as

$$MAC(m, k, n) = h(m||k) \bmod 2^n$$

Where m, k, n are a message, a key, and an adjustable parameter, respectively. When n = 1, MAC (m, k, 1) provides one-bit authentication, which can filter a false message with the probability 1/2; while n = α, MAC (m, k, α) can filter an invalid message with a higher probability $1-\frac{1}{2^{\alpha}}$.

To draining the invalid data injected by settled sensor nodes, this authentication scheme adopts neighbour router based draining mechanism. As shown in fig,

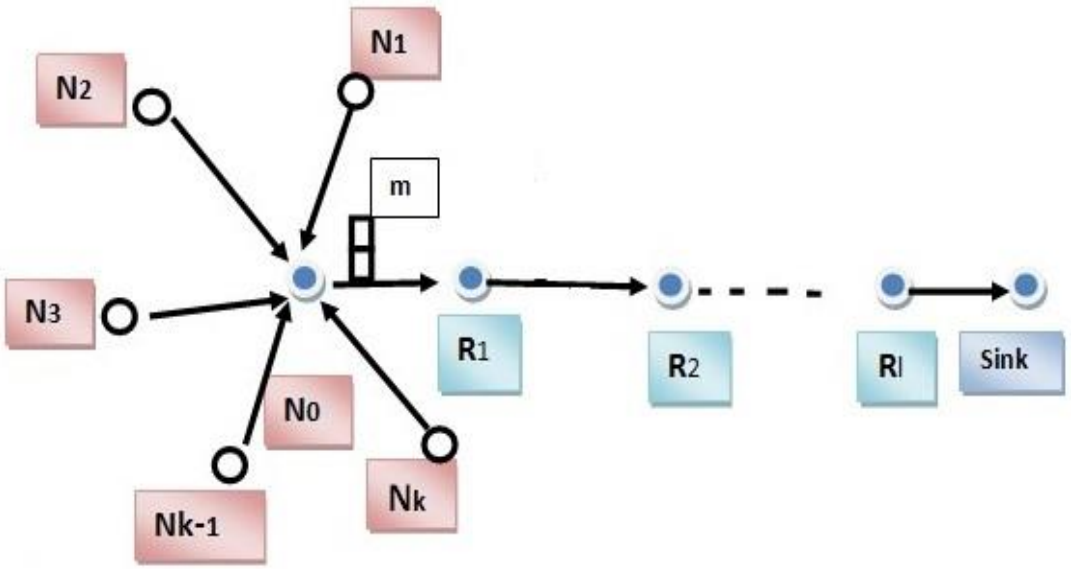
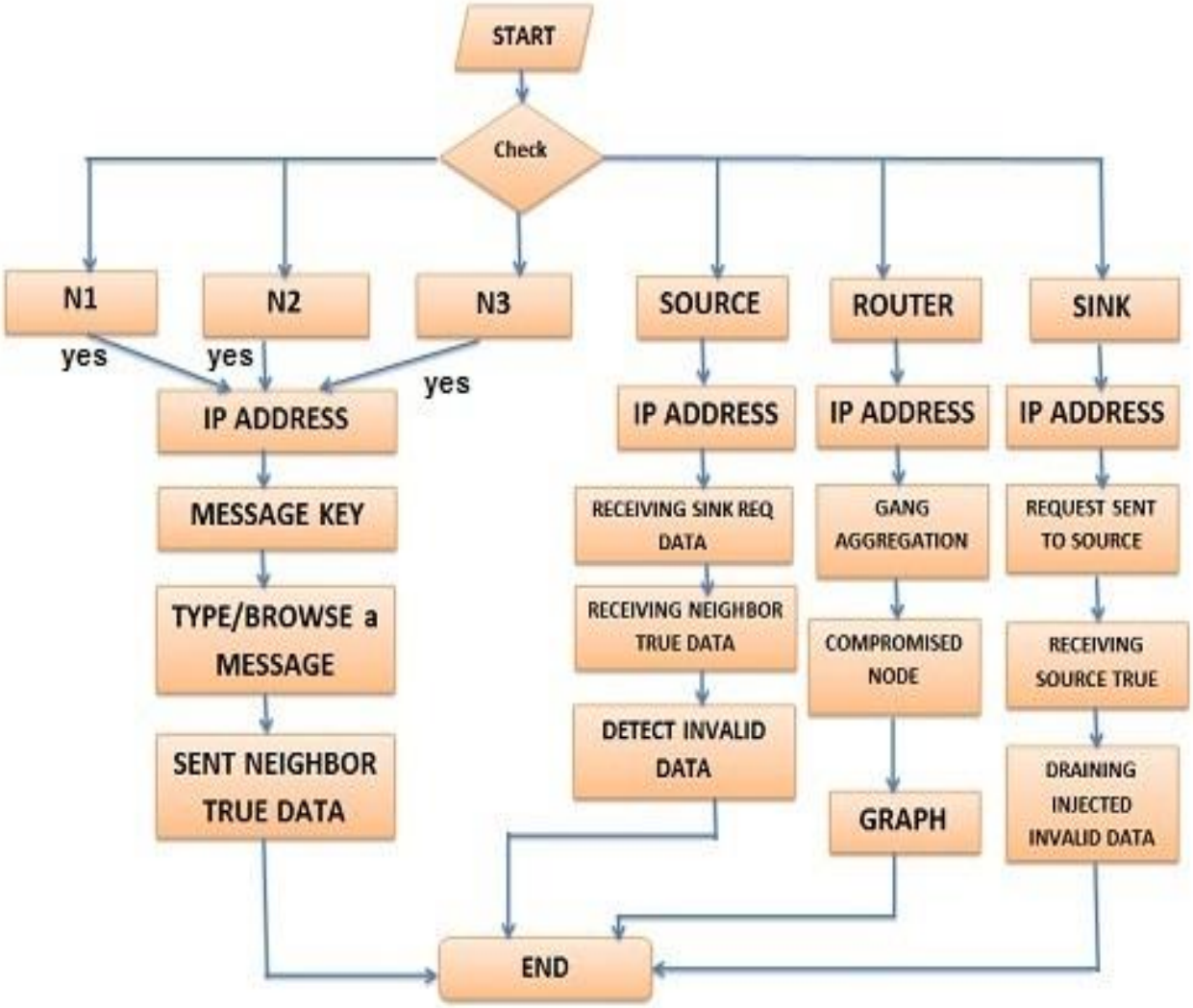


Figure 3: Neighbour router based authentication mechanism

In this mechanism, firstly set up a routing path between source node N0 and sink through $R_1 \rightarrow R_2 \rightarrow \cdots \rightarrow R_1 \rightarrow$ Sink. Each sensor (N_1, N_2, N_3, N_4,..N_k) send own report m (if any change of sensor event such as temp change, pressure change, etc., this information is called report.) to source node N_0 and this report m and authentication information Message authentication code send to the sink via routing path. Every sensor node has own private key and this key also shared with the sink. From the relationship between neighbour & source node, Consorting to the Elliptic Curve Cryptography based key pair establishment, established a relationship between sink & source, source & neighbours and sink & routers. When a sensor node send an invalid reports to the source node, it will be detected at source node and drained before it reaches the sink.

I. BLOCK DIAGRAM & ALGORITHMS



Block Diagram

Procedure of the message authentication scheme

1. Start process.
2. Create six nodes Neighbor1 (N_1), Neighbor2 (N_2), Neighbor3 (N_3), Source node, Router node, Sink node.
3. Assign the IP address to every node.
4. Assign a message subject (Message key) to every neighbor node individually, and the sink has all the keys.
5. Browse the massage to N_1, N_2, N_3 and transform to the source node.
6. Source node receives all the messages from N_1, N_2, N_3 nodes.
7. Sink node request to source node for true data.
8. On the source node we detect the invalid data and send to the sink node.
9. Receiving the true data from Source node through router.
10. On sink node we obtain drained injected invalid data.
11. End Process

Used Algorithm

Algorithm 1 : With (m, T,RN_0) as input, each sensor node Ni ∈ (NN_0 ∪ {N_0}) invokes the Algorithm 1 to generate a row authentication vector) and reports Row_i to the source node N_0.

MAC Generation

1: **procedure** MACGENERATION
Input: Ni ∈ (NN_0 ∪ N_0), m, k_i,R_{N0}
Output: Key
2: Every neighbour node (N1,N2, N3,….Nk)is connected with the sink node (S) through Route(R1,R2, R3….RL) and Private key of every neighbour node(ki1,ki2,ki3…kis) shared with the SINK node.
3. **if** neighbour sends the event triggered report m to the source node
then source node detects correct report m.

Algorithm 2 : If the returned value of Algorithm 2 is "accept", the sink accepts the report m; otherwise, the sink rejects the report.

Sink Verification

1. **procedure** SINKVERIFACTION
   Input: N_k, S_k, m
   Output: accept or reject
2. if(Neighbour node key N_k = SINK node key S_k)
3. return value = "report m accept "
4. else
5. return value = "report m reject"
6. **end if**
7. **end else**
8. **return** return value
9. **end procedure**

V. RESULTS

Following figure shows the route which is complete path from source to sink node with true data and it removes the gang injecting invalid data attack. Green nodes are selected for the establishing the complete path with the sink. Red nodes are showing detected invalid data and the purple node not selected in the further event and drained the invalid data before it received by the sink. By draining the invalid data we saved more energy and bandwidth of network, which was going in vain.

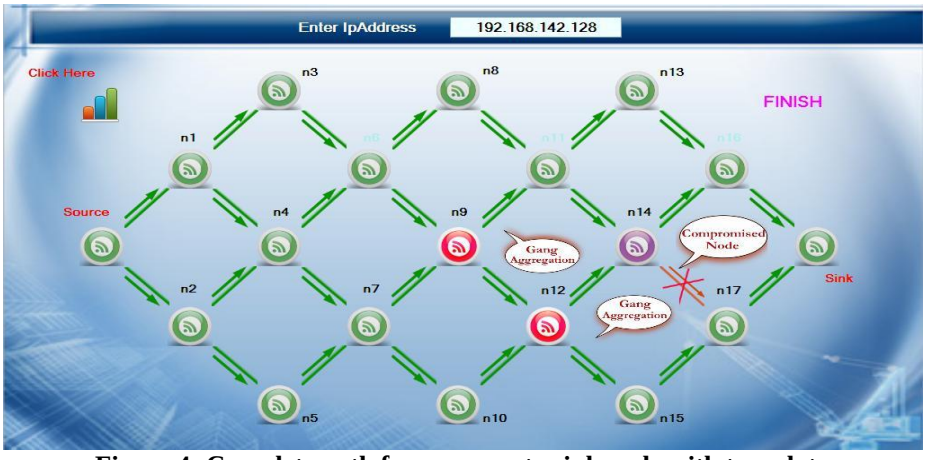


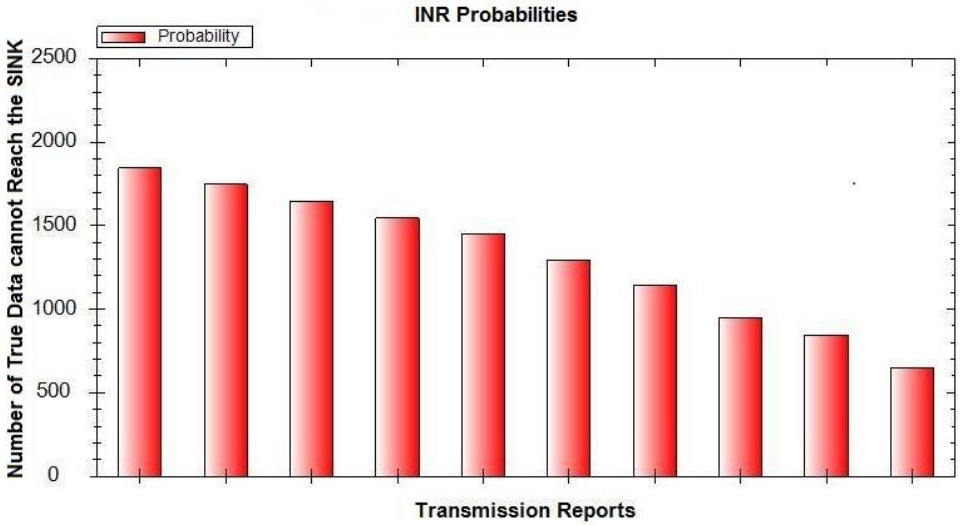
Figure 4: Complete path from source to sink node with true data

Invalid Negative Rate (INR) shows the high reliability of true data received by the sink. This Authentication scheme provides high draining probability with the high reliability.
For the testing of reliability of this scheme we use following

INR =N_t/T

N_t =Number of true data that cannot reach the *sink*
T= Total number of true data

If N_t is small than INR will decrease and small INR shows higher reliability**.** This figure shows the INR probabilities between Number of true data that cannot reach the sink and transmission Report. That figure shows that if Number of true data that cannot reach the sink is decrease than INR ratio is decrease**.**



Graph: INR probabilities

VI. CONCLUSION & FUTURE WORK

In this paper, proposed an authentication scheme for draining the injected invalid data. . The power and communication of data are the main problems of a wireless sensor network. With its limitations, it is important to design a network that uses optimal energy resources while transferring reliable data and bandwidth will be saved. By results this scheme has been achieve high reliability and high en-routing filtering probability with multi report.
This scheme is simple and effective, that it could be used in mobile sensor node authentication scenarios. In future work, we will apply this scheme while gang injecting invalid data attack on mobile sensor networks.

ACKNOWLEDGEMENT

I am very thankful to my guide Mr. Kunal Gupta, who helped me to prepare this paper. I also express my gratitude to all my friends. I never forget those who gave me the idea to prepare and submit this research paper in IJSRP prestigious journal.

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Morphology: Indian Languages and European Languages

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Abstract- Natural Language Processing (NLP) is a very popular and research area of computer science. NLP is a part of Artificial Intelligent but NLP has combination of many fields such as Hindi, English, and Computer Science etc. This paper contains how verb work in Hindi and English languages and morphology of both languages. Morphological Analyzer and generator is a tool for analyzing the given word and generator for generating word given the stem and its features. There are many Indian languages and many European languages but generally Hindi language consider as an Indian language and English as a European language. Both languages have grammatical rules. In English language, we do not use verbs as gender identification but in Hindi we use verbs for gender identification.

Index Terms- European languages, Indian languages, morphology, and verb

I. INTRODUCTION

Natural Language Processing (NLP) is the basic interface between Human and Computer. It is although considered as a branch of Artificial Intelligence; it is the need for almost all IT applications at the front end at least. It is also considered as major localization problem. No software application can proliferate to all users unless it has utility to operate it with local language.

Morphology is the field of the linguistics that studies the internal structure of the words. Morphological Analysis is essential for Hindi it has a rich system of inflectional morphology as like other Indo-Aryan family languages. Main concern here is on the grammatical information of words and this grammatical information like gender, number, person etc. is marked through the inflectional suffixes. A variety of scripts, and hundreds of dialects Eighth Schedule, lists twenty two Scheduled Languages - Assamese, Bengali, Gujarati, Hindi, Kannada, Kashmiri, Konkani, Malayalam, Manipuri, Marathi, Nepali, Oriya, Punjabi, Sanskrit, Sindhi, Tamil, Telugu, Urdu, Bodo, Dogri, Maithili and Santhali Hindi is spoken by 43% population of India followed by Bengali, Telugu, Marathi and others.

II. HISTORY

Artificial Intelligence (AI) goal initially was to give computer the ability to parse natural language sentences similar to sentence diagrams that grade-school children learn. One of the first such systems was developed in 1963 by Susumu Kuno of Harvard. The system revealed the depth of ambiguity in English language. Natural languages have very little inflectional morphology to distinguish between parts of speech; additional information is implied by emphasizing them by speech. The goal of NLP evaluation is to measure one or more qualities of an algorithm or a system, in order to determine whether and to what extent the system answers the goals of its designers, or meets the needs of its users. Research in NLP evaluation has received considerable attention.

III. NATURAL LANGUAGE PROCESSING

Natural language processing is a field of computer science and Computational linguistics and is associated with human – Machine interaction having two major components:

1) Natural language generation systems to convert information from computer to natural language and
2) Natural language understanding systems to convert reverse way.

As such NLP is the basic interface between Human and Computer. Many NLP problems fall under both generation and understanding NLP has significant overlap with the field of computational linguistics, and is often considered a sub-field of artificial intelligence.

Stages of language processing:

- Phonetics and phonology
- Morphology
- Lexical Analysis
- Syntactic Analysis
- Semantic Analysis
- Pragmatics
- Discourse

In this paper we discuss morphology in detail.

Word formation rules from root words

- Nouns: Plural (boy-boys); Gender marking (czar-czarina)
- Verbs: Tense (stretch-stretched); Aspect (e.g. perfective sit-had sat); Modality (e.g. request khaanaa→ khaaiie)
- First crucial first step in NLP
- Languages rich in morphology: e.g., Dravidian, Hungarian, Turkish
- Languages poor in morphology: Chinese, English
- Languages with rich morphology have the advantage of easier processing at higher stages of processing

A task of interest to computer science: Finite State Machines for Word Morphology.

IV. MORPHOLOGY

Morphology is the study of the way words are built up from smaller meaning bearing units, morphemes. European languages

have both regular noun and irregular noun but Hindi language have only regular noun. English verbal inflection is complicated then nominal inflection.

English has three kinds of verbs:

- Main verbs (eat, sleep, impeach)
- Model verbs (can, will, should)
- Primary verb (be, have, do)

Morphology is often useful to distinguish two broad classes of morphemes: stems and affixes. The exact details of distinction vary from language to language but intuitively, the steam is the main morpheme of the word, supplying the main meaning, while the affixes add additional meanings of various kinds.

Affixes are further divided into prefixes, suffixes and circumfuse. Prefixes precede the stem, suffixes follow the stem, circumfuse do both, and infixes are inserted inside the stem.

	Regular Noun	Irregular noun	
singular	Dog	Mouse	English language
plural	Dogs	Mice	
singular	dqRrk	pwgk	Hindi language
plural	dqRras	pwgsa	

Table 1: Morphology

Morphemes have two broad classes:

1) Inflection is the combination of a word stem with a grammatical morpheme, usually resulting in a word of the same class as the original stem.

2) Derivation is the combination of word stem with a grammatical morpheme, usually resulting in a word of a different class.

Inflectional morphology is work for only noun, verbs and adjective.

Derivation in English is more complex than inflection.

Suffix	Base verb	Derived word
ation	Computerize	Computerization
able	Embraceable	Embraceable
er	Kill	Killer
ee	Appoint	appointee

Table 2: Derivational Inflection

In English language, we do not use verbs as gender identification but in Hindi we use verbs for gender identification.

For example:

Saanchi NLP padati hai.
(Sanchi reads NLP.)

Saachya NLP padtaa hai.
(Sachya reads NLP.)

Here we easily see the difference between genders. For female (Sanchi) padati hai and for male (Sachya) padata hai. But in English both gender have same verb read. In these examples we can easily understand one more thing that is in English we use verb in between of the sentences or after that noun or pronoun. But in Hindi we use verb at last of he sentences.

If we had an exhaustive lexicon which listed all the word forms of all the roots and along with each word from it listed its features values then clearly we do not need a morphological analyser.

Lexicon has many problems:

- It is extremely wasteful of memory space
- It does not show relationships among different roots that have similar word forms.
- Some languages have a rich and productive morphology.

The figure morphological analyzer input output shows input output in paninian grammar.

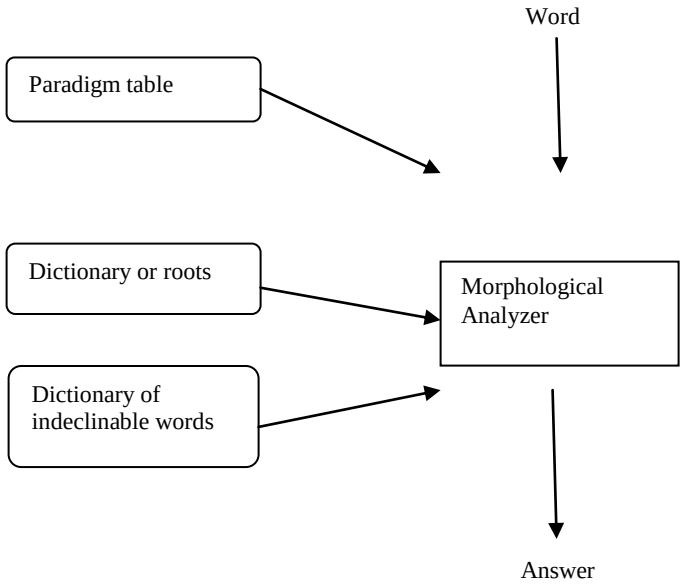

Figure.1: Morphological analyser input-output

A. Hindi Morphology

Morphology involves the study of inner structure of words and their forms in different uses and constructions. It can be mainly divided into two branches – derivational morphology and inflectional morphology. Derivational morphology involves the processes by which new lexemes are built from existing ones mainly through the addition of affixes.

As an example in Hindi + e + esjk = eesjk (Pronoun to Adjective), like in English – go + at = goat (verb to noun) etc. Inflectional morphology involves the processes by which various inflectional forms are formed from a lexical stem. As an example in Hindi – inflectional forms of noun (guest) are vfrfFk (masculine-singular-direct), vfrfFk (masculine oblique-singular), vfrfFk (masculine-direct-plural), vfrfFk;ksa (masculine-oblique-plural). Hindi is very rich in inflectional morphology can be witnessed from the fact that in English usually there are maximum of 7-8 inflected word forms of noun but in Hindi it can be up to 40 and even more than that.
Grammatical information that are being used for Hindi:

Noun: Grammatical information required for Hindi Nouns are - gender, number and case. Gender can be masculine, feminine or both (as some nouns can be used both as masculine and as feminine). Number can be singular or plural. Case can be two types (in present work) – direct and oblique.

Pronoun: Grammatical information required is – number, case, person, and gender. Gender can be masculine, feminine or both. Number can be singular or plural. Case can be two types (in present work) – irect and oblique. Person can take first, second and third person.

Adjective: Grammatical information required for Hindi nouns is - gender, number and case. Gender can be masculine, feminine. Number can be singular or plural. Case can be two types – direct and oblique.

Verb: Grammatical information required is gender, number, person, Gender can be masculine, feminine. Number can be singular or plural. Person can take first, second and third person. Number can be singular and plural.

Adverb: There are two classes of adverbs, inflected and uninflected. Inflected adverbs behave like nouns so no separate paradigms were required for these. Grammatical information required for inflected adverbs will be same as required for nouns and for uninflected adverbs no grammatical information is to be stored.

Sharisthi Pronoun: Grammatical information required is – number, case, person, and gender, parsarg. Gender can be masculine, feminine or both. Number can be singular or plural. Case can be two types (in present work) – direct and oblique. Person can take first, second and third person. Parsarg will be shashthi.

V. NDIAN LANGUAGE PROPERTY

A scripts used are phonetic in Nature Better Articulatory discipline Systematic manner of production Five or Six distinct places of Articulation Various types of Flaps/Taps or Trills Fewer fricatives compared to English / European languages Presence of retroflex consonants A significant amount of vocabulary in Sanskrit with Dravidian or Austroasiatic origin gives indications of mutual borrowing and counter influences.

D. Some Exceptions

- In Tamil language, all plosives of a given place of articulation are represented by a single grapheme. The pronunciation of such graphemes depends on the context.
- More fricative consonants are present in Hindi, Punjabi, Sindhi, Kashmiri and Urdu due to influence of Perso-Arabic & English.
- च and ज are dental-alveolar in Marathi only, while these are alveolar in Hindi.
- ड़ and ढ़ are present in Hindi, Urdu, Sindhi, Punjabi & Oriya.
- Fricative स is श or ष in Oriya.
- व and ब are pronounced as ब in Bengali.
- व and ब are pronounced as भ in Oriya.
- Punjabi is a tonal language mostly in aspirated voiced sounds.
- Sindhi language has implosives.
- Native words of the Dravidian languages do not contain aspirated sounds.
- ण sound is more frequently used in Gujarati and Marathi.
- त and द are pronounced mostly as ट and ड in Assamese and Gujarati languages.
- य and स are pronounced as ज and ह in Assamese.

VI. DIFFERENCES

There are many differences between Hindi and English languages.

A Difference in Origin

The Hindi language could be traced back to the Khariboli dialect used in Delhi. It belongs to the Indo-European language family under the Western Hindi. English meanwhile is of the Germanic language family. Its roots could be traced to as far back as the year 400's from the tongues of the Anglo-Saxon kingdoms in England. Though both Hindi and English are under the Indo-European language family, they have major differences.

B Difference in Alphabet

The English language is written using the English alphabet consisting of 26 letters. Written Hindi employs the Devangari script which contains 10 vowels and 40 consonants. Bars on top of the symbols make them distinct. Since Hindi is a phonetic language, the word is pronounced according to its spelling. This makes the language easier to pronounce since it follows the written form all the time. This is unlike English where pronunciations of certain words do not strictly follow the written form.

C Difference in Grammar

English and Hindi share the same verb tenses, i.e. simple present, past, future, and so on. In Hindi, however, there is a deficiency in associating them to properly convey different meanings. Thus, Hindi speakers often find themselves using present continuous instead of the simple present.

Hindi does not have the equivalent of "do". So instead of structuring the words to form queries, intonation is used to convey a question. Moreover, in conditional sentences, Hindi makes use of the future tense in the independent clause.

In English, polite requests are usually expressed in the form of questions. In Hindi, subjunctives are employed and the sentence structure changed to ask for something. While the English language has definite articles, Hindi does not. Moreover, the number "one" is used instead of the indefinite article.

In terms of sentence structure, the subject-object-verb is used in Hindi, whereas English uses the subject-verb-object word order. Prepositions in English come after the pronoun or noun they qualify. For Hindi, prepositions succeed the noun or pronouns. Hindi speakers typically have difficulty using the correct prepositions as is common to most non-native speakers learning English.

D Difference in Vocabulary

Hindi has adapted many English words. The pronunciations of these incorporated words, though, have been modified.

Though differences between Hindi and English languages are clear, especially with the Devangari script it uses, Hindi is not too hard to master.

Figure.2: European language country

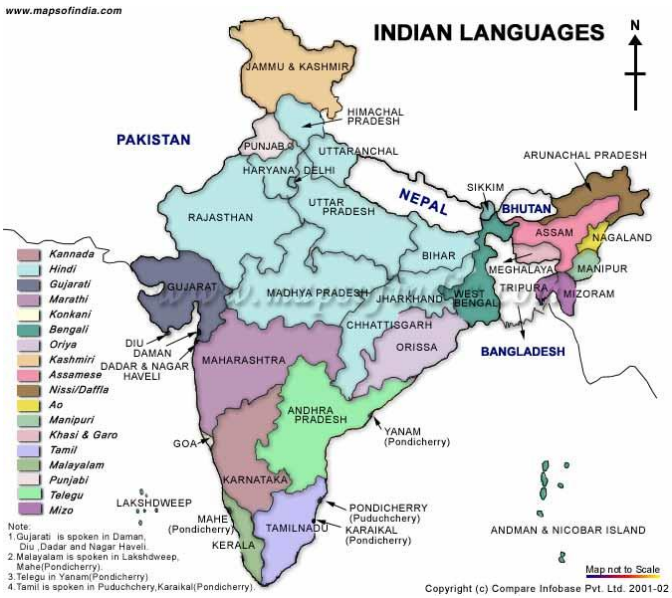

Figure.3: Indian language country

VII. ENGLISH LANGUAGE

Words are divided into different kinds or classes, called Parts of speech, according to their use; that is, according to they do in a sentence. The parts of speech are eight in number:-

- Noun: A noun is a word used as the name of a person place or thing.
- Pronoun: A pronoun is a word used instead of a noun.
- Verb: A verb is a word used to express an action or state.
- Adjective: An adjective as a word used to add something to the meaning of a noun.
- Adverb: An adverb is a word used to add something to the meaning of a verb, an adjective, or another verb.
- Preposition: A preposition is a word used with a noun or a pronoun to show how the person or thing denoted by the noun or pronoun stand in relation to something else.
- Conjunction: A conjunction is a word used to join word or sentences.
- Interjection: An interjection is a word which expresses some sudden feeling.

A verb is a word that tells or asserts something about a person or thing. Verb comes from the Latin verbum, a word. It is so called because it is the most important word in a sentence.

The verb, like the personal pronouns, has three person- the first, the second and third. Thus we say

1) I speak.
2) You speak.
3) He speaks.

This is because of the difference in person of the subjects, as all the three are subjects of the singular number.
In sentence 1, the subject is of the first person; therefore the verb is also of the first person.
In sentence 2, the subject is of the second person; therefore the verb is also of the second person.
In sentence 3, the subject is of the third person; therefore the verb is also of the third person.
We thus see that the verb takes the same person as its subject: or, that the verb agrees with its subject in person.

The verb like the noun and the pronoun has two numbers: the singular and the plural. Thus we say-

1) He speaks.
2) They speak.

This is because of the difference in number of the subjects.
In sentence 1, the subject is singular, therefore the verb is singular.

In sentence 2, the subject is plural, therefore the verb is plural.
We thus see that the verbs takes the same number as its subject; or that the verb agrees with its subject in number.

VIII. CONCLUSIONS

In this paper we see both languages: Indian and European. The growth of European languages is increase day by day and every most of the thing available in computer in your own languages. But in Indian language there are not same as European language in computer field. For example most o the thing available in Wikipedia in Turkish, but in Hindi reverses of this. So we are trying to convert all things in Hindi. This language problem most of the Indian people not connect with computer. If everything available in Hindi then every people connected with computer. With the help of Natural Language Processing not far that day when everything available in Hindi.

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Machine Learning Algorithms for Opinion Mining and Sentiment Classification

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Abstract- With the evolution of web technology, there is a huge amount of data present in the web for the internet users. These users not only use the available resources in the web, but also give their feedback, thus generating additional useful information. Due to overwhelming amount of user's opinions, views, feedback and suggestions available through the web resources, it's very much essential to explore, analyse and organize their views for better decision making. Opinion Mining or Sentiment Analysis is a Natural Language Processing and Information Extraction task that identifies the user's views or opinions explained in the form of positive, negative or neutral comments and quotes underlying the text. Various supervised or data-driven techniques to Sentiment analysis like Naïve Byes, Maximum Entropy and SVM.For classification use support vector machine (SVM), it performs the sentiment classification task also consider sentiment classification accuracy.

Index Terms- Text mining, support vector machine (SVM), Sentiment Classification, Feature extraction, opinion mining.

I. INTRODUCTION

Text mining offers a way for individuals and corporations to exploit the vast amount of information available on the Internet. In current search engine people to search for other people's opinions from the Internet before purchasing a product or seeing a movie because practically, when we are not familiar with a specific product, we ask our trusted sources to recommend one [6]. Many website provide user rating and commenting services, and these reviews could reflect users' opinions about a product. With the propagation of reviews, ratings, recommendations, and other forms of online expression, online opinion could present essential information for businesses to market their products and manage their reputations. Current search engines can efficiently help users obtain a result set, which is relevant to user's query. However, the semantic orientation of the content, which is very important information in the reviews or opinions, is not provided in the current search engine. For example, Google will return around 7 380 000 hits for the query "Angels and Demons review." If search engines can provide statistical summaries from the semantic orientations, it will be more useful to the user who polls the opinions from the Internet. A scenario for the aforementioned movie query may yield such report as "There are 10 000 hits, of which 80% are thumbs up and 20% are thumbs down." This type of service requires the capability of discovering the positive reviews and negative reviews.Opinion Mining is a process of automatic extraction of knowledge from the opinion of others about some particular topic or problem. This paper will try to focus on the basic definitions of Opinion Mining, analysis of linguistic resources required for Opinion Mining, few machine learning techniques on the basis of their usage and importance for the analysis, evaluation of Sentiment classifications.

Current-day Opinion Mining and Sentiment Analysis is a field of study at the crossroad of Information Retrieval (IR) and Natural Language Processing (NLP) and share some characteristics with other disciplines such as text mining and Information Extraction. Opinion mining is a technique to detect and extract subjective information in text documents. In general, sentiment analysis tries to determine the sentiment of a writer about some aspect or the overall contextual polarity of a document. The sentiment may be his or her judgment, mood or evaluation. A key problem in this area is sentiment classification, where a document is labeled as a positive or negative evaluation of a target object (film, book, product etc.).In recent years, the problem of "opinion mining" has seen increasing attention. Sentiment classification is a recent subdiscipline of text classification which is concerned not with the topic a document is about, but with the opinion it expresses. Sentiment classification also goes under different names, among which opinion mining, sentiment analysis, sentiment extraction, or affective rating.

II. SENTIMENT ANALYSIS

Sentiment analysis of natural language texts is a large and growing field. Sentiment analysis or Opinion Mining is the computational treatment of opinions, sentiments and subjectivity of text. Sentiment analysis is a Natural Language Processing and Information Extraction task that aims to obtain writer's feelings expressed in positive or negative comments, questions and requests, by analyzing a large numbers of documents. Converting a piece of text to a feature vector is the basic step in any data driven approach to Sentiment analysis. Term frequency has always been considered essential in traditional Information Retrieval and Text Classification tasks. But Pang-Lee [1] found that term presence is more important to Sentiment analysis than term frequency. That is, binary-valued feature vectors in which the entries merely indicate whether a term occurs (value 1) or not (value 0).It also reported that unigrams outperform bigrams when classifying movie reviews by sentiment polarity. As a result, the sentiment analysis research from the determination of the semantic orientation of the terms. Determining semantic orientation of words Hatzivassiloglou and McKeown [8] hypothesize that adjectives separated by "and" have the same polarity, while those separated by "but" have opposite polarity .Starting with small seed lists, this information is used to group

adjectives into two clusters such that maximum constraints are satisfied. Sentiment classification is a recent sub discipline of text classification which is concerned not with the topic a document is about, but with the opinion it expresses. Functional to the extraction of opinions from text is the determination of the orientation of "subjective" terms contained in text, i.e. the determination of whether a term that carries opinionated content has a positive or a negative connotation [2]. Esuli and Sebastiani proposed new method for determining the orientation of subjective terms. The method is based on the quantitative analysis of the glosses of such terms, i.e. the definitions that these terms are given in online dictionaries, and on the use of the resulting term representations for semi-supervised term classification. Sentiment classification can be divided into several specific subtasks: determining subjectivity, determining orientation, determining the strength of orientation [2]. Esuli and Sebastiani [4] described SENTIWORDNET, which is a lexical resource in which each WordNet synset is associated with three numerical scores, i.e., Obj(s), Pos(s), and Neg(s), thus describing how objective, positive, and negative the terms contained in the synset.

Traditionally, sentiment classification can be regarded as a binary-classification task [1], [5].Dave,Lawrence,Pennock [5] use structured reviews for testing and training, identifying appropriate features and scoring methods from information retrieval for determining whether reviews are positive or negative. These results perform as well as traditional machine learning method then use the classifier to identify and classify review sentences from the web, where classification is more difficult. Various supervised or data-driven techniques to Sentiment analysis like Naïve Byes, Maximum Entropy and SVM. Pang Lee [1] compared the performance of Naïve Bayes, Maximum Entropy and Support Vector Machines in Sentiment analysis on different features like considering only unigrams, bigrams, combination of both, incorporating parts of speech and position information, taking only adjectives etc. It is observed from the results that:

a. Feature presence is more important than feature frequency.

b. Using Bigrams the accuracy actually falls.

c. Accuracy improves if all the frequently occurring words from all parts of speech are taken, not only Adjectives.

d. Incorporating position information increases accuracy.

e. When the feature space is small, Naïve Bayes performs better than SVM. But SVM's perform better when feature space is increased.

According to their experiment, SVMs tended to do the best, and unigram with presence information turns out to be the most effective feature. In recent years, some researchers have extended sentiment analysis to the ranking problem, where the goal is to assess review polarity on a multipoint scale. Goldberg and Zhu [7] proposed a graph-based semi supervised learning algorithm to address the sentiment-analysis task of rating inference and their experiments showed that considering unlabeled reviews in the learning process can improve rating inference performance.

III. MACHINE LEARNING APPROACHES

The aim of Machine Learning is to develop an algorithm so as to optimize the performance of the system using example data or past experience. The Machine Learning provides a solution to the classification problem that involves two steps:

1) Learning the model from a corpus of training data

2) Classifying the unseen data based on the trained model.

In general, classification tasks are often divided into several sub-tasks:

1) Data preprocessing
2) Feature selection and/or feature reduction
3) Representation
4) Classification
5) Post processing

Feature selection and feature reduction attempt to reduce the dimensionality (i.e. the number of features) for the remaining steps of the task. The classification phase of the process finds the actual mapping between patterns and labels (or targets). Active learning, a kind of machine learning is a promising way for sentiment classification to reduce the annotation cost. The following are some of the Machine Learning approaches commonly used for Sentiment Classification [10].

4.1 **Naive Bayes Classification**

It is an approach to text classification that assigns the class c* = argmaxc P(c | d), to a given document d. A naive Bayes classifier is a simple probabilistic classifier based on Bayes' theorem and is particularly suited when the dimensionality of the inputs are high. Its underlying probability model can be described as an "independent feature model". The Naive Bayes (NB) classifier uses the Bayes' rule Eq. (1),

$$P(c \mid d) = \frac{P(c)P(d \mid c)}{P(d)} \qquad (1)$$

Where, P (d) plays no role in selecting c*. To estimate the term P(d|c), Naive Bayes decomposes it by assuming the fi's are conditionally independent given d's class as in Eq.(2),

$$P_{NB}(c \mid d) = \frac{P(c)\left(\prod_{i=1}^{m} P(f_i \mid c)^{n_i(d)}\right)}{P(d)} \qquad (2)$$

Where, m is the no of features and fi is the feature vector. Consider a training method consisting of a relative-frequency estimation P(c) and P (fi | c). Despite its simplicity and the fact that its conditional independence assumption clearly does not hold in real-world situations, Naive Bayes-based text categorization still tends to perform surprisingly well; indeed, Naive Bayes is optimal for certain problem classes with highly dependent features.

4.2 **Maximum Entropy**

Maximum Entropy (ME) classification is yet another technique, which has proven effective in a number of natural language processing applications. Sometimes, it outperforms Naive Bayes at standard text classification. Its estimate Of P(c | d) takes the exponential form as in Eq. (3) [10],

$$P_{ME}(c \mid d) = \frac{1}{Z(d)} \exp\left(\sum_i \lambda_{i,c} F_{i,c}(d,c)\right) \qquad (3)$$

Where, Z (d) is a normalization function. Fi, c is a feature/class function for feature fi and class c, as in Eq. (4),

$$F_{i,c}(d,c') = \begin{cases} 1 & n_i(d) > 0 \text{ and } c' = c \\ 0 & \text{otherwise} \end{cases} \quad (4)$$

For instance, a particular feature/class function might fire if and only if the bigram "still hate" appears and the document's sentiment is hypothesized to be negative. Importantly, unlike Naive Bayes, Maximum Entropy makes no assumptions about the relationships between features and so might potentially perform better when conditional independence assumptions are not met.

4.3 **Support Vector Machines**

Support vector machines (SVMs) have been shown to be highly effective at traditional text categorization, generally outperforming Naive Bayes. They are large-margin, rather than probabilistic, classifiers, in contrast to Naive Bayes and Maximum Entropy. In the two-category case, the basic idea behind the training procedure is to find a maximum margin hyperplane, represented by vector w, that not only separates the document vectors in one class from those in the other, but for which the separation, or margin, is as large as possible. This corresponds to a constrained optimization problem; letting cj Ɛ {1, −1} (corresponding to positive and negative) be the correct class of document dj, the solution can be written as in Eq. (5) [10],

$$\vec{w} := \sum_j \alpha_j c_j \vec{d}_j, \quad \alpha_j \geq 0 \quad (5)$$

Where, the αj's are obtained by solving a dual optimization problem. That dj such that αj is greater than zero are called support vectors, since they are the only document vectors contributing to w. Classification of test instances consists simply of determining which side of w's hyperplane they fall on.

Support vector machines were introduced in [3] (Vapnik) and basically attempt to find the best possible surface to separate positive and negative training samples. Support Vector Machines (SVMs) are supervised learning methods used for classification. In this project, SVM is used for sentiment classification. First module is sentiment analysis and Support vector machines perform sentiment classification task on review data. The goal of a Support Vector Machine (SVM) classifier is to find a linear hyperplane (decision boundary) that separates the data in such a way that the margin is maximized. Look at a two class separation problem in two dimensions like the one illustrated in figure 1, observe that there are many possible boundary lines to separate the two classes. Each boundary has an associated margin. The rationale behind SVM's is that if we choose the one that maximizes the margin we are less likely to misclassify unknown items in the future.

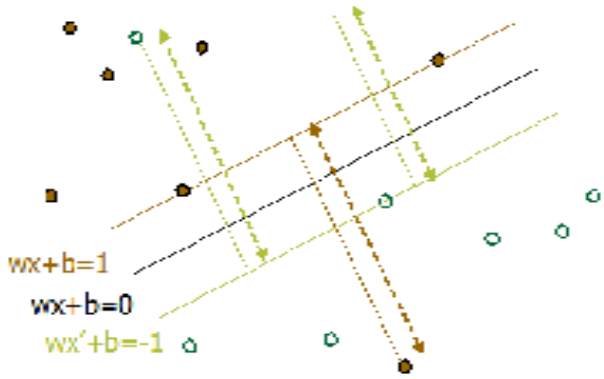

Figure 1: Different boundary decisions are possible to separate two classes in two dimensions. Each boundary has an associated margin.

What SVM is used for?

SVM is primarily used for categorization. Some examples of SVM usage include bioinformatics, signature/hand writing recognition, image and text classification, pattern recognition, and e-mail spam categorization. Many research documents such as the ones mentioned above have shown that SVM can classify reasonably well. In this project, SVM is used for text classification. Text classification is a method used to put text into meaningful groups. Besides SVM, there are many other methods for text classification such as Bayes and k-Nearest Neighbor. Based on many research papers (Joachims, T., 1998), SVM outperforms many, if not all, popular methods for text classification. The studies also show that SVM is effective, accurate, and can work well with small amount of training data [12].

How SVM Works

The idea for SVM is to find a boundary (known as a hyperplane) or boundaries that separate clusters of data. SVM does this by taking a set of points and separating those points using mathematical formulas. The following figure illustrates the data flow of SVM.

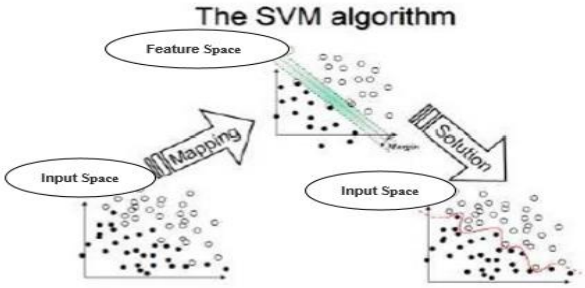

Figure 2: SVM Process Flow

In Figure 2, data are input in an input space that cannot be separated with a linear hyperplane. To separate the data linearly, points are map to a feature space using a kernel method. Once the data in the feature space are separate, the linear hyperplane gets map back to the input space and it is shown as a curvy non-

linear hyperplane. This process is what makes SVM amazing. The SVM's algorithm first starts learning from data that has already been classified, which is represented in numerical labels (e.g. 1, 2, 3, etc.) with each number representing a category. SVM then groups the data with the same label in each convex hull. From there, it determines where the hyperplane is by calculating the closest points between the convex hulls (Bennett, K. P., & Campbell, C., 2000). Once SVM determines the points that are closest to each other, it calculates the hyperplane, which is a plane that separates the labels.

Simple SVM Example

Let us use a few simple points to illustrate the concept of SVM. The following example is similar to Dr. Guestrin's lecture (Guestrin, C., 2006). Given the following points with corresponding classes (labels) in Figure 3, find a hyperplane that separated the points [12].

Table 1: Simple Data in 1-Dimension

Class	X_1
+1	0
-1	1
-1	2
+1	3

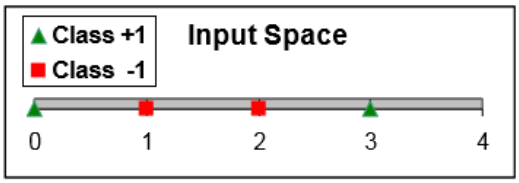

Figure 3: Simple Data in an Input Space

As Figure 3 shows, these points lay on a 1-dimensional plane and cannot be separated by a linear hyperplane. The first step is to find a kernel that maps the points into the feature space, then within the feature space, find a hyperplane that separates the points. A simple kernel that would do the trick is $\Phi(X1) = (X1, X12)$. This kernel is actually a polynomial type. As the reader sees, this kernel will map the points to a 2-dimensional feature space by multiplying the points to the power of 2. From calculating the kernels, we get (0, 0, +1), (1, 1, -1), (2, 4, -1), (3, 9, +1) [12].

Table 2: Simple Data in 2-Dimension

Class	X_1	X_1^2
+1	0	0
-1	1	1
-1	2	4
+1	3	9

Figure 4: Simple Data in a Feature

The next step is finding a hyperplane

$\langle w \bullet x \rangle + b = +1$ (positive labels) (1)

$\langle w \bullet x \rangle + b = -1$ (negative labels) (2)

$\langle w \bullet x \rangle + b = 0$ (hyperplane) (3)

From these equations, find the unknowns, w and b. Expanding the equations for the SVM problem will get:

w1x1 + w2x2 + b = +1

w1x1 + w2x2 + b = -1

w1x1 + w2x2 + b = 0

Solve w and b for the positive labels using equation, w1x1 + w2x2 + b = +1.

w1x1 + w2x2 + b = +1

→10 + w20 + b = +1

→13 + w29 + b = +1

Solve w and b for the negative labels using equation, w1x1 + w2x2 + b = -1.

w1x1 + w2x2 + b = -1

→11 + w21 + b = -1

→12 + w24 + b = -1

By using linear algebra, we find that the solution is w1 = -3, w2 = 1, b = 1, which satisfies the above equations. Many times, there is more than one solution or there may be no solution, but SVM can find the optimal solution that returns a hyperplane with the largest margin. With the solutions: w1 = -3, w2 = 1, b = 1, positive plane, negative plane, and hyperplane can be calculated.

Table 3: Calculation Results of Positive, Negative, and Hyperplane

Positive Plane:	Negative Plane:	Hyperplane:
$\langle w \bullet x \rangle + b = +1$	$\langle w \bullet x \rangle + b = -1$	$\langle w \bullet x \rangle + b = 0$
$w_1x_1 + w_2x_2 + b = +1$	$w_1x_1 + w_2x_2 + b = -1$	$w_1x_1 + w_2x_2 + b = 0$
→ $-3x_1 + 1x_2 + 1 = +1$	→ $-3x_1 + 1x_2 + 1 = -1$	→ $-3x_1 + 1x_2 + 1 = 0$
→ $x_2 = 3x_1$	→ $x_2 = -2 + 3x_1$	→ $x_2 = -1 + 3x_1$

X_1	X_2
0	0
1	3
2	6
3	9

X_1	X_2
0	-2
1	1
2	4
3	7

X_1	X_2
0	-1
1	2
2	5
3	8

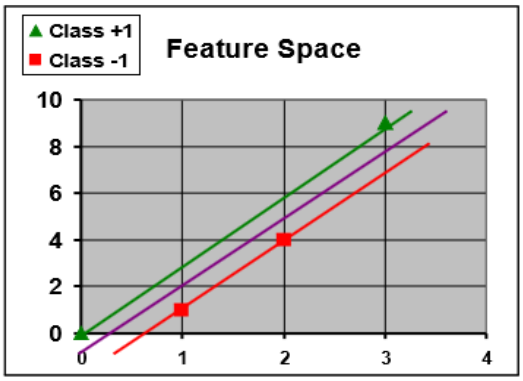

Figure 5: Simple Data in a Feature Space Separated by a Hyperplane

Thus, we have the model that contains the solution for w and b and with margin $2/\sqrt{(w \bullet w)}$. The margin is calculated as follow.

$2/\sqrt{(w \bullet w)}$ (4)

$2/\sqrt{(-32 + 12)}$ → margin = 0.632456

In SVM, this model is used to classify new data. With the solutions, new data can be classified into category. For example, if the result is less than or equal -1, the new data belongs to the -1 class and if the result is greater than or equal to +1, the new data belongs to the +1 class.

LIBSVM is a well-known library for SVM that is developed by Chih-Chung Chang and Chih-Jen Lin. LIBSVM is a library for Support Vector Machines (SVMs).LIBSVM is an integrated software for support vector classification, (C-SVC, nu-SVC), regression (epsilon-SVR, nu-SVR) and distribution estimation (one-class SVM) [9]. It supports multi-class classification. LIBSVM involves two steps: first, training a data set to obtain a model and second, using the model to predict information of a testing data set. SVM procedure includes Transform data to the format of an SVM package, Conduct simple scaling on the data, Select model here use linear formula, Use cross-validation to find the best parameter, Use the best parameter to train the whole training set and Test.

IV. EVALUATION OF SENTIMENT CLASSIFICATION

In general, the performance of sentiment classification is evaluated by using four indexes. They are Accuracy, Precision, Recall and F1-score [11]. The common way for computing these indexes is based on the confusion matrix as shown below:

Table 4: Confusion Matrix

#	Predicted positives	Predicted negatives
Actual positive instances	Number of True Positive instances (TP)	Number of False Negative instances (FN)
Actual negative instances	Number of False Positive instances (FP)	Number of True Negative instances (TN)

These indexes can be defined by the following equations:

- $\text{Accuracy} = \dfrac{TN + TP}{TN + TP + FP + FN}$
- $\text{Precision} = \dfrac{TP}{TP + FP}$
- $\text{Recall} = \dfrac{TP}{TP + FN}$
- $\text{F1} = \dfrac{2 \times \text{Precision} \times \text{Recall}}{\text{Precision} + \text{Recall}}$

Accuracy is the portion of all true predicted instances against all predicted instances. An accuracy of 100% means that the predicted instances are exactly the same as the actual instances. Precision is the portion of true positive predicted instances against all positive predicted instances. Recall is the portion of true positive predicted instances against all actual positive instances. F1 is a harmonic average of precision and recall.

V. CONCLUSION

Some of the machine learning techniques like Naïve Bayes, Maximum Entropy and Support Vector Machines has been discussed. Many of the applications of Opinion Mining are based on bag-of-words, which do not capture context which is essential for Sentiment Analysis. The recent developments in Sentiment Analysis and its related sub- tasks are also presented. The state of the art of existing approaches has been described with the focus on the Sentiment Classification using various Machine learning techniques. This paper introduced and surveyed the field of sentiment analysis and opinion mining. It has been a very active research area in recent years. In fact, it has spread from computer science to management science. Finally, this paper concludes saying that all the sentiment analysis tasks are very challenging. The concept of SVM is explained through a small set of data in a 2-dimenional feature space. With the use of kernel methods, SVM can classify data in high dimensional space. SVM is an excellent method for data classification. Finally, the future challenges and directions so as to further enhance the research in the field of Opinion Mining and Sentiment Classification are discussed.

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Cloud Computing Platform: A Perspective Overview

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Abstract- Traditional business applications have always been very complicated and expensive. The amount and variety of hardware and software required to run them are daunting. You need a whole team of experts to install, configure, test, run, secure, and update them. When you multiply this effort across dozens or hundreds of apps, it's easy to see why the biggest companies with the best IT departments aren't getting the apps they need. With cloud computing, you eliminate those headaches because you're not managing hardware and software-that's the responsibility of an experienced vendor like salesforce.com. In this paper we define a various platform of cloud computing and define the comparison between various infrastructure as a service platform and platform as a service platform.

Index Terms- Customer relationship management , virtual machine.

I. INTRODUCTION

Traditional business applications have always been very complicated and expensive. With cloud computing, you eliminate those headaches because you're not managing hardware and software-that's the responsibility of an experienced vendor like salesforce.com. The shared infrastructure means it works like a utility: You only pay for what you need, upgrades are automatic, and scaling up or down is easy. Cloud-based apps can be up and running in days or weeks, and they cost less. With a cloud app, you just open a browser, log in, customize the app, and start using it. Businesses are running all kinds of apps in the cloud, like customer relationship management, HR, accounting, and much more. Some of the world's largest companies moved their applications to the cloud with salesforce.com after rigorously testing the security and reliability of our infrastructure

II. CLOUD APPLICATION DEVELOPMENT PLATFORMS

Cloud Application Development Platforms Application development, deployment and runtime management have always been reliant on development platforms such as Microsoft's .NET, Web Sphere, or JBoss, which have been deployed on-premise traditionally. In the Cloud-computing context, applications are generally deployed by Cloud providers to provide highly scalable and elastic services to as many end users as possible. The need for support as many users to access and utilize the same application services, with elastic resources allocation have led to enhancement in development platform technologies and architectures to handle performance, security, resource allocation, application monitoring, billing, and fault tolerance. There are several solutions available in the PaaS market, to mention few-: Google App Engine, Microsoft Windows Azure, Force.Com, and Manjrasoft Aneka

(a)Google application engine

Google App Engine provides an extensible runtime environment for web based applications developed with Java or Python, which leverage huge Google IT infrastructure. Google App Engine is offered by Google Inc. Its key value is that developers can rapidly build small web based applications on their machine and deploy them on the Cloud. A notable thing is that Google App Engine provides developers with a simulated environment to build and test applications locally with any operating system or any system that runs a suitable version of Python and Java language environments. Google uses the Java Virtual Machine with Jetty Servlet engine and Java Data Objects.

(b)Windows Azure

The Windows Azure Platform [1] consists of SQL Azure and the .NET services. The .NET services comprises of Access Control services and .NET service bus. Windows Azure is a platform with shared multitenant hardware provided by Microsoft. Windows Azure application development mandates the use of SQL Azure for RDBMS functionality, because that is the only coexisting DBMS functionality accessible in the same hardware context as the applications.

(c)Force.com

Force.com is a development and execution environment that is independent for Salesforce.com. Force.com is the best approach for Platform as-a-Service (PaaS) for developing CRM based application and, with regards to the design of its platform and the runtime environment is based on the Java technology. The platform uses a proprietary programming language and environment called Apex code, which it has a reputation for simplicity in learning and rapid development and execution.

(d)Manjrasoft Aneka

Aneka [2] is a distributed application platform for developing Cloud applications. Distributed means that
Aneka can seam together any number of Windows based physical or virtual desktops or servers into a network of interconnected nodes that act as a single logical "application execution layer." The middleware is managed and monitored with advanced tools that allow monitoring applications' performance and the system status in order to meet the Service Level Agreements (SLAs) made with the users. Aneka-based Clouds can be deployed on a variety of hardware and operating systems including several flavors of the Windows and Linux operating system families. This flexibility allows Aneka to virtually harness almost all the different types of infrastructure and runtime environment to serve application execution on demand.

(e)Amazon web services

The Amazon Web Services (AWS) are a collection of re- mote computing services (also called web services) that together make up a Cloud computing platform, offered over the Internet by Amazon.com. Since early 2006, Amazon Web Services (AWS) has provided companies of all sizes with an infrastructure web ser- vices platform in the Cloud. With AWS you can requisition compute power, storage, and other services-gaining access to a suite of elastic IT infrastructure services as your business demands them. Amazon's Cloud services offerings consist of following services:

1. Elastic Compute Cloud (EC2)
2. SimpleDB
3. Simple Storage Service (S3)
4. Relational Database Service (RDS)
5. CloudFront
6. Simple Queue Service (SQS)
7. Elastic MapReduce
8. Elastic Block Store (EBS)

(f)GoGrid

GoGrid is a Cloud hosting service that enables automated provisioning of virtual and hardware infrastructure over the Internet. GoGrid is an Infrastructure as a Service (IaaS) Cloud provider.GoGrid Cloud Hosting offers developers the F5 Load Balancers for distributing application service traffic across servers, as long as IPs and specific ports of these servers are attached. The load balancer [4] allows Round Robin algorithm and Least Connect algorithm for routing application service requests.

(g)Eucalyptus

Eucalyptus is an open source Cloud computing platform [3]. It is composed of three controllers. Among the controllers, the Cluster Controller is a key component to application service provisioning and load balancing. Each Cluster Controller is hosted on the head node of a cluster to interconnect outer public networks and inner private networks together. By monitoring the state information of instances in the pool of server controllers, the Cluster Controller can select the available service/server for provisioning incoming requests.

(h)Rackspace

The Rackspace Cloud is a growing set of Cloud-related products and services billed on a utility computing basis. Offerings include web application Platform, Cloud Storage Cloud Load Balancers, Cloud Databases, Cloud Backup, and Cloud Monitoring. The Rackspace Cloud was one of the first commercial cloud computing services.

(i)Terremark

Terremark brings the power of the cloud to the enterprise with solutions built to integrate seamlessly into your existing I.T. infrastructure, compatible with your existing applications, and conforming to your policies and compliance needs, helping you move faster, respond quicker, and accelerate innovation. Terre mark's Enterprise Cloud Services give you precise, dynamic allocation of computing resources with the scale, performance and security to handle enterprise-wide applications. Large organizations, IT executives and multi-site teams will appreciate the robust solution for its multi-user capacity, dedicated resource pool architecture and role-based security model as well as private network connectivity and physical device integration.

III. TEST CLOUD PERFORMANCE

In order to test cloud performance, We have selected 4 types of tests and benchmarking 5 native applications running on 5 different cloud platforms:

Tests

(a)Requesting a Small Object – 1x1 pixel GIF

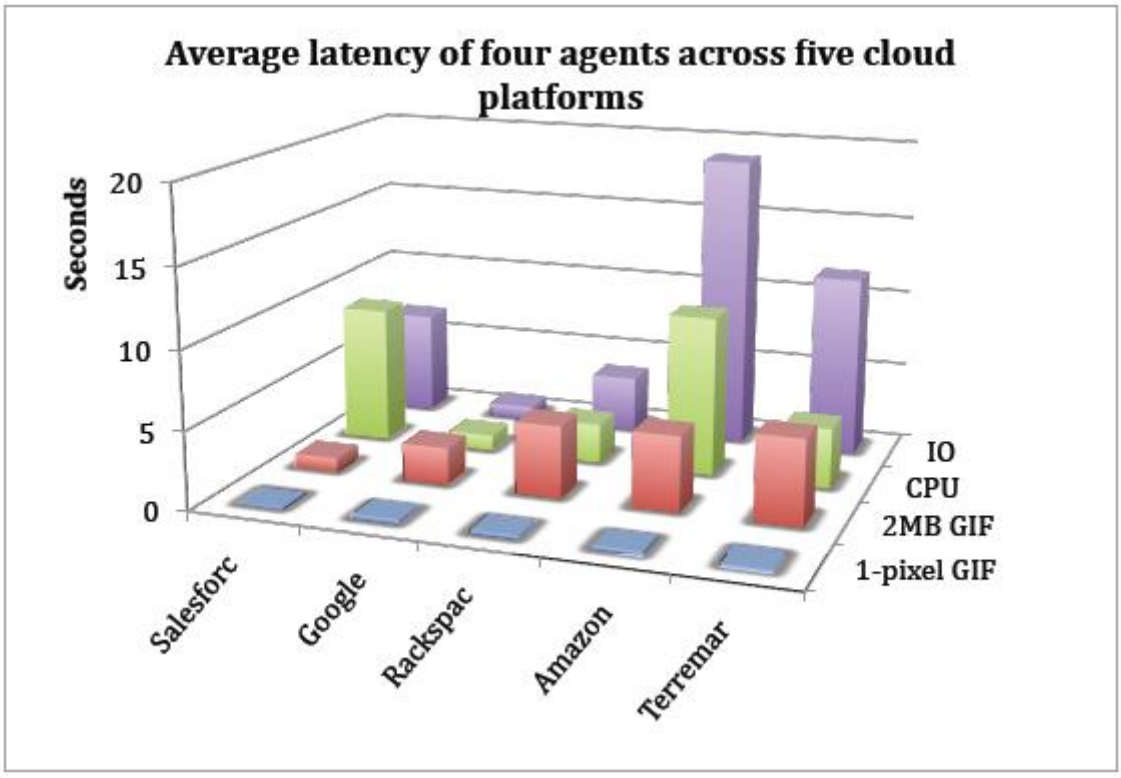
(b)Requesting a Large Object – 2 MB image

(c)Performing a CPU Intensive Task – 1,000,000 sine and sum operations. For Salesforce.com a 100,000 ops load was used because of a platform limitation.

(d)Performing an IO Intensive Task – Querying a 500,000 rows table using a MySQL database with cleared cache for Amazon, Rackspace and Terremark, a data store for Salesforce.com, and a BigTable for Google.

To benchmark native applications, the authors chose 5 real-world websites developed for the platform they ran on. The websites were written in Apex for Salesforce.com, in Java and Python for GAE, websites running on Linux servers on Xen server for Amazon and Rackspace, and websites running on VMware VMs for Terremark. The names of the applications were not disclosed.

Result- The latency of the 4 tests for all 5 cloud platforms were as following-



All platforms performed well for small objects, while PaaS platforms performed better than IaaS for larger objects. Salesforce.com performed poorly for CPU intensive tasks although the test included only 10% of the number of operations used on the other platforms. Google and Rackspace were best at the IO test.

IV. COMPARISON OF VARIOUS PLATFORMS

Cloud provider	**Amazon EC2**	**Windows Azure**	**Google App. engine**
Classes of utility computing	Infrastructure service	Platform service	Platform service
Target applications	General-Purpose applications	General-Purpose applications	Traditional Web applications
Computation	OS level on a Xen virtual machine	Microsoft Common Language Runtime (CLR) VM; Predefined roles of app. instances	Predefined web application frameworks
Storage	Elastic Block Store; Amazon Simple Storage Service (S3); Amazon SimpleDB	Azure storage service and SQL Data Services	Big Table and Megastores
Auto Scaling	Automatically changing the number of instances based on parameters that	Automatic scaling based on application roles and a configuration file	Automatic Scaling which is transparent to users.

	users specify.	specified by.	

V. PERFORMANCE MEASURING REPORT

The authors of the performance measuring report drew up a number of conclusions summarizing the lessons learned during the tests-

(a).Understand the profile of your cloud-Different cloud provider are good at different tasks. You will need to choose the size of your virtual machines in terms of CPU, memory and so on in order to deliver good performance.

(b).Choosing between PaaS or IaaS depend on your intended workload- If you are willing to recode your application to take advantages of big data systems like big table, you can scale well by choosing a PaaS cloud. On the other hand if you need individual machines you will have to build elasticity into your IaaS configuration.

(c).Monitor usage and governors- In PaaS if you exceed your rate limits your users will get errors.

(d). PaaS means you are in the same basket- We noticed that if you are using a PaaS, when the clouds gets slow, everyone gets slow. With IaaS, there are more separation of the CPU and the server responsiveness but you are still contending for shared storage and network bandwidth.

VI. CONCLUSION

Cloud computing has recently emerged as a compelling paradigm for managing and delivering services over the Internet. The rise of cloud computing is rapidly changing the landscape of information technology, and ultimately turning the long-held promise of utility computing into a reality. In this paper we define various platform of cloud computing. In which we define If you are willing to recode your application to take advantages of big data systems like big table, you can scale well by choosing a PaaS cloud. On the other hand if you need individual machines you will have to build elasticity into your IaaS configuration.

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Experimental Investigation on Self Compacting Concrete Using Quarry Dust

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Abstract —This study presents an experimental investigation on self-compacting concrete (SCC) with fine aggregate (sand) replacement of a Quarry Dust (QD) (0%, 25%, 50%, 75%, 100%) and addition of mineral admixtures like Fly Ash (FA) and Silica Fume (SF) & chemical admixtures like super plasticizers (SP). After each mix preparation, 45 cubes specimens and 45 cylinders specimens are cast and cured. The specimens are cured in water for 3, 7 & 28 days. The slump, V-funnel and L-Box test are carried out on the fresh SCC and in harden concrete compressive strength and split tensile strength values are determined. Attempts have been made to study the properties of such SCCs and to investigate the suitability of Quarry Dust to be used as partial replacement materials for sand in SCC.

Index Terms — SCC, Fly Ash, Silica Fume, Quarry Dust, Super plasticizer, compressive strength, split tensile strength.

I. Introduction

Self-compacting concrete (SCC) is considered as a concrete which can be placed and compacted under its self weight with little or no vibration effort, and which is at the same time cohesive enough to be handled without segregation or bleeding of fresh concrete. SCC mixes usually contain superplasticizer, high content of fines and/or viscosity modifying additive (VMA). Whilst the use of superplasticizer maintains the fluidity, the fine content provides stability of the mix resulting in resistance against bleeding and segregation.

The use of fly ash and blast furnace slag in SCC reduces the dosage of superplasticizer needed to obtain similar slump flow compared to concrete mixes made with only Portland cement [1]. It is estimated that SCC may result in up to 40% faster construction than using normal concrete. The special rheological properties of SCC could be achieved, through the use of chemical and mineral admixtures and mixture modifications, including [3]:

- Superplasticizer (SP)
- Viscosity Modifying Agent (VMA)
- Fly ash (FA), silica fume (SF), or micro-silica particles
- Reduced water/powder ratio(powder = cement + FA + SF)
- Limited coarse aggregate size and content

Significant water reduction ability of SPs is essential to provide the necessary workability; high fluidity, however, can increase the tendency of a mix to segregate.

Therefore maintaining homogeneity is an important issue for the quality control of SCC. Polycarboxylate Ether (PCE) based superplasticizers represent a major breakthrough in concrete technology as they can reduce the water requirement by as much as 40% and impart very high workability that can be extended up to 60 minutes for good flowability (the diameter of slump flow is larger than 600mm) without the undesirable effects of postponement and segregation [1].

With proper use of viscosity modifying agents, SCC could achieve higher flowability and higher slump without segregation, and also maintain better slump retention, thus making concrete also more durable[2].

II. Objectives of the Study

The main objective of this investigation is to determine the suitable percentage of quarry dust replacement and influence of different proportioning of super plasticizers in SCC that gives the highest value of concrete compressive strength.

III. Experimental Program

In this investigation, 45-cubes, 45-cylinders are tested to investigate concrete compressive strength and split tensile strength of SCC with the combination of fly ash, silica fume and different proportioning of polycarboxyilc ether with the replacement of quarry dust. All test specimens of cube with 150 mm size and cylinders with diameter of 150mm and 300mm in length.

A. Materials used in this experiment

1) Cement

In this experimental study, Ordinary Portland Cement conforming to IS: 8112-1989 was used. The physical and mechanical properties of the cement used are shown in Table1.

Table-1: Properties of Cement

Physical property	Results
Fineness (retained on 90-µm sieve)	8%
Normal Consistency	28%
Vicat initial setting time (minutes)	75
Vicat final setting time (minutes)	215
Specific gravity	3.15
Compressive strength at 7-days	20.6 MPa

Compressive strength at 28-days	51.2 MPa

2) Fly ash (Class –F type)

The flow ability of self compacting concrete depends on the powder and paste content. Hence, in order to increase the flow ability, mineral admixtures such as fly ash has been used. A class 'F' flyash obtained from Ennore Thermal Power Plant (Chennai, Tamil Nadu) was used. Table 2 gives the physical properties of the fly ash.

Table-2: Properties of Fly Ash

Physical Properties	Test Results
Colour	Grey (Blackish)
Specific Gravity	2.12

3) Silica Fume

Silica fume is a waste by-product of the production of silicon and silicon alloys. Silica fume is available in different forms, of which the most commonly used now is in a densified form. In developed countries it is already available readily blended with cement. The details of silica fume used in this experiment are in the Table-3

Table-3: Details of Silica Fume

Code	920-D
Type	Densified (Non-Combustible)
Main content	Amorphous Sio_2

4) Aggregates

Locally available natural sand with 4.75 mm maximum size was used as fine aggregate, having specific gravity, fineness modulus and unit weight as given in Table-4 and crushed stone with 12mm maximum size having specific gravity, fineness modulus and unit weight as given in Table-4 was used as coarse aggregate. Table-4 gives the physical properties of the coarse and fine aggregates.

Table-4: Physical Properties of Coarse and Fine Aggregates

5) Super plasticizer (SP)

The admixture used was a superplasticizer based on viscosity modified polycarboxylates, which was used to provide necessary workability. A new generation based Polycarboxylic ether (PCE) was used, which is known as PCE (Viscosity Modified). Table-5 gives the Properties of PCE.

Table-5: Properties of PCE

Name	CONXL-PCE 8860 (Viscosity Modified)
Color	Dark Amber Color
Solid Content	40%
Ph	8.0
Specific Gravity	1.14

6) Quarry Dust(QD)

Locally available quarry dust was collected from crushing quarry near Mailam. Quarry dust comprises of the smaller aggregate particles, so it was sieved to 1.18mm and then used for the replacement of fine aggregate.

Table-6: Properties of Fly Ash

Physical Properties	Test Results
Colour	Grey
Specific Gravity	2.4

7) Water

Ordinary tap water is used.

B. SCC Mix Design

Several methods exist for the mix design of SCC. The general purpose mix design method was first developed by Okamura and Ozawa (1995). In this study, the key proportions for the mixes are done by volume. The detailed steps for mix design are described as follows:

- Assume air content as 2% (20 litres) of concrete volume.
- Calculate the coarse aggregate content by volume (28 – 35%) of mix volume.
- Adopt fine aggregate volume of 40 to 50% of the mortar volume.
- Replace cement with 10% Class F type fly ash and 10% silica fume by weight of cementitious material.
- Optimize the dosages of super plasticizer (viscosity modified)
- Perform SCC tests.

1) Mixing procedure for SCC

Mixing procedure for SCC is described as follows:

- Binder and aggregate are mixed for one minute.
- The 1st part (70%) of water was added and mixed for two minutes.
- SP along with the 2nd part (30%) of water was added and mixed for two minutes.
- The mix was stopped and kept rest for 2 minutes.
- The mix was remixed for one minute and discharged for SCC tests

Table-6: Mixture Proportions for Trial and SCC (Kg/m3)

Property	Fine Aggregate	Coarse Aggregate
Specific Gravity	2.56	2.7
Fineness Modulus	3.1	7.69
Surface Texture	Smooth	--
Particle Shape	Rounded	Angular
Crushing Value	---	17.40
Impact Value	---	12.50

Materials	TRIAL_1	TRIAL_2	TRIAL_3	TRIAL_4	SCC
Cement	381.6	381.6	381.6	381.6	381.6
Sand	900	900	900	900	900
CA	700	700	700	700	700
SP	0.1%	0.5%	1%	2%	3%
FA	16.6	16.6	16.6	16.6	16.6
SF	16.6	16.6	16.6	16.6	16.6
W/P	0.45	0.4	0.38	0.36	0.35

Materials	SCC_0%	SCC_25%	SCC_50%	SCC_75%	SCC_100%
Cement	381.6	381.6	381.6	381.6	381.6
FA	16.6	16.6	16.6	16.6	16.6

SF	16.6	16.6	16.6	16.6	16.6
W/P	0.35	0.35	0.35	0.35	0.35
Sand	900	900	900	900	-
Quarry Dust	-	225	450	675	900
CA	700	700	700	700	700
SP	3%	3%	3%	3%	3%

C. Testing Fresh Properties of SCC

1) Slump Flow Test

Slump flow test apparatus is shown in Figure 1(a). Slump cone has 20 cm bottom diameter, 10 cm top diameter and 30 cm in height. In this test, the slump cone mould is placed exactly on the 20 cm diameter graduated circle marked on the glass plate, filled with concrete and lifted upwards. The subsequent diameter of the concrete spread is measured in two perpendicular directions and the average of the diameters is reported as the spread of the concrete.

T50cm is the time measured from lifting the cone to the concrete reaching a diameter of 50 cm. The measured T50cm indicates the deformation rate or viscosity of the concrete.

2. V-Funnel Test

V-Funnel test apparatus is shown in Figure 1(b). In this test, trap door is closed at the bottom of V-Funnel and V-Funnel is completely filled with fresh concrete. V-Funnel time is the time measured from opening the trap door and complete emptying the funnel. Again, the V-Funnel is filled with concrete, kept for 5 minutes and trap door is opened. V-Funnel time is measured again and this indicates V-Funnel time at T5min.

3. L-Box Test

L-Box test apparatus is shown in Figure 1(c). In this test, fresh concrete is filled in the vertical section of L-Box and the gate is lifted to let the concrete to flow into the horizontal section. The height of the concrete at the end of horizontal section represents h2 (mm) and at the vertical section represents h1 (mm). The ratio h2/h1 represents blocking ratio.

Figure 1: (a) Slump cone, (b) L-Box, (c) V-Funnel





D. Casting & Curing

For each mix of SCC 9 no of specimens were casted and tested for compressive. Before these strength studies the slump flow, V-Funnel and L-Box tests were done to study the workability properties of SCC to access the filling ability and passing ability of SCC. The fresh property test should fall under the limits specified by EFNARC as shown in the Table-7.

Table-7: Limitations specified by EFNARC

Test methods	**Units**	**Mini.**	**Maxi.**	**Property**
Slump flow	mm	650	800	Filling ability
T50	Sec	2	5	Filling ability
L box	h2/h1	0.8	1	Passing ability
V funnel	Sec	6	12	Filling ability
V-funnel at T5minutes	Sec	0	+3	Segregation resistance

By varying the volume of fine and coarse aggregate in the mix design, several trial mixes were made and the one satisfying the fresh concrete properties as per EFNARC guidelines is selected as an optimum mix. The trial mixes made and their fresh concrete properties and workability tests.

Table-8: Fresh Properties of Trial and SCC Mixes

Mix	**w/p**	**Slump (mm)**	**V-funnel (Sec)**	**V-funnel T5min (Sec)**	**L-Box h2/h1**	**T50 (Sec)**
TRIAL_1	0.45	-	-	-	-	-
TRIAL_2	0.4	-	-	-	-	-
TRIAL_3	0.38	-	-	-	-	-
TRIAL_4	0.36	550	-	-	-	15

SCC_0%	0.35	750	7.45	10.90	0.8	3.20
SCC_25%	0.35	725	8.35	11.30	0.8	3.20
SCC_50%	0.35	720	9.38	12.5	0.8	3.55
SCC_75%	0.35	500	NOT SATISFIED			
SCC_100 %	0.35	450	NOT SATISFIED			

I. Mechanical Properties

Compressive strength test and split tensile strength test are conducted on hardened concrete at 3, 7 and 28 days and results are tabulated in Table -9 & 10.Both the tests are shown in the Figure-2 and Figure-3 below:

Fig-2 Split tensile strength test

Fig-3 Compressive strength test

Table-9: Compressive Strength of Cube (MPa)

Mix	3 days	7 days	28days
SCC_0%	13.8	20.4	32.35
SCC_25%	14.6	21.1	34.62
SCC_50%	12.2	19.8	30.27
SCC_75%	10.3	15.10	27.65
SCC_100%	9.6	13.25	25.08

Table-10: Split Tensile Strength of Cylinder (MPa)

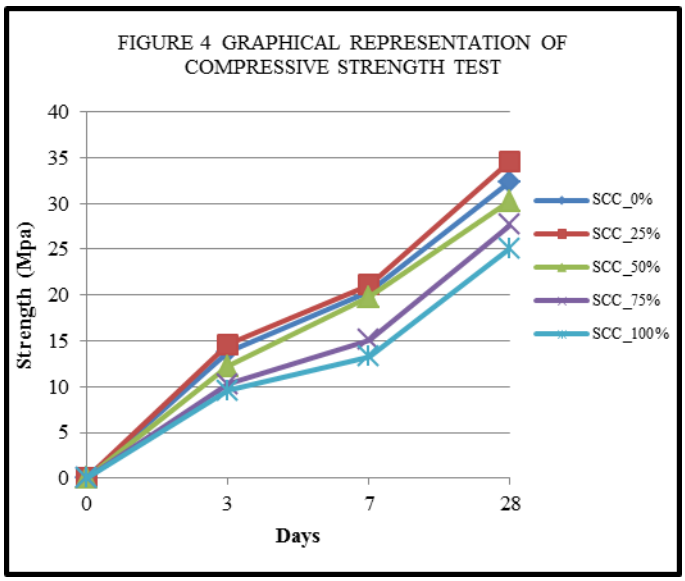
Mix	3 days	7 days	28days
SCC_0%	1.08	1.31	2.25
SCC_25%	1.15	1.47	2.36
SCC_50%	1.04	1.36	2.2
SCC_75%	1.02	1.28	2.06
SCC_100%	1.00	1.08	1.74

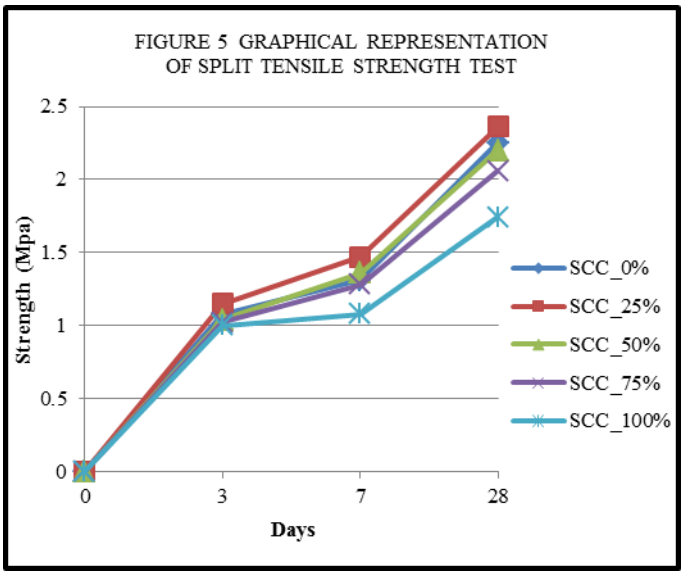
II. RESULTS AND DISCUSSION

Table-9&10 shows the mechanical strength obtained for different mixes. The SCC_25% series has shown the best performance at 3 days, 7 days and 28 days.

- While replacing fine aggregate to quarry dust the strength values are decreases gradually after 25% of replacement of quarry dust.
- In the case of replacement of 100% of quarry dust there will highly decrease in the compressive strength and tensile values of both cube and cylinder specimens.

Figure-4 and Figure -5 shows the graphical representation of the compressive strength of cube and split tensile strength of cylinder respectively.





III. CONCLUSION

From the experimental investigation on Self Compacting Concrete with fine aggregate replacement of quarry dust, replacing the fly ash and silica fume for cement by weight basis the following conclusion are made

- In general the use of mineral admixtures improved the performance of SCC in fresh state and also avoided the use of VMAs. SCC could be developed without using VMA was done in this study. Such kind of SP is known as new generation super plasticizers, which reduces the cost of VMA.
- At the water/cement ratio of 0.4, slump flow test, V-funnel test and L-box test results were found to be satisfactory, i.e. passing ability, filling ability and segregation resistance are well within the limits only for mixes SCC_0%, SCC_25% & SCC50% for other SCC mixes it doesn't satisfied because quarry dust has high fineness, its usage in the concrete is limited due to increasing water demand.
- The results of the hardened properties of SCC such as compressive strength and split tension strength had shown that the higher strength has been obtained for SCC_25% mix of about 34.62 Mpa and 2.36 Mpa respectively.
- While fine aggregate replacement of quarry dust increases with the gradual decreases in the strength values after replacement of 25% of quarry dust. In the case of 100% replacement of quarry dust there will be highly decrease in the compressive strength of cube and split tensile strength of cylinder.
- Optimum W/C ratio was chosen as 0.40 by weight, the ratio greatly beyond or less than this may cause segregation and blocking tendency in SCC mixtures.

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Ultrastructural observation of the vitelline cells of diplozoon sp (from Arunachal Pradesh) (Monogenea, Polyopisthocotylea)

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Abstract- An Electron microscopic studies of the vitellaria of three polyopisthocotylean fish-gill flukes,Diplozoon paradoxum, Diclidophora merlangi andD. Denticulata are composed of cells in different stage of development.(Halton et al 1974) Immature cells are embryonic and undifferentiated. Differentiation into maturing vitelline cells involves the development of extensive GER, Golgi complexes and the production of dense droplets of shell-protein. With the onset of maturity, protein synthesis stops and, as the GER disintegrates, the cell develops food-reserves in the form of yolk bodies, glycogen and lipid and released in the ciliated vitellian duct. Vitelline development is continuous and all of the cellular stages involved can be found in each follicle.

Index Terms- Diplozoon sp- ultrastructure- vitelline cells – Monogenea- Polyopisthocotylea

I. Introduction

It was regarded that the reproductive organs , especially the ovary and vitelline glands from female schistosomes were most sensitive to the changes in invitro conditions (Hua , Zhou ,1988). Ultra structures and their dynamic changes of the cultured cells from *Metamicrocotyla macracantha* were also studied in detail (Baptista-Farias, Maria de Fatima D, & Kohn, Anna. 1998). The present study details ultrastructural observations of vitelline cells of monogenea , Polyopisthocotylea parasite and then evaluate the culture conditions used in the experiments.

II. Materials and Methods

The parasites were collected from the gills of *Schizothorax richardsonii* from the Tenga River through the Himalayan ranges of Arunachal Pradesh within the Kameng river system following examination in a saline medium under stereoscopic microscope. For light microscopy, worms were fixed in 5 % formalin under slight cover-slip pressure stained in alcoholic chlorhydric carmine (Langeron 1949), dehydrated through an alcohol series, cleared in beechwood creosote and mounted in Canada balsam . For transmission electron microscopy worms were fixed in 2.5% glutaraldehyde and 2% paraformaldehyde in 0.1 M sodium phosphate buffer (PH 7.3) for 12 hrs at 4°C. After wash in buffer samples were post fixed in 1% OsO4 for one hour at 4° C. The samples were dehydrated in an ascending grade of acetone , infiltrated and embedded in araldite CY 212 (TAAB UK). Thick sections (1µm) were cut with an ultramicrotome, mounted onto glass slides , stained with aqueous toluidine blue and observed under light microscope for gross observation of the area and quality of tissue fixation. For electron microscope examination, thin sections of grey-silver colour interference (70-80 nm) were cut and mounted onto 300 mess copper-grids. Sections were stained with alcoholic uranyl acetate and alkaline lead citrate, washed gently with distilled water and observed under a Morgagni 268D transmission electron microscope (Fei Company , The Netherlands) at an operating voltage 80 KV. Images were digitally acquired by using a CCD camera (Megaview III, Fei company) attached to the camera.

III. Results

The details ultrastructural observations of vitelline cells of *Metamicrocotyla macracantha* (Monogenea, Microcotylidae) by Baptista –Farias et al(1998) has unique similarity in the result of the ultrastructural observation with the Ultrastructural observation of the vitelline cells of diplozoon *sp* (Monogenea, Polyopisthocotylea).

Observed by transmission electron microscopy, the vitelline follicles are juxtaposed separated by profiles of parenchyma and small amounts of fibrous material and muscle fibres . These cells can not be confused with the parenchymatous cells for : (1) the cells were collected from follicles and these cells significantly differ in their morphology from the parenchymatous cells of parasitic helminths (Morris and Threadgold 1968, Reissig and Colucci 1968 and Reissig 1970).

Immature vitelline cells are irregularly- shaped and each contains a large nucleus which occupies almost all the volume m a single nucleolus and dense area of heterochromatin . The cytoplasm is filled with numerous unattached ribosomes and few mitochondria .(Fig.1)

Developing vitelline cells are larger , have nuclei similar to immature ones , cytoplasm with golgi apparatus and granular endoplasmic reticulum. At this stage , droplets of egg shell protein appear and cytoplasm shows large amounts shell material due to continuous protein shynthesis.(Fig2)

Mature cells increase in size and in the quantity of membrane- bound protein globules that form clusters. In the mature cells, the amount of heterochromatin decreases in the nucleus and size of nucleolus increases in size. It is characterized by a growing number of egg-shell droplets while the cells are active state of secretion .(Fig 3&4)

At the end of development , the vitelline cell cytoplasm is filled with parallel arrays of GER and homogenous droplets of shell-protein that gradually increase in size alongside deposits of lipid and glycogen which with disintegrated portion of GER form

into large yolk bodies . All of these inclusions can be observed as isolated components or in groups ,throughout the cytoplasm, in variable number, or present and largely free in ciliated vitelline ducts ready to be expelled.

IV. Discussion

Histochemical and electron microscopic studies of the vitellaria of three polyopisthocotylean fish gill flukes ,*Diplozoon paradoxum, Diclidophora merlangi* and*D. denticulata*, and one monopisthocotylean fish-skin fluke,*Calicotyle kröyeri* have shown that, in each case, vitelline cell development is basically similar.Halton et al. (1974). The vitelline cell development of *M. macracantha* is similar to that of these polyopisthocotyleans. Baptista –Farias et al(1998). An electron microscope study of the vitelline follicles of *Fasciola hepatica* also shows the similar result (Irwin and Threadgold 1970), *Halipegus eccentricus* by Holy and Wittrock (1986)

Differentiation into maturing vitelline cells involves the development of extensive GER, Golgi complexes and the production of dense droplets of shell-protein. With the onset of maturity, protein synthesis stops and, as the GER disintegrates, the cell develops food-reserves in the form of yolk bodies, glycogen and lipid. It is then released into the vitelline ductlet . These processes occur in all the follicles at the same time, and all stages of development can be found in any one follicle.(Halton et al 1974)

Acknowledgement

UGC Minor Research Project

SAIF , AIIMS , New Delhi for the facilities offered for the use of Electron Microscope

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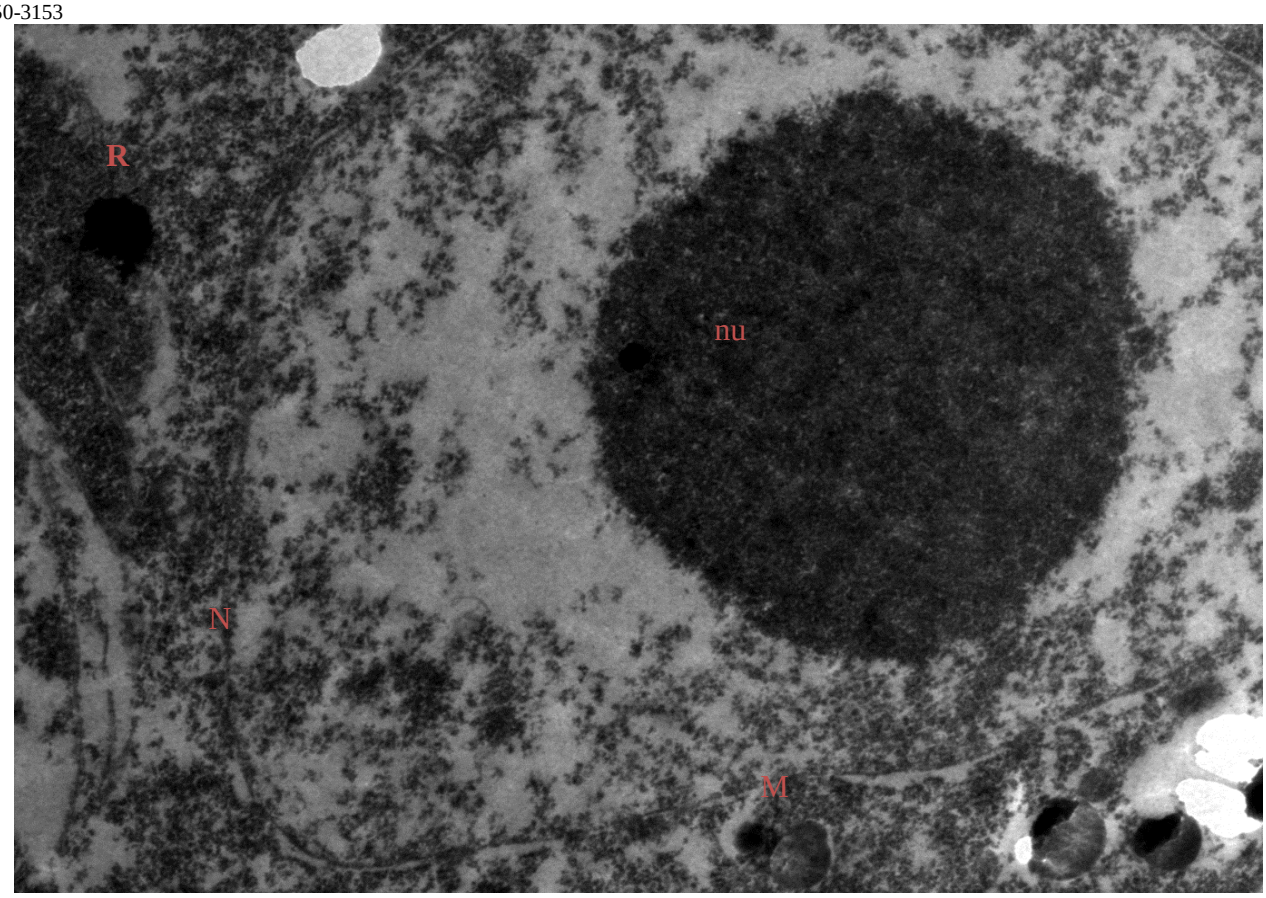
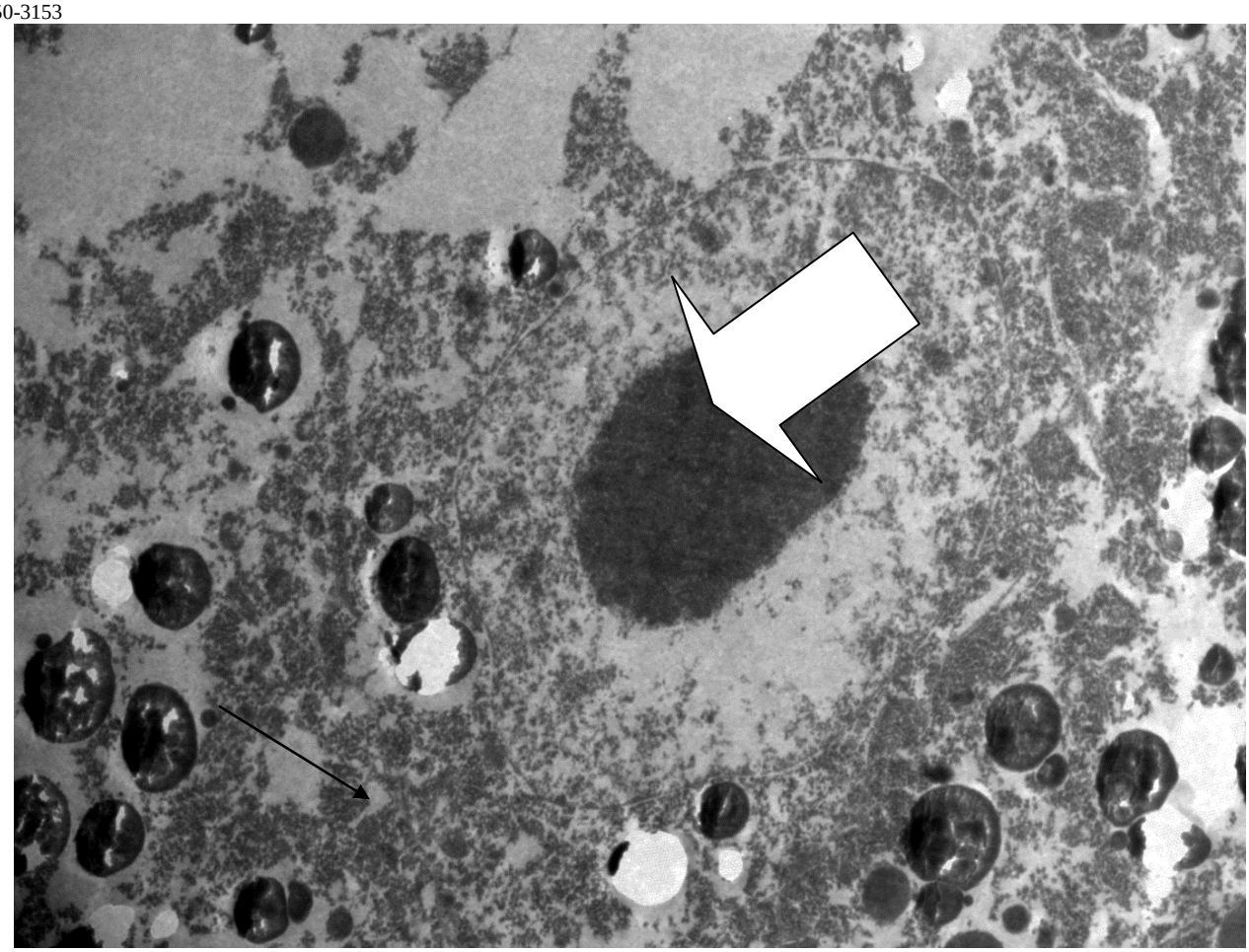
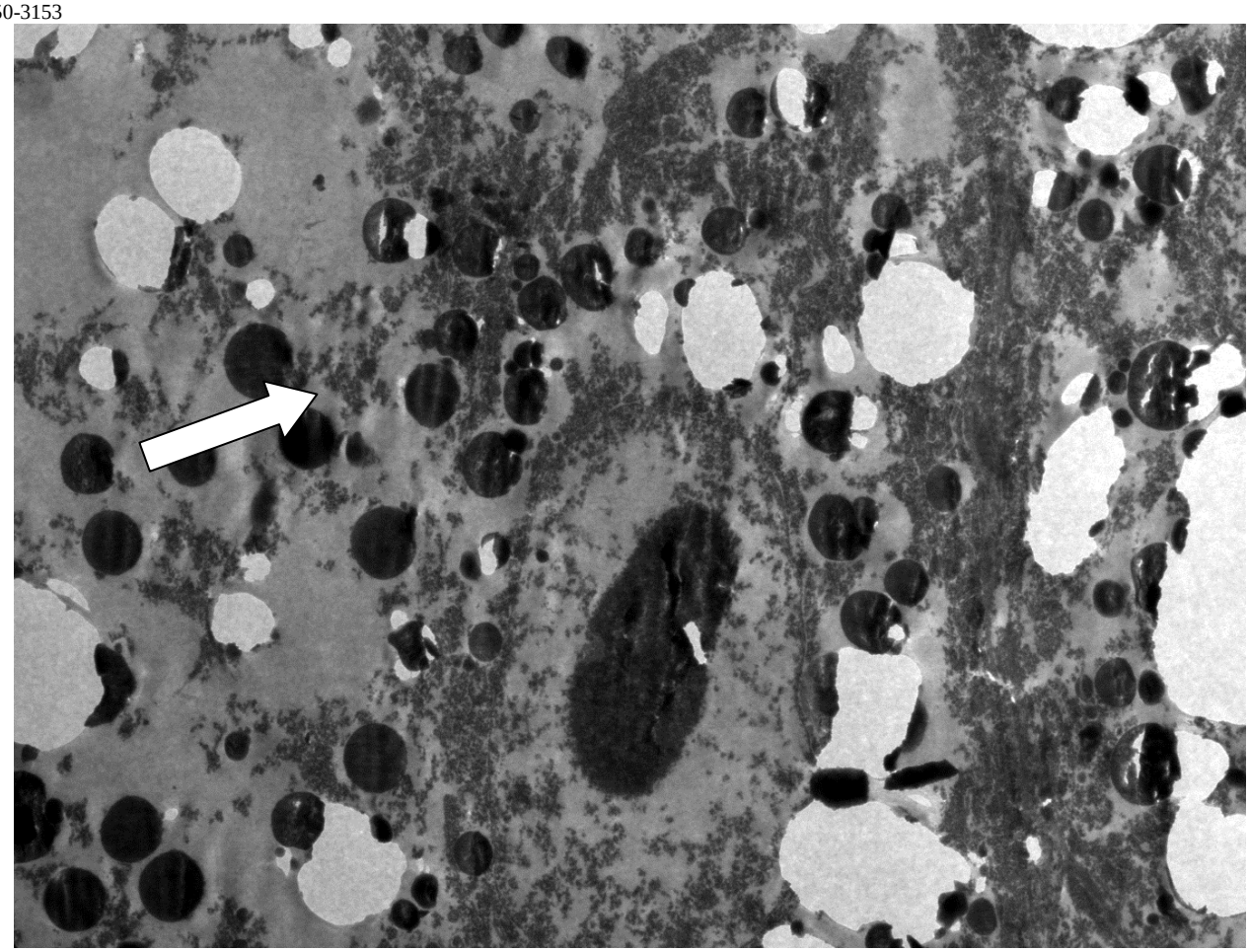


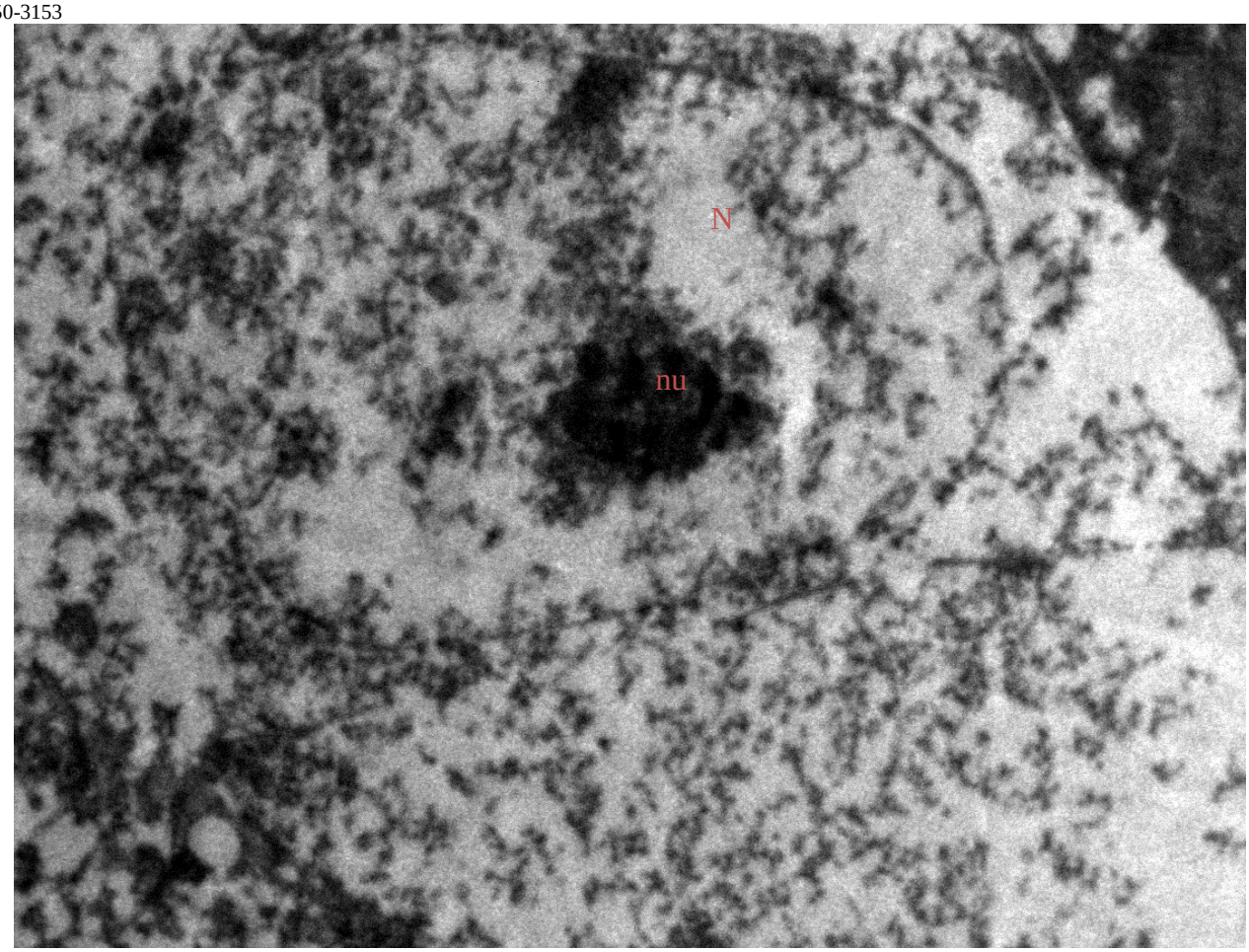
Diplozoon sp **Fig.1 : immature cells of the vitelline follicles, with a large nucleus (N), nucleolus (nu), mitochondria (M), and free ribosomes (R)**



Diplozoon sp **Fig .2 : developing vitelline cell with nucleus, large nucleolus (big arrow), granular endoplasmic reticulum (little arrow) and droplets of egg- shell protein . X 9,000.**



Diplozoon sp **Fig.3 : mature vitelline cell showing the increase of the shell-protein droplets (arrow) and decrease of the nuclear heterochromatin . X 8,000**



Diplozoon sp **Fig. 4: mature vitelline showing the decrease of nuclear heterochromatin X. 8,000.**

Decision Making of Conducting Remedial Classes for Weak Students through Fuzzy Ingredients

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Abstract- Making decisions are one of the most fundamental activities of human beings. In an atmosphere of uncertainty the decision maker has to select the best course out of several alternative courses of action that may be available to him. In earlier days, decisions were made mainly on personal judgement. Now-a-days judgement is combined with several quantitative techniques and the best action is arrived at in a given situation. In this paper we find the solution for the problem that Bharathidasan Constituent College (W), Orathanadu, Thanjavur district,Tamil Nadu, South India need to conduct remedial classes for the weak students in their College. Finally we conclude that the decision maker (The Principal) enable to take an optimal decision through Fuzzy ingredients.

Index Terms- Decision situation, Fuzzy actions, Fuzzy states, Fuzzy information

I. INTRODUCTION

In order to deal with vagueness of human thought, Zadeh(1965) first introduced the fuzzy set theory. A fuzzy set is an extension of a crisp set. Classical statistical decision method involves the notion that the uncertainty in the future states of nature can be characterized as probability events. When we want to make a decision among various alternatives our choice is predicated on information about the future which is normally discretized into various "states of nature". The problem with the statistical scheme, the events are vague and ambiguous. The statistical method can be further extended to include the possibility that the states of nature are fuzzy and the decision makers alternatives are also fuzzy.

II. PRELIMINARIES

Here some basic definition of membership function, orthogonal fuzzy set are reviewed.

. **Definition 2.1:-** Let $X = \{ x_1,x_2,x_3,\ldots,x_r\}$ is a universe of discourse. We define fuzzy events, M on this information, such as "good", "moderate", and "poor" information. Then the fuzzy event will have membership function $\mu_M(x_k)$, $k = 1,2,.....r$

Definition 2.2:- The collection of all the fuzzy events describing fuzzy information is defined as an orthogonal fuzzy information system.

i.e. $\varphi = \{M_1,M_2,....,M_g\}$.

The sum of the membership values for each fuzzy event, M_i for every data point in the information universe x_k equals unity.

$$\text{i.e.} \sum_{t=1}^{g} \mu_{Mt}(x_k) = 1 \qquad \text{for all } x_k \in X \qquad (1)$$

Remedial classes can be a positive environment for students suffering from low-self esteem, as they encourage students to ask as many questions as necessary to understand a subject, rather than feeling pressured to learn everything immediately.

Weak Students

Here we consider 'weak' students as those who had a 3rd class, had failed more than 40 or 50 percent of their subjects in a given year.

III. DECISION MAKING UNDER FUZZY STATES AND FUZZY ACTIONS

I.

In any organization, the main function of the executive is to make decisions. The organisation is faced with several type of decision problems. The decision maker has to face such endless problems. In each of decision-making problems there are certain common elements which are called ingredients of decision problems. Here we consider the statistical decision problem ingredients with fuzzy states and fuzzy actions as follows:

1. Alternative courses of fuzzy actions: The process of decision-making involves the selection of a single act from among some set of alternative acts. The decision maker can choose best action out of several actions. The possible fuzzy actions among m alternatives are given by $A_1, A_2, A_3, \ldots A_m$.

2. Uncertainity: In all decision problems "uncertainty" is found to be a common element. When there are many possible outcomes of an event (also called fuzzy states of nature) one cannot predict with certainity and it is only the probability. Here the possible fuzzy states of nature is given by F_s, s=1,2,….n and the orthogonal condition on the fuzzy state is given by

$$\text{i.e. } \sum_{s=1}^{n} \mu_{F_s}(s_i) = 1 \quad i = 1,2,\ldots n \qquad (2)$$

3. Utility value: In order to evaluate each possible course of action the result of each event with each course of action have a payoff value. While the fuzzy alternative have a utility value. We assign a **utility value u_{js}** for a given fuzzy alternative A_j and the future states of nature F_s.A number of consequences for various fuzzy states of nature will be mxn in number.

4. Decision criteria: The decision maker must determine how to select the best course of action. In most statistical decision problems the decision payoff (EP) is used as a decision criteria. In Fuzzy decision making problem the expected utility is used as a decision criteria. The utility value is a non-dimensional unit and it should be determined by the decision maker. The values are usually arranged in matrix form shown in Table 1.

The expected utility of fuzzy alternative A_j is given by

$$E(u_j) = \sum_{s=1}^{n} u_{js} P(F_s) \quad i = 1,2,\ldots n \qquad (3)$$

where

$$P(F_s) = \sum_{s=1}^{n} \mu_{F_s}(s_i) P(s_i) \qquad (4)$$

Table I: Utility values for fuzzy states & fuzzy alternatives

u_{js}	F_1	F_2	……	F_n
A_1	u_{11}	u_{12}	……	u_{1n}
A_2	u_{21}	u_{22}		u_{2n}
.				
A_m	u_{m1}	u_{m2}	……	u_{mn}

The membership values for each orthogonal fuzzy set on the fuzzy information system is given by

$$\sum_{t} \mu_{M_t}(x_i) = 1 \qquad (5)$$

In order to make an optimal decision some criterion and additional information are necessary. With the utility matrix the decision maker may be able to reach the optimal solution of a problem. The most common decision criteria is the maximum expected utility among all fuzzy alternatives.

$$\text{i.e. } E(u^*) = \max_j E(u_j) \qquad (6)$$

Which leads to the selection of fuzzy alternative A_k if $u^* = E(u_k)$

IV. APPLICATIONS AND RESULTS

Suppose that the Bharathidasan university has allotted fund to conduct remedial classes for weak students in BDUCC(W), Orathanadu, Thanjavur district, Tamil Nadu, South India. A sample analysis of examination results of 2500 students was made. Considering all the departments it was found that only the students of the following three departments have weak students.The records of 400 students performance are given below.

Scores / No.of Students	Below 40	Between 40&50	Above 50	Total
B.A.,(English)	90	20	10	120
B.Sc.,(Mathematics)	30	30	70	130
B.Com.,(Commerce)	25	30	95	150
Total	145	80	175	400

After verifying the above record, the decision maker has to take an optimal decision using fuzzy ingredients.
i.e. the decision maker has to select one of the three departments for conducting remedial classes.

Solution

The three courses of fuzzy alternatives (actions) are

A_1- Students belonging to the department of English
A_2- Students belonging to the department of Mathematics
A_3- Students belonging to the department of Commerce

The three possible fuzzy states of nature are

F_1-Below average marks
F_2- Average marks
F_3-Above Average marks

The prior probabilities for each of these fuzzy states are

$P(s_1) = 0.3$
$P(s_2) = 0.4$
$P(s_3) = 0.3$

Consider each department as x_1-Tamil; x_2-English; x_3-Mathematics; x_4-History; x_5-Economics; x_6-Physics; x_7-Chemistry; x_8.Social Work; x_9-Computer Science; x_{10}-Commerce.The utilities of x_2,x_3 &x_{10} are assessed by the decision maker in non-dimensional units are given in table 2. Hence, the utility values for this situation is given by

Table II: Utilities for fuzzy states and alternatives

u_{is}	F_1	F_2	F_3
A_1	10	8	9
A_2	7	3	-7
A_3	4	-3	8

Consider a fuzzy information system,
$M = \{M_1, M_2, M_3\}$

Where M_1- Marks is less than 40

M_2- Marks between 40&50
M_3-Marks is more than 50

The membership value for each orthogonal fuzzy state is given in Table 3. The fuzzy set in the below table satisfy the orthogonality condition, for the sum of each column equals 1,

$$\text{i.e. } \sum_{s} \mu_{Fs}(s_i) = 1$$

Table 3: Orthogonal fuzzy sets for fuzzy states

μ_{Fs}	S_1	S_2	S_3
F_1	1	0.5	0
F_2	0	0.5	1
F_3	0	0	0

Calculate the prior probabilities for fuzzy states using eqn.,(5)

i.e$P(F_1) = (1)(0.3) + (0.5)(0.4) + (0)(0.3) = 0.5$

Similarly $P(F_2) = 0.5$ and $P(F_3) = 0$

Therefore, the expected utility using equation (4) is given by

$$E(u_j) = \begin{pmatrix} 9.0 \\ 5.0 \\ 0.5 \end{pmatrix}$$

The optimum expected utility of the fuzzy alternatives (actions) using equation (6) is $E(u^*) = 9.0$

So alternative A_1, is the optimum choice. Hence on the basis of prior information only (prior probabilities) the decision maker take an optimal decision.

IV. CONCLUSION

This paper concludes that the decision maker decides to conduct remedial classes for the weak students belonging to the department of English, BDUCC(W), Orathanadu, Thanjavur district, Tamil Nadu, South India using fuzzy ingredients. By conducting this kind of remedial class the weak students will definetly got the clear idea about their subject.

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Design of Object-Oriented Water Quality Software System

A Case Study of Upper Godavari River Paithan, Aurangabad (MS) India.

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Abstract- Software models are important for the evaluation and management of environmental resources. This paper presents a framework for developing a software system for water quality analysis of river ecosystems. A major component of the system is a database that permits inclusion of analytical water quality and sediment data, river geometry and sampling site characteristics, hydrologic measurements, and reference information on water quality parameters and criteria. Associated with the database is software for managing, analyzing, and representing the information in the database. An object-oriented strategy is applied to derive a model of the software system. The resulting object-oriented design is then translated into an entity-relationship model, which is in turn translated into a relational model. The formality of this translation process ensures consistency among the successive design stages. The overall development approach to system design and implementation is de-scribed, and an application for evaluating water quality conditions in the upper Godavari River is presented.

I. INTRODUCTION

Environmental engineers and scientists often are called upon to provide reliable water quality information to guide the man-agement and protection of water resources (Becker and Neitzel 1992; Fuhrer et al. 1996). Typical uses of these data are to assess compliance with permits and water supply standards, evaluate trends in water quality, develop remediation plans for contamination problems, assess and design water quality mon-itoring systems, and optimize operations at industrial, waste-water, and water supply facilities. The data collected to support these diverse water quality management objectives can be combined into a single large database, accessible to each analyst and decision maker in a river basin (*Transportation Research Board* 1997). With all the available data made ac-cessible, decision making can be improved, uncertainty in pre-dictions (usually) reduced, redundant monitoring programs identified, and data usage maximized.

In this paper, a prototype database and analysis system is developed for water resources data from the upper Godavari River. The system was developed for the Godavari River. The project goals are to evaluate and analyze data collected between the years 1960 and 2012. These data represent a suite of parameters describing water quality and hydrology in the upper Godavari River environment. The sources of the data are the Center for Bioenvironmental Research of Aurangabad municipal corporation (AMC). Geological Survey (AMCGS), the Aurangabad Department of Environmental Quality (ADEQ), the Aurangabad Department of Pollution and the Environment, and several other agencies. The multitude of authorities, sources, quality criteria, and analysis methods significantly complicates data integration.

One way to begin structuring a database is to define the types of queries that are expected from the data, and optimize database design based on these queries. For example, suppose that the data will be used to assess the effect on water quality of upper Godavari River. In this case, a database that links land use data with time series data on nutrient sales, nutrient con-centrations in the river, and upper Godavari River flow rates would be constructed. On the other hand, a database intended to help evaluate the efficacy of cap-ping contaminated aquatic sediment would include contaminant concentrations in the sediment, sediment transport char-acteristics, parameters of natural contaminant degradation, bathymetric surveys, etc.

The output format would be struc-tured to appeal directly to the type of problem under consid-eration and to subsequent use of the data. For example, the output from the database might be used directly for decision making, or might be linked to hydrologic or water quality modeling systems. An interface with a geographic information system (GIS) or with a statistical package might be designed into the system.

In some cases, databases are created without knowing *a priori* how they will be used. Thus, it is necessary to make the database as flexible, inclusive, and adaptable as possible. The prevalence of very large data sets is increasing. As more and more data are made available in electronic form and on the Internet, there is a greater drive to consolidate and apply as much as is relevant to a water quality management problem. No longer are boundaries between data gathered by different organizations considered restrictive — water quality managers are expected to include all available data in their analyses. Much of these data is now available on the Internet but has not been translated into usable form and conceptual uniformity.

Furthermore, there is now an emphasis on finding time trends in water quality data, such as determining whether regulatory efforts and improvements in pollution technology have resulted in improved water quality, or made a difference in

the rate of change in environmental quality. To answer these questions, it is necessary to merge data taken at different time periods, which often means the data set will include measurements taken with varied levels of precision and different parameters describing the same phenomenon (for example, polychlorinated biphenyls (PCBs) were once reported under the product name ‘‘Aroclors,’’ which were combinations of many congeners; now the analytical chemistry instrumentation has improved, so that PCBs may be reported on a congener-specific basis.)

This is the situation we explore in this paper: how to de-velop a water quality database system encompassing data from many sources, taken over several decades, without a specified decision objective, and permissive of including additional data in the future. Since this problem came to the writers’ attention while designing the software system for the upper Godavari River.

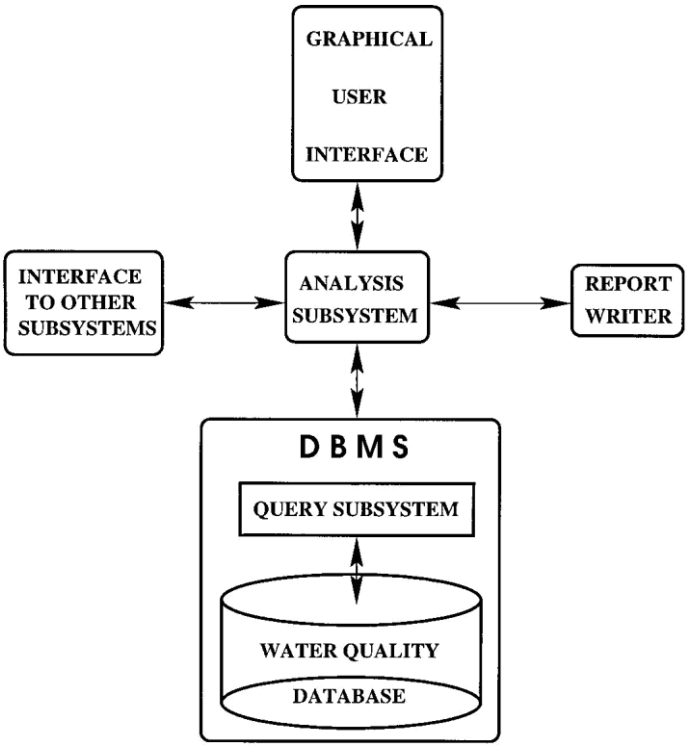

FIG. 1. Structure of Water Quality Software System

Water Quality Project, we will refer to this system throughout the paper. An important aspect of the design of the upper Godavari River software system is its use by people with little experience in database design, GIS, modeling, or applied statistics. Thus, the system is accessible to a broad range of people ex-ploring water quality management problems from many per-spectives.

II. WATER QUALITY MODEL DEVELOPMENT

A water quality information system should be capable of integrating large amounts of heterogeneous data collected by various sources and of providing a consistent conceptual model of the water body. Typically, existing water quality databases have been organized as flat structures; that is, the data are collected into one big monolithic table. Real-world con-cepts and their interrelationships as such are lost in the implementation, thus making the model far removed from the problem domain. Consequently, users confront a database that is neither user-friendly nor suitable for the type of analyses they need. We have explicitly addressed these issues by designing a conceptual model that supports various interests and lends itself to analysis of trends, identifying factors that affect trends and highlighting the relationships among these factors. Generically, the analysis process addresses questions of the form who, what, when, where, how much, and how many. Specifically, questions to explore the availability of data and their geographic distribution, the concentration levels and distribution of parameters, the hydrology of the river, and the relationships among the various variables are supported directly. Analysis questions address the following categories:

4.1 **Inventory:** Data availability, temporal and spatial cover-age, sampling types and their frequency, and collecting agencies and their respective stations. The questions also explore the relationships among the different attributes of parameters, stations, and agencies.

4.2 **Geography:** Geographic point data such as sampling lo-cations, flow information, and continuous data such as land use, soils, and geology.

Water quality parameters: Parameter and time series con-centrations from which statistical analysis can be made.

Hydrology: Flow characteristics of the river from which statistics about river stage and discharge are determined.

Comparison: Relations among the various measured en-tities. Concentration, discharge, stage, time, and bathymetry data are analyzed in relationship to each other to de-termine potential factors that affect the state of the river.

We adopt an object-oriented (OO) view of a. Thus, modeling a river consists of identifying the major components that form the structure of the river, establishing the interrelations that exist among these components, and specifying the behavior of the entire structure and of each component. Such an approach emphasizes problem-related issues. In general, the OO design approach allows the designer to generate models that are closer to the real-world objects being modeled. The development of the model described here uncovered some major issues. One of them, related to the monitoring and management of water resources, is the scarcity of tools providing capabilities to integrate heterogeneous data, manipulate data, support analyses, and report results. To ad-dress this issue, we set out to design an automated water quality database system for the lower Mississippi River with the following characteristics: (1) The system is generic, i.e., it does not depend on the particular data it manipulates; (2) the system is user-friendly; and (3) the system is extensible, i.e., future extensions can be made without altering the existing components. The implementation provides a sophisticated system for manipulating the water quality database and for analyzing wa-ter quality data. Manipulating the database

includes such func-tions as entering new data, retrieving specific data, updating the database to reflect changes in the riverine environment, and generating reports from the data. Analyzing the water quality data involves querying in combination with mathematical and statistical procedures.

III. System Structure

The structure of the software system is shown in Fig. 1. The major component is the analysis subsystem that supports different water quality analysis procedures. The main part of the procedures is implemented as a set of nested and grouped queries. Query results from the water quality database are re-trieved and transposed according to conditions specified by the analysis procedures and the user. The analysis subsystem also provides the interface for inserting new data in the database and updating information.

The graphical user interface supports an intuitive and effective-to-use interaction of users with the analysis subsystem and other system components. It allows the users to manipulate windows, menus, controls, and other graphic objects in specifying requests and responds interactively to the user's input actions.

The report writer is used to output the results of database querying and data analysis. The reports can be formatted by including headers and footers, forms, and graphics, computing totals or data summaries, and performing computations on the data.

An interface to other subsystems is provided to facilitate the interaction with specialized software for data analysis, such as a GIS used to create maps of river study areas, statistical packages, and mathematical analysis packages. This interface consists of two main modules: an export module and an import module. The export module outputs stored data and results of retrievals into a format that can be processed by the specialized software. The import modules consist of several modules that convert collected data in various formats into a uniform format and create files to be inserted into the database. Compared to the other database design tasks, the conversion task is one of the most tedious due to the heterogeneity of formats and conventions imposed by the various sources.

The water quality database shown in Fig. 1 consists of two types of files: data files and reference files. The distinction between these two types of files is based on the dynamic nature of the data. Information in the data files tends to be dynamic and ever changing, whereas information in the reference files is static. Basically, data files capture the dynamic behavior of the object being modeled, and reference files capture its static structure. The data files contain the following data:

- Concentration of water quality parameters and methods of detection. In the case of the upper Godavari River Water Quality Project, the data consist of 780 parameters that include metals, volatile organics, semi-volatile organics, pesticides, nutrients, herbicides, and radio chemicals. Some of these parameters were measured both in the water column and sediments.
- Collected information on physical characteristics of the river, including geographic, bathymetric, and hydrologic data.
- Descriptive data on sampling stations and water quality agencies.
- Other information related to the environment of the river under study.

Reference files contain general information related to each water quality parameter:

- Reference information on water quality parameters extracted from the EPA Storage and Retrieval (STORET) database and applicable to all data sources used in this study. This includes items such as Chemical Abstract Ser-vice (CAS) number, unit of measurement, and carcinogenicity.
- Concentration limits for contaminants as specified by fed-eral and state water quality guidelines. Federal guidelines for water quality criteria that were developed by EPA are used (EPA 1986). They include acceptable limits for aquatic life and human health protection, such as fresh water acute criteria, fresh water chronic criteria, and drinking water maximum contaminant level.

The catalogue stores meta-data that represent environmental database definitions available for users as on-line system documentation. Meta-data include descriptions of the database system schemas, users and their access rights, information on storage structure and access paths, database fields and record sizes, and usage statistics.

IV. Development Lifecycle

The activities related to the construction of the water quality software model constitute the development life cycle. They include the following phases (Elmasri and Navathe 1989; Pressman 1995):

1. Object-oriented (OO) modeling: Producing a requirements specification and developing an OO model of the system. This activity is described in the section on water quality database development.
2. Conceptual design: Transforming the OO model into a conceptual schema. This includes the identification of data required for processing and their natural relationships and constraints with respect to performance, integrity, and security. This activity is described in the section on conceptual design.
3. Database design: Transforming a conceptual data model into the relational data model, as described in the section on water quality database design and implementation.
4. Implementation: Writing internal database definitions, creating empty database files, and developing application software.
5. Database population: Integrating fields from various files and then converting these files into database formats. An initial data validation process is carried out

to ensure consistency. The process involves the detection of miss-ing values, typographical errors, improbable values, and duplicate values.

6. Testing: The new system is tested against performance criteria and user requirements.
7. Monitoring and modification: During database system operation, monitoring indicates modifications to improve performance and satisfy changing user requirements.

V. WATER QUALITY DATABASE DEVELOPMENT

The first activity involves an object-oriented analysis and design. As part of the object-oriented analysis, the user's re-quirements are analyzed in order to extract objects. A prelim-inary analysis of the requirements results in the following ob-servations:

1. Many sampling stations are located along the river. Each station's identifier code, name, river mile location, and coordinates, including latitude and longitude, must be stored. A station may be used to collect data on water quality or river stage and may be located at only one segment. Water quality organizations may calculate dis-charge rates from river stage data.
2. At each station, data are collected by an organization that has a name, identifier code, jurisdiction, mailing address, and phone number. An organization may collect data at several stations, and more than one organization may collect data at the same station.
3. Each station participates in a project described by an identifier code and a definition. Several stations may par-ticipate in the same project.
4. For each stage measurement, taken at a given station, the information to be maintained includes the stage value, date (month, day, and year), and time of measurement. Stage data in the database consists of MCA data col-lected twice daily. (Hourly stage data are also available from the MCA. These data might be particularly use-full when performing modeling studies of transient conditions such as dynamic plume modeling. However, be-cause of their infrequent use, they are not included yet in the database.)
5. For each discharge rate measurement taken at a given station, the information to be maintained includes the daily average discharge rates and the sampling date (month, day, and year). Most discharge values in the da-tabase are from the MCA and are available from the MCA only as daily average values. Other water quality organizations, including the MCAGS, have collected instantaneous discharge values on an ad hoc basis, and these have also been included in the database.
6. Each water quality measurement taken at a given station is analyzed. The information to be maintained about analyzed samples includes the compound STORET number, the station identifier, sampling date, sampling time, project identifier, medium, sampling depth, sampling method, analytical method, and compound concentration.
7. A compound is described by a STORET number, name, CAS number, chemical symbol, octanol water coeffi-cient, carcinogenicity, and detection limit. In addition, the fraction (whole, dissolved, suspended), status as a priority pollutant, and toxicity are recorded for each compound. At this stage, the data set does not include fish tissues and other biological media.
8. Ambient water quality criteria may be available for some compounds. These criteria assign compound concentra-tion limits and include the following values: EPA fresh water acute criterion, EPA fresh water chronic criterion, EPA drinking water maximum contaminant level, state water acute criterion, state water chronic criterion, state drinking water criterion, and state drinking water supply criterion.
9. The river is divided into segments, and summary statistics describing the water quality can be computed for each segment. Each has an identifier code, a name, and lower and upper bounds specified by river mile location. Segment boundaries may be defined in any way desired; one potential method is to divide the river into segments based on the designated use categories, such as primary contact recreation, secondary contact recreation, propagation of fish and wildlife, drinking water supply, oyster propagation, agriculture, outstanding natural resource waters, limited acquatic life, and wildlife use. The delineation of segments adopted here is the one defined by LADEQ.

Once the user's requirements are defined and the water qual-ity data are identified (EPA 1986; Becker and Neitzel 1992; Fuhrer et al. 1996; Meade 1995), an object-oriented model is developed (Booch 1994). The object-oriented strategy of mod-eling is based on identifying real-world objects and describing their structure, interrelationships, and behavior. Fig. 2 shows a partial object-oriented view of the model.

VI. CONCEPTUAL DESIGN

The second phase in the database design and implementation process is the conceptual design (Fig. 3). It involves the development of a conceptual model or schema that shows all the data and their relations. An effective method for conceptual data modeling is entity-relationship (ER) modeling (Codd 1970; Teorey 1990), allowing the capture of real-world data requirements in a simple and meaningful way. Also, the trans-lation from the object-oriented model to the ER model is one-to-one, thus ensuring the consistency of the design process. Fig. 4 provides a conceptual view of the water quality design based on ER modeling. Before we describe this design in detail, a short explanation of the ER concepts and terms is given.

Entities are any objects worth representing in the database. In this model (Fig. 4), rectangular boxes represent entities. Entities whose existence depends on the presence of some other entity (known as the owner) are depicted with a double-bordered rectangle. Thus, STAGE depends on the entity STA-TION and ANALYZED SAMPLE has two owner entities: STATION and COMPOUND. Various relations that may exist among entities are represented by diamond boxes linked to the entities that

participate in a relation. Relations have a domain, a range, and an ‘‘arity,’’ that is, they may be binary, ternary, or *n*-ary, depending on whether they involve two, three, or *n* entities. A blank diamond denotes a one-to-one relation, and a half-shaded diamond denotes a one-to-many relationship. Thus, the connectivity that COMPOUND and CONCENTRA-TION LIMITS in the relationship ‘‘are assigned’’ is one-to-one, whereas the connectivity of STATION and ANALYZED SAMPLE in the relationship ‘‘samples’’ is one-to-many. The participation of an entity in a relation is defined as either total or partial. The partial participation is specified by a 0 on the line between an entity and a relationship. Thus, the partici-pation of STATION in the relationship ‘‘measures’’ is partial (not every station measures the river stage), whereas the par-ticipation of STATION in COLLECTS DATA ON is total (at every station, data are collected by an organization).

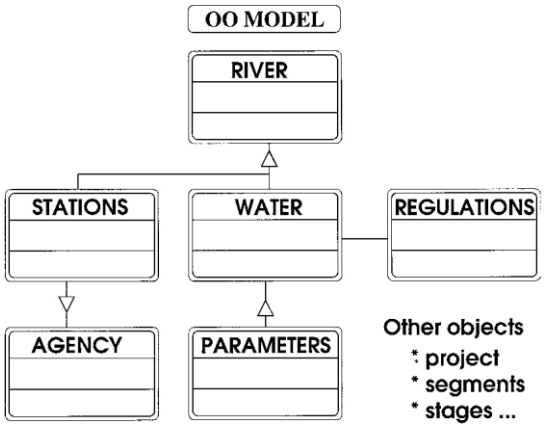

FIG. 2. Water Quality Object-Oriented Model

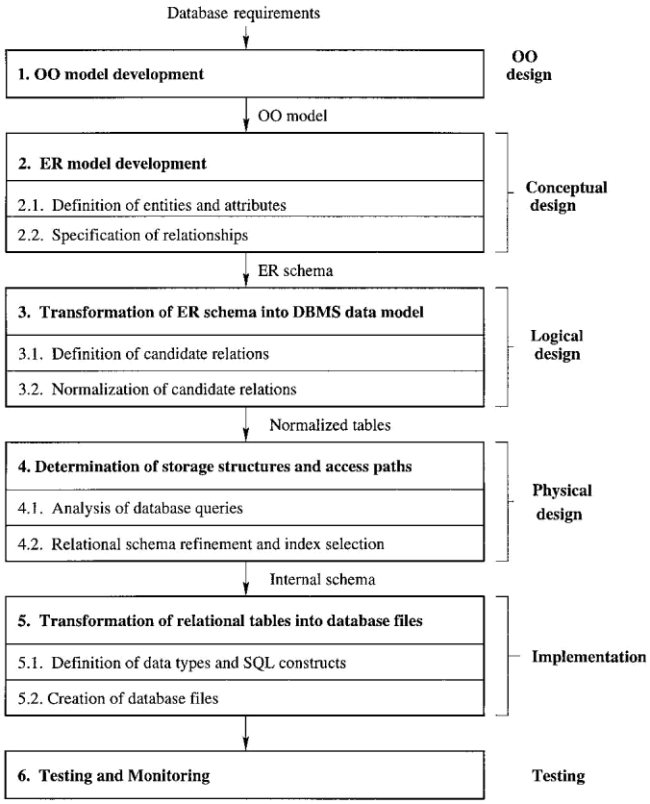

FIG. 3. Lifecycle Activities

Properties (attributes) are associated with entities. These are shown as columns in Fig. 5. Some properties are simple (atomic, indivisible); others are composite (made up of more than one property). Thus, some of the properties of the entity AGENCY are the agency identification (AGENCY ID), the agency name (Name), the agency jurisdiction (Jurisdiction), the agency address (Address), the agency city (City), and the agency phone (Phone). Except for the agency address, which is composite, all the other fields are simple.

The analysis of these requirements resulted in the ER schema displayed in diagrammatic form in Fig. 4. A further refinement of this figure results in the design shown in Fig. 5. Each entity is now refined to show its components. For ex-ample, the entity SEGMENT has the following components: SEGMENT ID, Segment Name, Upstream Mile, and Down- stream Mile. Accessing and retrieving data require that entries in the database be identified uniquely by attributes or a com-bination of attributes, called keys. A key belonging to an entry in a given table that is used to identify the entries in the same table is called a primary key. A key belonging to a table entry that is used to identify entries in other tables is called a foreign key. Primary key attributes are shown in bold face, and foreign key attributes are shown in italics in Fig. 5.

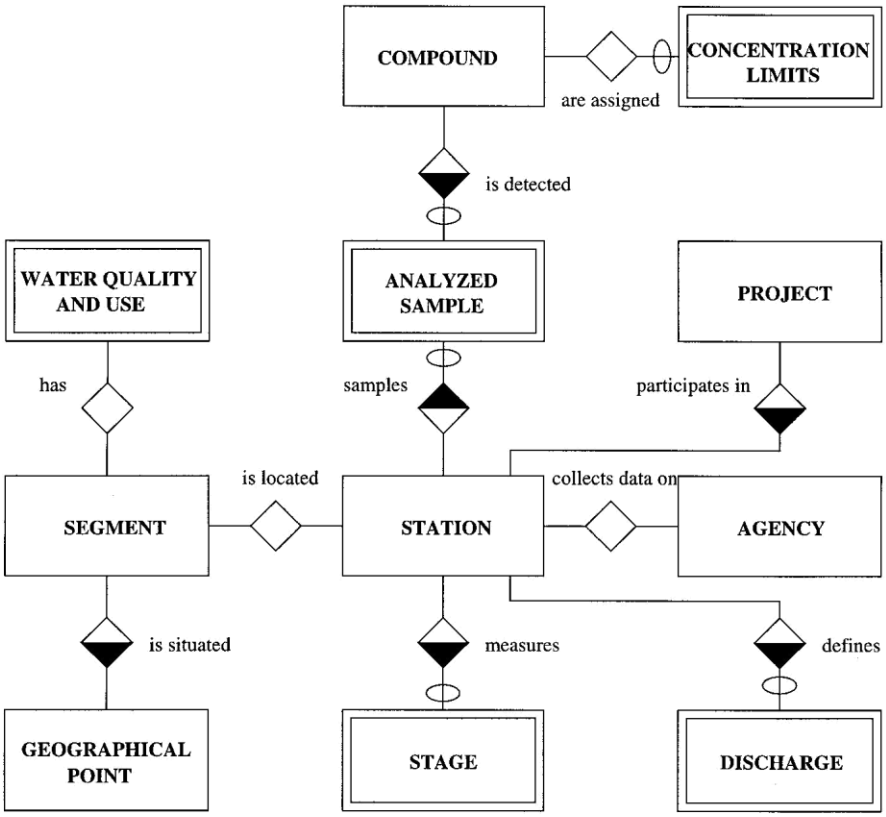

FIG. 4. Top Level ER Schema Diagram for Water Quality Database

Segment

SEGMENT ID	Segment Name	Upstream Mile	Downstream Mile

Geographic Point

POINT NAME	Point River Mile	Point Latitude	Point Longitude	City Name	Population	*SEGMENT ID*

Station

STATION ID	Name	Type	Latitude	Longitude	River Mile	*AGENCY ID*	*SEGMENT ID*	*PROJECT ID*

Agency

AGENCY ID	Name	Jurisdiction	Address	City	Phone

Stage

DATE	STATION ID	Maximum	Minimum	Average

Discharge

DATE	STATION ID	Maximum	Minimum	Average

Analyzed Sample

STORET #	STATION ID	DATE	TIME	proj_id	st_type	media	method	date2	concentration	analysis_method

Compound

STORET #	Name	Symbol	Fraction	Class	subclass	CAS	Toxicity	Carcinogenicity	Priority

Concentration Limits

STORET #	Federal Acute	Federal Chronic	Drinking Water MCL	State Acute	State Chronic	Drinking Water Supply	Nondrinking Water Supply

FIG. 5. Major Relations Design

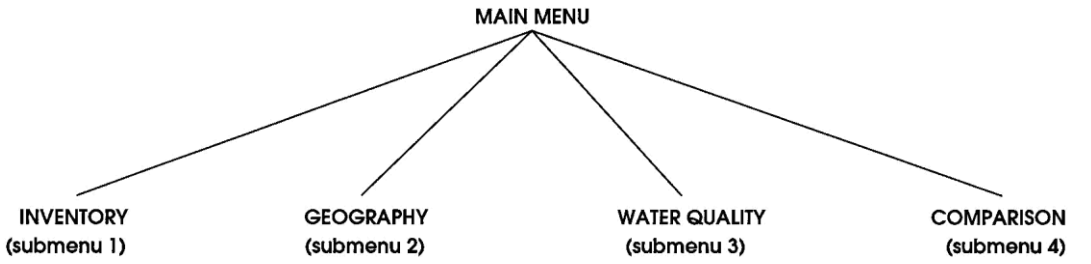

FIG. 6. Schematic of Menu Interface

Water Quality Database Design and Implementation

The next phase of database design and implementation is the choice of a database management system (DBMS) (Fig. 3). For the upper Godavari River Water Quality database implementation, DBMS Oracle is chosen. This DBMS implements the relational data model most appropriate for water quality data with many interrelations. A relational DBMS ensures high data integrity, recovery, and concurrency control and supports the high-level query language SQL. Such a language has the necessary computational power to enable users to perform sophisticated data retrievals used in water quality analysis.

The ER model is transformed into a relational data model by the following general mapping procedure (Elmasri and Na-vathe 1989):

1. For each entity in the ER schema, a relation including all the simple attributes of the entity is created. The key attribute of the entity becomes the primary key of the

relation, such as SEGMENT ID. A primary key is simply a unique identifier for the given relation.

2. For each weak entity, a relation is created and all simple attributes are included as attributes of the relation. The key attribute of the relation corresponding to the owner entity is included as a foreign key. (A foreign key is created when a primary key is used as a key in another relation). The primary key of the created relation is the combination of the primary key of the owner and the partial key of the weak entity.
3. For each binary one-to-one relationship, the primary key of the relation with partial participation is included as the foreign key in the relation with total participation in the relationship.
4. For each binary one-to-many relationship, the relation primary key belonging to the relation domain is included as a foreign key in the relation range.

The next step in the database design process involves the normalization of the relations. Normalization ensures that the relations have certain properties, such as integrity and main-tainability (Teorey 1990). During physical design, behavior analysis of database queries is carried out in order to assess the execution efficiency of these queries. Dominant queries with high frequency of execution and high volume of data access and modification were identified to become candidates for further optimization. The basic modification is to add at-tributes to existing relational tables to speed up join operation. For example, the query ‘‘Show measured concentrations of a given parameter in a given year as a function of station lo-cation’’ is executed by a join of tables ANALYZED SAMPLE (500,000 records) and STATION (700 records) and was ex-amined for adding attributes StatName and StatRivMile to ANALYZED SAMPLE. The application of the usage refine-ment algorithm (Teorey 1990) resulted in optimized queries.

The formal database schema design is implemented by us-ing Stuctured Query Language (SQL), a language for manip-ulating databases, to create table statements. For each table, the SQL statement defines the name of table, the name and data types of its fields, and the integrity constraints.

Application Software Development

The Water Quality Database System is implemented on an IBM RISC System/6000 running UNIX. The system applica-tion software consists of a package of C programs using SQL statements to access the database supported by ORACLE. The Pro*C precompiler is used for embedding SQL statements. The developed application allows the user to enter and update environmental data, to do sophisticated retrievals from the da-tabase, and to generate reports on analytical data. The software presently supports numerous queries and update transactions. Queries processing is extremely fast. Typically, it takes ap-proximately 2 s for a query retrieving data from two relations. At least 2 GB of hard disk space are required for programs and files, although this requirement increases as the database is populated.

The RISC System version of the database supports a menu-based interface (Fig. 6). The main menu is organized accord-ing to groups of analytical queries about parameters, parameter concentration, stations, agencies, segments, time, hydrography, and geography. By selecting and entering options from this and secondary menus, the user can create the required query. If necessary, the user is asked to enter the input query param-eter (compound STORET number or station identification code). The results of querying are presented in tabular form. For large output data lists, page breaking is supported.

VII. EXAMPLES OF ANALYSIS USING SYSTEM

Suitability of Database for Time Series Analysis

For some water quality mangement issues, it may be desir-able to develop a time series of water quality data. Examples include assessing trends in water quality, correlating pollutant concentrations with loading, and comparing concentrations of a pollutant at several locations throughout the water body. The database is particularly well suited for developing these types of subsets of the database. For example, a query asking for all mean weekly values of phosphate in Segment 3 would be con-structed as in the following sequence: (1) Select the parameter name; (2) select the function (e.g., mean); (3) select the weekly interval; (4) select the overall range; and (5) select the seg-ment.

An example of a time series data analysis that is done with this data set is the modeling of the seasonality of the nitrate concentration in the area of the upper Godavari River around

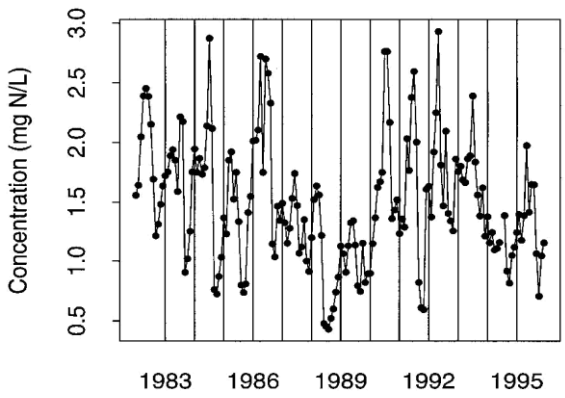

FIG. 7. Nitrate Concentrations of Godavari **(mg N/L)**

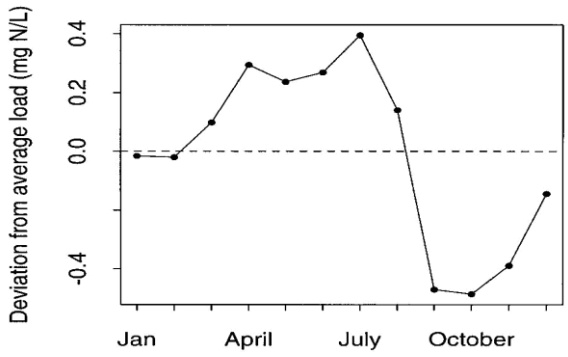

FIG. 8. Monthly Seasonality of Nitrate Concentration of Godavari River

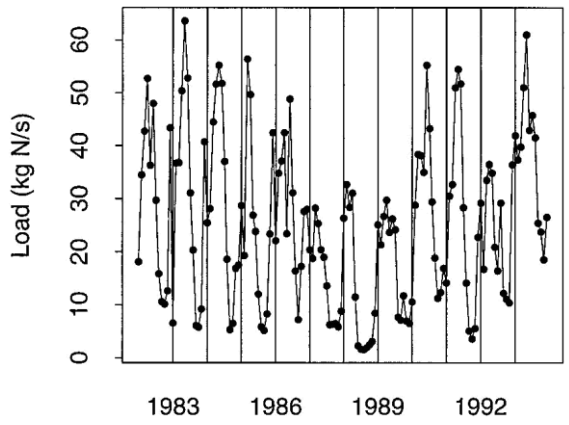

FIG. 9. Time Series of Nitrate Load of Godavari River

A search of the database indicated that the most dense data set of nitrate concentrations in this region was taken at river kilometer 16, the Aurangabad Water Works (AWW) intake location at Kopargaon. This is just 1.1 km upstream of New Orleans. The query produced a time series of nitrate concentration values along with the associated date of measurement. Also available for each measurement, if desired, were any combination of the following: sampling time, sampling depth, compound STORET number, the station identifier, sampling date, sampling time, project identifier, medium, sampling depth, sampling method, analytical method, and compound concentration.

We loaded these data into Splus, a statistical package, grouped the measurements by month, averaged to find monthly values, and produced the time series of monthly data shown in Fig. 7. We then computed monthly seasonality using a moving average filter (Brockwell 1996). The results are shown in Fig. 8. Subsequently, a fuller time series analysis using Auto-Regressive Integrated Moving Average (ARIMA) modeling on these data could be performed.

Interdependence of Water Quality Parameters

One of the issues relating to water quality in the upper Godavari River is its effect on the ‘‘Dead Zone’’ during the summer months and is believed to be created as a result of high nutrient loadings from the upper Godavari River. To assess this hypothesis, we queried the database for seasonal nitrate loading of the Godavari River. Since the AWW is less than 16 km from the mouth of the river, we used these data in the loading analysis. We then queried the database to find the clos-est hydrological monitoring station. This yielded the MCACOE site at Tarberts Landing, approximately 322 km upstream of the AWW monitoring site.

We loaded the flow data into Splus, matched it by date with nitrate concentration at JWW, and multiplied the flow by the nitrate concentration. This yielded an approximate load of ni-trate passing JWW on a given day. Then we grouped the com-puted loads by month, averaged to find monthly values, and produced the time series of monthly data shown in Fig. 9. We then computed monthly seasonality using a moving average filter (Brockwell 1996). The results are shown in Fig. 10. Once again, this analysis could be extended into a full time series analysis of the nitrate load.

We also used the database to find the correlation between nitrate plus nitrite and total phosphorus by segment. We que-ried the database for all nitrate plus nitrite and total phosphorus concentrations in each segment. Downloading the data to Splus, we matched the concentrations by date and computed the correlations (Table 1).

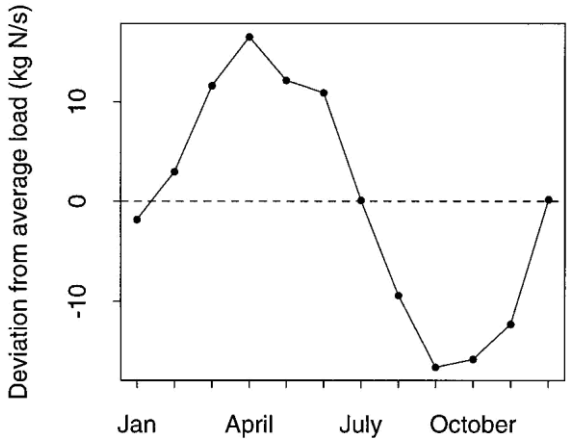

FIG. 10. Monthly Seasonality of Nitrate Load of Mississippi RIver at JWW, New Orleans

TABLE 1. Correlation of Nitrate Plus Nitrite with Total Phos-phorus by Godavari River **Segment**

Segment (1)	Correlation (2)	*n* (3)
1 and 2	20.1	369
4	0.35	394
5	0.28	364
6	0.29	142
7	0.22	152

Table 2, Average physico-chemical properties of upper Godavari River (Jan1989-Dec2010).

Sr.No.	Parameters	Summer	Rainy	Winter
1	Turbidity	1.6	4.61	1.79
2	pH	7.46	7.55	7.6
3	Chlorides	56.36	48.18	51.13
4	Free saline ammonia	0.06	0.08	0.12
5	Albuminoid Ammonia	0.12	0.16	0.24
6	Dissolved oxygen	0.93	1.67	1.31
7	Nitrate	2.81	3.05	2.46
8	Total hardness	137.11	131.86	141.47
9	Total dissolved solids	281.09	300.25	293.96
10	Iron (Fe)	0.21	0.28	0.13
11	Fluoride (F)	0.18	0.21	0.19
12	Total alkalinity as CaCO3	129.19	127.29	128.4

VIII. CONCLUSIONS

The Water Quality Software System is a computer-based system that helps manage and assess the water quality of river ecosystems. It facilitates the integration of several data sources, as well as the sharing of data among interested parties. It supports input of environmental data, water quality analysis through the use of sophisticated querying, construction and output of reports on water quality parameters, and interfaces with specialized statistical and geographical information systems. The water quality database includes general reference data on water contaminants and water quality criteria and collected data on the environment of the river under study. Future research in this area includes the integration of a decision-support system and inclusion of preventive and remedial actions based on the state of the ecosystem.

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Efficacy of Some Botanicals for the Control of Wet Rot Disease on Mechanically Injured Sweet Potato Caused by Rhizopus Stolonifer in Bauchi State

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Abstract- Laboratory experiment was conducted in the Microbiology Laboratory of School of Science and Science Technology, Abubakar Tafawa Balewa University, Bauchi, Nigeria in May, 2012 to determine the antifungal effect of different concentrations of neem and moringa seed extracts on wet rot disease of sweet potato. Moringa and neem seed extracts each with four varying concentrations (30,60,90,and 120g/L) were evaluated along with carbendazim and untreated sweet potato serving as a control constitttuted the treatments. The treatment were laid out in Completely Randomized Design (CRD) with three replications. The result showed that neem seed extact was significantly ($P < 0.01$) better than th moringa seed extract in controlling the disease. Treatment of the sweet potato with varying concentrations of neem and moringa seed extracts significantly ($P < 0.01$) inhibited radial mycilial growth of R. stolonifer and also reduce the weight loss of sweet potatoes caused by R. stolonifer compared with the control, except the application of 25g/1 of moringa seed extract. Preventive method of control significantly reduce the disease than the curative method. The effectiveness of the two plants seed extracts compared favourably with carbendzim. The study revealed that there exist a potential in natural plant products for the control of crop diseases, and if fully exploited, they can replace chemical pesticide in the control of crop diseses. It is therefore recommended that farmers should used 90g/1 or120g/1 as postharvest treatment for sweet potatoes before storage as control measure for R. stolonifer.

Index Terms- Carbodenzim, moringa, sweet potato, radial growth, wet rot.

I. INTRODUCTION

Sweet potato (*Ipomoea batatas* (L) Lam) is dicotyledenous plant belonging to the farmily Convolvulaceae. The family include about 45 genera and 1000 species, with only *I. batatas* of economics importance as food. Sweet potato ranks seventh among the world's major crops with an annual production of over 100 million tones (Nwokocha, 1992).

Sweet potato is an important staple food crop, particularly in Northen Nigeria where most of it is produced. It is one of the six important root tuber crops grown in Nigeria. The other root crops are cassava, yam, Irish potato,cocoyam,and ginger. Within sub-saharah Africa, sweet potato is the third most important root tuber crop after cassava (*Manihot esculenta*) and yam (*Discorea spp*) (Ewell and Matura, 1991). Nigeria produces about 0.2% of the world sweet potato(Agbo and Ene 1994). The production of sweet potato in Nigeria can be improved by increasing crop productivity and avoiding crop failure caused by storage rot (Echerenwa and Unechuruba, 2004).

The production of sweet potato in Nigeria is constrained by several factors among which storage rot is one of the most important (Echerenwa and Unechuruba 2004). The fungi reported to be associated with rottening of sweet potato include, *Fusarium oxysporum, Ceretocysts fimbriata, Fusarim solani, Monilochaetes infuscans, Macrophomina phaseolina and Botryodiplodia theobromae* (Clark and Hoy, 1994). Onuegbu (2002) implicated *Penicillium sp*. *Cerocystis fimbriata*, *Diaporthe batatalis, Aspergillus flavus* and *Aspergillus niger*, as fungi responsible for decay of sweet potato tuber. Oyewale (2006) repoted fungi associated with postharvest fungal rot to include *Motierella ramanniana, Rhizopus stolonifer, Muco pusiluss, Botrytis cinerea, Erysiphe polygoni and A. flavus*. These fungi create local discoloration of the surrounding tissues of infected tubers (Snowdor, 1991), resulting in changes in appearance, deterioration of texture and possibly flavour or taste. Rot fungi causes postharvest losses, reduction in the market value and misfortune to farmers. Fungacides such as Dichloronitroanline are used to protect tubers against Rhizopus wet rot (Clark and Moyer 1988). However, the use of synthetic fungicides apart from their potential danger to both the farmer and envirronment (Ogbawu *et al.,* 1997), are unaffordable by most farmers. Recent studies on the use of plant extract have opened a new approach to control of plant diseases. These plant extract have been reported to be safe, non-toxic to man, but effective against plant pathogens (Shivpuri *et al.,* 1997). In Nigeria plant extracts have been used to control fungal diseases of plant such as brown blotch of cowpea (Owolade and Osikanlu, 1999), black sigatoka of banana (Okigbo and Emoghene, 2004), yam tuber rot (Okibo and Nmeka 2005), pea root rot (Abdulaziz and Younes 2010,), and pawpaw fruit rot (Ebele, 2011).

The aim of this study therefore was to investigate the effecacy of using moringa and neem seed extracts for the control of tuber rots of sweet potato, incited by *R. Stolonifer*.

II. MATERIALS AND METHODS

Experimental Site

The experiment was conducted in the Microbiology Laboratory of School of Science Technology, Abubakar Tafawa Belewa University, Bauchi in May 2011. Bauchi town is located at lattitude $10^0$17'N and longitude $9^0$49'E, situated at 609.5m above sea level in the northen guinea savanah ecological zone of Nigeria.

Isolation of *R. stolonifer*

White fluffy fungal mycelia were carefully isolated from decaying bread using cooled flamed inoculation needle and fluffy fungal mycelia were place on solidified malt agar plate and incubated at room temperature (28$\pm$ 2^0C). The organism was sub-cultured by aseptically transfering the fungi to freshly prepared plate of malt agar beginning after 24 hours until pure culture was obtained.

Preparation of plant extracts

Ripe neem (*Azadrachta indica*) seeds were collected underneath of neem trees in fatara district and ripe moringa (*Moringa oleifera*) seeds were collected in Kujuru district of Azare all in Katagun local government area of Bauchi state. The seeds were dried for three days at room temperature (28$\pm$ 2^0C) to reduce moisture content. The dried seeds were ground using blender to get neem and moringa seed powder.

To get concentrated solution of neem and moringa extracts, four lots (30, 60, 90, 120) respectively of the seed powder were dissolved in 1litre of distilled water separately, vigorously agitated and left for 24 hours to stand before filteration. The filterates were used as the plant extractsin the experiment.

Assessment of the Effect of Plant Extracts on *R. Stolonifer*

Fresh, healthy sweet potato tubers were purchased from Wunti Market in Bauchi. These were washed with tap water, rinsed with distilled water and surface sterilized with 60% ethonol. Cylindrical disc of 0.8cm were removed from each tuber with a sterile corkborer. Then a disc of five days old culture of the isolated fungus was transferred into the holes created into sweet potato tubers. Prior to inoculation of pathogen into the tubers, the tubers were treated with plant extracts concentrates and carbendazim and after thirty minnute the tubers were inoculated with pathogen isolates. This is called preventive method of control. Another set of tubers were inoculated with pathogen first and then later treated with plant extracts and carbendazim and this is called curative method of control. Those tubers that are not treated with plant extracts and carbendazim served as the control. The tubers were arranged in a Completely Randomized Design (CRD) with three replications. Each method of control have thirty potato tubers with ten tubers per replicate (four sweet potato for neem concentration, four for moringa concentration one for carbendazim and serving as a cheack making a total of ten tubers per replicate) then times three replications making thirty sweet potato tubers for preventing method and thirty sweet potato tubers for curative control making a total of sixty experimental unit for both methods. The radial growth of the *R. stolonifer* were recorded at interval of 24 hours for ten days. The following data were collected:-

1. Initial weight of potato tuber prior to treatment
2. Initial cut of 0.8cm made before inoculation
3. Daily weight loss at the interval of 24hours for each potato tuber for ten (10) days by subtracting the new weight from the initial weight.
4. Daily radial growth at the interval of 24hours for each potato tuber for ten (10) days by subtracting the new radial increase from the initial using a meter rule

III. DATA ANALYSIS

Statistical analysis of the data was conducted using GenStat Release 72 DE (PC/Window XP) copyright 2007, Lawes Agricultural Trust (Rothemsted experimental station)and treatment means were separated using Duncan's Multiple Range Test (DMRT).

IV. RESULTS

Table 1 shows that the mylicial growth of *R. stolonifer in-vivo* was lower in sweet potatoes treated with neem seed extracts (0.20cm) followed by those tubers treated with moringa seed extracts (0.23), and was lowest in tuber treated with carbendazim, compared with control.

Also varying concentrations of the plant seed extracts significantly ($p \leq 0.01$) differed in reducing the mycelial growth of *R. stolonifer* on infected potatoes (table 2). At 60g/L and 120g/L of neem and moringa seed extracts significantly ($p \leq 0.01$) reduce radical growth of *R. stolonifer* compared with control. However, compared with carbendazim, raqdial growth was significantly higher in the extract treated sweet potato. All the treatmet tasted significantly **(**$p \leq 0.01$**)** reduce radial growth of *R. Stolonifer* compared with the control except moringa seed extracts at 30g/1.

Table 1: The effect of plant extracts on radial mycelial growth of *Rhizopus stolonifer* in vivo

Treatmet	Radial growth (cm)
Moringa seed extract	0.23^b
Neem seed extract	0.20^c
Carbendazim	0.13^d
Control	0.33^a
Level of significance	**
Se$\pm$	0.01

Means with different superscripts in the same colum are significally different.

** = Signifcant at 1%

SE = Standard error

Table 2: Effect of different concentrations of plant extracts on mycelial growth of *Rhizopus stolonifer* on infected sweet potatoes

Treatment	Concentration (g/L)	Radial growth (cm)
Moringa seed extracts	30	0.33[a]
	60	0.25[b]
	90	0.21[c]
	120	0.19[c]
neem seed extract	30	0.24[b]
	60	0.21[bc]
	90	0.19[c]
	120	0.17[c]
Carbendazim	2.0	0.12[d]
Control	0	0.34[a]
Level of significant		**
Se ±		0.01

Means with different superscripts in the same colum are significally different.
** = Signifcant at 1%
SE = Standard error

The result of effect of concentration of different plant extracts and method of control on disease development of wet rot on sweet potato is presnted in table 3. There was a significant ($p \leq 0.01$) difference between those sweet poatatoes tubers treated with varying concentrations of plant extracts compared with those that were not treated under both curative and preventing methods of control. However, disease development was rerduce with icreased concentration of plant extracts under both methods of control. Neem seed extract at 90 and 120g/1 concentration significantlly ($p \leq 0.01$) reduce the disease development and is comparable to the application of 90and 120g/1 moringa seed extract under both method of control. The effectiveness of these concentrations of plant extracts is comparable to carbemdazim at curative method of control.

Table 3: Effect of different concentrations of plant seed extracts and method of control on wet rot disease development on sweet potato.

		Method of control (cm)	
Treatment	Concentration (g/1)	Curative	preventive
Moringa seed extrac	30	0.32[b]	0.26[c]
	60	0.26[c]	0.26[c]
	90	0.21[cde]	0.20[cde]
	120	0.20[cde]	0.19[de]
Neem seed extract	30	0.25[cd]	0.25[cd]
	60	0.24[cd]	0.22[cde]
	90	0.19[de]	0.17[e]
	120	0.17[e]	0.17[e]
Carbondazim	2.0	0.16[e]	0.07f
Control	0	0.14[a]	0.41[a]
Level of signifigcanc		* *	
SE ±		0.02	

Means with different superscripts in the same colum are significally different.
** = Signifcant at 1%
SE = Standard error

Table 4 presented the effect of concentrations of different plant extracts on weight loss of sweet potato infected by wet rot disease. The result showed a significant ($P \leq 0.01$) difference between various concentration of plant extracts. Tubers treated with 30g/1 moringa seed extract did not differ with the untreatrd tubers but differed significantly ($P \leq 0.01$) with other concentrations of plant extracts in reducing weight loss caused by *R.stolonifer* on sweet potato. The effectiveness of moringa seed extract except 30g/1 and the neem seed extract compared effectively with the synthetic fungacide (carbendazim) in reducing weight loss of sweet potato caused by *R. stolonifer*.

Table 4: Effect of concentration of different plant extracts on weight loss of sweetpotato infected by *Rhizophus stolonifer*.

Treatment	Concentration (g)	Weight loss (g)
Moringa seed extract	30	16.26[c]
	60	15.25[ab]
	90	14.93[ab]
	120	14.18[ab]
Neem seed extract	30	15.21[ab]
	60	15.03[ab]
	90	14.83[ab]
	120	14.16[a]
Carbondazim	2.0	13.46[a]
Control	0	16.42[c]
Level of significance		**
Se ±		0.49

Means with different superscripts in the same colum are significally different.
** = Signifcant at 1%
SE = Standard error

Result presented in table 5 showed a significant ($P \leq 0.01$) difference between concentrations of different plant extracts and methods of control on weight loss of potato infected by *R. stolonifer*. Treatment of infected sweet potatoes with 30,60,90,and 120g/1 of moringa seed extract and 90, and 120g/1 of moringa seed extract using any method of control reduced the weight loss of sweet potato due to wet rot disease than the control. The effectiveness of these concetrations is comparable to carbendazim in reducing the damage caused by the pathogen.

Table 5: Effect of concentration of different plant extracts and method of control on weight loss of sweet potato infec90ted by *R. stolonifer*.

		Method of Control(g)	
Treatment	Concentration (g/1)	Curative	Preventive
Moringa seed extrac	30	17.81[ab]	16.85[abc]
	60	16.33[abcd]	15.59[bcde]
	90	14.72[cde]	14.47[cde]
	120	14.36[cde]	14.09[cde]
Neem seed extract	30	15.22[bcde]	15.02[bcde]
	60	14.89[cde]	14.83[cde]
	90	13.96[cde]	13.77[de]
	120	13.11[e]	12.96[e]
Carbondazim	2.0	12.81[e]	12.69[e]
Control	0	18.74[a]	18.47[a]
Level of significance		**	
SE ±		0.69	

Means with different superscripts in the same colum are significally different.
** = Signifcant at 1%
SE = Standard error

V. Discussions

Investigation on the antifungal properties of some plant extracts on the growth of *R. stolonifer* isolate shows that crude plant extracts posses some inhibitory components which cause significant reduction in mycelial growth of the pathogen. Neem seed extract inhibited the mycelial growth of the pathogen as well as weight loss of sweet potato tubers more than the moringa seed extract. This may have resulted from variation in the principle active ingredients in the plant seed extracts. The neem seed extract contain azadrachtin which is known to be fungitoxic against most fungal pathogens. Akpa *et al.*, (1991) reported a significant inhibitory property of neem (*A. indica*) extract on mycelial growth of *Collectotrichum graminicola*, just as Amuchi (1999) found the extract of *Ocimum gratissimum* reduced the radial growth of *Rhizopus spp*.

The effectiveness of plant extracts depends on the nature and amount of active ingredient it contains. Increase in the concentration of the plant extracts correspondingly decreased radial growth of *R. stolonifer* and weight loss of sweet potato. The increased of the concentration of the extract implied an increased in the active ingredients of the solution which acts on fungus there by affecting its physiological processes and consequently lowering the growth of the fungus. The optimum concentration for the control of *R. stolonifer* in-vivo using moringa and neem seed extracts as revealed by this study is 60,

90, or 120g/1. This study has also confirmed and established the antifungal activity of these plant crude extracts, which are interestingly systematic in action and can be used or applied as tuber treatment against wet rots in sweet potato tuber caused by *R. stolonifer*. This agrees with earlier reports of Udo *et al.*, (2001) on the inhibition of growth and sporulation of fungal pathogens on *Ipomea batatas and Dioscorea sp*, by garlic extract; Okigbo and Nmeka, (2005) on the use of *Xylopia aethiopica and Zingiber officinade* to control yam tuber rot caused by *F. oxysporum, A. niger and A.flavus* and Amienyo *et al.*, (2007) on the use of *Z. officinale, Annona muricata, gacinia cola, Alchorniea cordifolia, Allium sativum* to control wet rot on sweet potato caused rot fungal pathogen, Abdullaziz and younes, (2010) on the use of *Cinnamomum verum*, arise (*Pimpinella anisum L.*), black seed (*Nigella sativa L.*) and clove (*Syzygium aromaticum L. Merr and perry*) against pea (*Pisum sativum L.*) root-rot fungus (*Rhizoctonia solani*) and Ebele, (2011) on the use of *Carica papaya, Chronolaena odorota and Acalypha ciliate* on the control of pawpaw fruit rot fungi.

Application of plant seed extracts at varying concentrations reduced wet rot disease under preventive method of control better than under curative method of control. This is probably as a result of the microbes being killed on exposure to the higher concentration of these plant extracts when the inoculum was introduced on the treated parts of the sweets potatoes (i.e, under preventive) which inhibit their ability to establish a nutritional relantionship that will subsequently enable the pathogen to get nourishments or nutrient required for its growth and development. This consequently resulted in reduction in the weight loss of sweet potato caused by *R. stolonifer*. Unlike when the plant seed extracts where used as curative when the pathogen has already established its self and thus the plant extracts may have little effect on the pathogen.

In conclusion, this study has shown that the neem and moringa seed extracts used, have the potentials in the protection of sweet potato plant against rot fungi especially wet rot caused by *R. stolonifer*. Therefore, due to the fact that chemical control of disease is envitronmentally hazardous and very expensive, this inexpensive, non-hazardous and biodegradable plant materials could be used as an alternative way of reducing and controling rot disease by farmers to increase food production in many developing countries, where sweet potato is a staple food for the populace.

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Occurrence of Two Spirurid Nematodes in Cyprinid Fishes from Nilwala River Basin, Sri Lanka

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Abstract- Characterization of the helminth parasites of wild fish has a considerable importance from the point of view of hygiene and public health, as well as from its taxonomic interest. To study the pathogenecity of parasites in the field of fisheries, require detail knowledge of the parasites inhabiting localities involved. Present study aimed to investigate the intestinal nematodes from the *Puntius* species inhabiting Nilwala river basin, Sri Lanka and to evaluate their population levels in host populations. Eight host fish species were surveyed and two spirurid nematodes, *Camallanus fotedari* from *Puntius dorsalis* and *P. titteya* and *Rhabdochona sarana* from *P. filamentosus* and *P. sarana*, were recovered. *C. fotedari* was found inhabiting in low infection levels in its two hosts, and it, however had a relatively high preference to *P. dorsalis* (20%) than *P. titteya* (4.2%). Of the two host species of *R. sarana*, high prevalence, mean intensity and abundance were reported in *P. filamentosus* (syn. *Dawkinsia singhala*) compared with those of in *P. sarana* (syn. *Systomus sarana*). Occurrence of these two spirurid nematode, *C. fotedari* and *R. sarana*, parasitizing in wild fresh water fishes is a new records to Sri Lanka.

Index Terms- First record, *Rhabdochona sarana*, *Camallanus fotedari*, Freshwater, *Puntius*, Sri Lanka

I. INTRODUCTION

Fish species occur in most of the tropical and subtropical countries of the world, including those of the south Asia, carry heavy infections of helminth parasites. Of them, parasitic nematodes represent an important group of fish parasites, many species of which are considerably parasites and may cause serious disease or death of fish. Though, parsitologists are now paying attention on pathogenecity of fish parasites, knowledge on the effect of parasitic nematodes on fish host is scarcer (Sood, 1988). Anemia, perforation of internal organs, muscle and skin or formations of tumour are the observed disease in fishes with nematode infections (Van Duijan, 1956). Therefore, to solve practical problems in fisheries and aquaculture, such as attempts to increase the productivity of fish farms, to enhance the stocks of valuable commercial fishes in the natural waters or to acclimatize fish in new localities, require detail knowledge of the parasites inhabiting the localities involved (Sood, 1988). Extensive surveys on parasitic fauna of wild freshwater fishes of Sri Lanka are meager, and only a few studies on fish parasitic fauna of Sri Lanka have been published (Nilakkarawasam, 1993 and 1998). The records of identified fish parasites of Sri Lanka comprise of a few intestinal parasites, few parasitic crustaceans and gill monogeneans, and species list of fish parasites recorded from inland fishes of Sri Lanka have been given in Nilakkarawasam, 1993. However, no information is available on fish parasite fauna of fishes of upstream river systems of Sri Lanka. Of the cyprinid fishes, species of the genus *Puntius* (Hamilton Buchanan, 1822) are abundant in streams and rivers of Sri Lanka, represent 16 (25.8%) of the 62-recorded freshwater dispersant species in Sri Lanka (Pethiyagoda, 1991). Present study aims to investigate the intestinal nematodes parasitizing in *Puntius* species inhabiting Nilwala river basin, Sri Lanka, and to compute population levels of parasites in host species.

II. MATERIALS AND METHODS

Puntius titteya Deraniyagala 1929, *P. nigrofasciatus* Gunther 1868 (synonyms: *Pethia nigrofasciatus* Pethiyagoda et al. 2012), *P. amphibious* Valenciennes 1842, *P. dorsalis* Jerdon 1849, *P. filamentosus* Valencienns 1844 (synonyms: *Dawkinsia singhala* Pethiyagoda et al. 2012), *P. sarana* Hamilton 1822 (synonyms: *Systomus sarana* Pethiyagoda et al. 2012), *P. chola* Hamilton 1822, *P. vittatus* Day 1865, and *P. cumingii* Gunther 1868 (synonyms: *Pethia cumingii* Pethiyagoda et al. 2012) were collected using field collecting gears and instruments from tributaries of Nilwala river basin, wet zone, southern part of Sri Lanka. Host fishes were collected from average age and size class for the population as 25 specimens for each species and identified using the diagrams and keys given in Pethiyagoda (1991), Munro (1955) and Deraniyagala (1952). Fish were euthanized by cervical dislocation and examined fresh (within 1

day from collection) for the parasites. Intestinal nematodes were recovered from intestine of host species under Stereo-zoom dissecting microscope (Wild 3MB) and the number of each host species infected and number of each nematode species in fish hosts were recorded. The recovered nematodes were washed in vertebrate saline solution, fixed with Berland's fluid (Berland, 1982) and preserved in 70% Alcohol. Temporarily mounted animals in glycerol were examined under a phase compound microscope (Olympus CH-2), identified and measured, male and female separately, using an ocular micrometer. Drawings were made with a aid of camera lucida (Olympus 1.25x) mounted on phase compound microscope (10x, 40x, or 100x objective lens, 10x ocular lens). Identification was carried out using consultation of original descriptions in the primary literature and synthetic keys given in Anderson et al, 1975; Moravec, 1975 and Sood, 1988. All measurements were given in micrometers.

Prevalence, Mean abundance and Mean intensity were computed as the common measurements of parasite population levels in host species. Prevalence refers to the percentage of individuals of the host infected by a particular species of parasite, while Mean abundance refers to the number of parasites of a given species per host examined, infected and uninfected. Mean intensity is the mean number of parasites of a given species per infected host (Bush et al, 1997).

III. RESULTS

Two species of Spirurid nematode (*Camallanus fotedari* and *Rhabdochona sarana*) were recovered from the survey (Figure 1), and population levels of the parasites computed in host fishes are depicted in Figure 2 and 3.

Camallanus fotedari Raina and Dhar, 1972
Synonyms: *Camallanus cotti* Fujita, 1927
Host: *P. dorsalis* and *P. titteya*

Description: Mouth terminal, slit like; buccal capsule consisting of two lateral chitinous valves, internally with 22-24 longitudinal rib like thickenings. From the point of junction of the valves, dorsally and ventrally, a trident-shaped chitinous process directed backward. A chitinous ring present at the junction of the valves and esophagus. Esophagus consisting of a short anterior muscular portion and a long posterior glandular portion enlarged posteriorily.

Male: (based on one specimen).
Length of body 2476, maximum width 116. Buccal capsule 77 x 81. Muscular esophagus 251, glandular esophagus 325. Nerve ring 137 from anterior end, caudal papillae 7+2+6=15 pairs. Post-anals disposed characteristically, as three pairs immediately post-cloacal in a group, two pairs slightly posterior to former and last sixth pair near tip of tail. Spicules unequal with pointed tips. Small spicule 109, large spicule 156 in length.

Female: (based on three specimens).
Length of body 4715 (2144-6929), maximum width 195 (114-263). Buccal capsule 116 x 119 (88-135 x 88-149). Nerve ring 195 (142-226) from anterior end. Muscular esophagus 372 (247-453), glandular esophagus 459 (263-585) in length. Vulva just post-equatorial, at 2284 (1042-3452) from posterior end. Tail with rounded tips, 860 (279-1340) in length. Egg size 25 x 19 (24-26 x 17-20).

Rhabdochona sarana Karve & Neik, 1951
Host: *P. filamentosus* (syn. *Dawkinsia singhala*) and *P. sarana* (syn. *Systomus sarana*)

Description: Anterior end of body narrow, rounded with indistinct cephalic papillae. Buccal capsule funnel shaped, supported by short longitudinal ridges projecting anteriorly as sharp teeth. Vestibule long and narrow. Esophagus distinctly divided into short muscular portion and long glandular portion. Body cuticle with transverse striations throughout its length.

Male: (based on 10 specimens).
Shorter than female. Length of body 6325 (5095-7340), maximum width 111 (85-123). Length of prostom 16 (15-18), width 13 (11-15); vestibule including prostom 109 (98-128). Muscular esophagus 185 (140-220); glandular esophagus 2339 (1976-2690) in length. Nerve ring at distance of 121 (108-133); excretory pore 194 (178-213); deirids 53 (48-55) from anterior end. Preanal papillae: 6 pairs subventral and 2 pairs lateral; latter pairs located between 2nd and 3rd and then between 3rd and 4th (counted from cloaca). Six pairs of post-anal papillae present, first pair lateral, remaining subventral. All papillae rather elongated; cuticle around them inflated, forming large dome-shaped formations, which may be partly fused together in neighboring papillae (usually in post anal pairs). Larger spicule very slender, 203 (183-223) long. Small spicule 69 (60-78) long, relatively narrow, tapering to distal end. Tail 137 (118-160) long, with rounded tip (without any crown).

Female: (based on 10 specimens)
Body of female 14305 (8905-17524) long and 202 (145-263) wide. Length of prostom 23 (20-28), maximum width 17 (13-20). Vestibule including prostom 139 (110-163) long. Length of muscular esophagus 234 (210-298); of glandular esophagus 3699 (2952-4833). Distance of nerve ring from anterior extremity 151 (130-168), excretory pore 225 (205-245), deirids 60 (55-70). Tail relatively wide, 206 (158-273) long, with a rounded end having stumpy projections. Length of crown 9 (5-15), width 17 (15-20). Vulva post equatorial with slightly elevated lips, 6748 (3786-8238) from posterior extremity. Eggs smooth, oval, size 30 x 21 (20-38 x 18-35), without filaments.

Comparative measurement of *C. fotedari* and *R. sarana* recorded previously with present materials are given in Table 1 & 2.

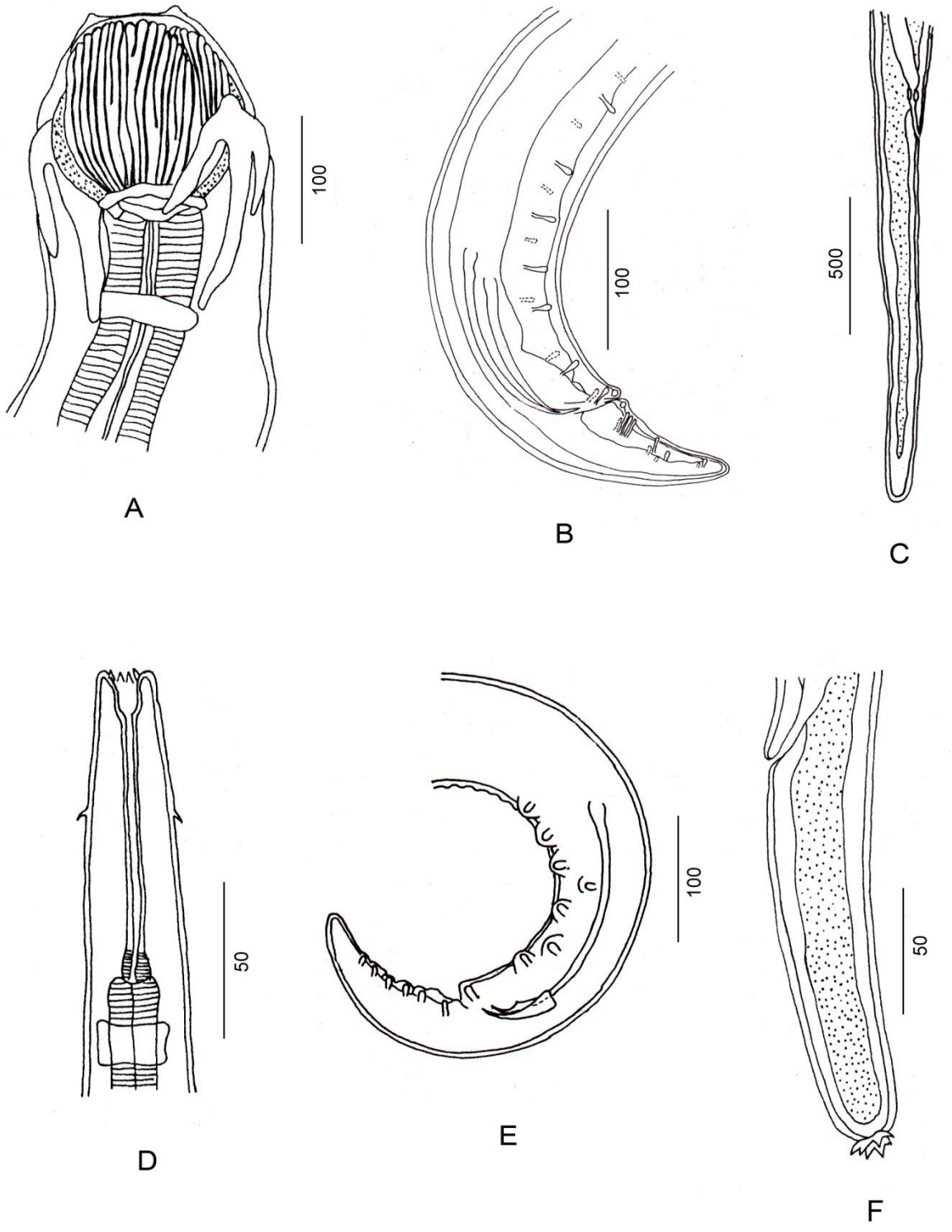

Figure 1: *Camallanus fotedari*: A- head region of male, B- tail region of male, C- tail region of female; *Rhabdochona sarana*: D- head region of male, E- tail region of male, F- tail region of female. (Values with scale bars are in micrometers)

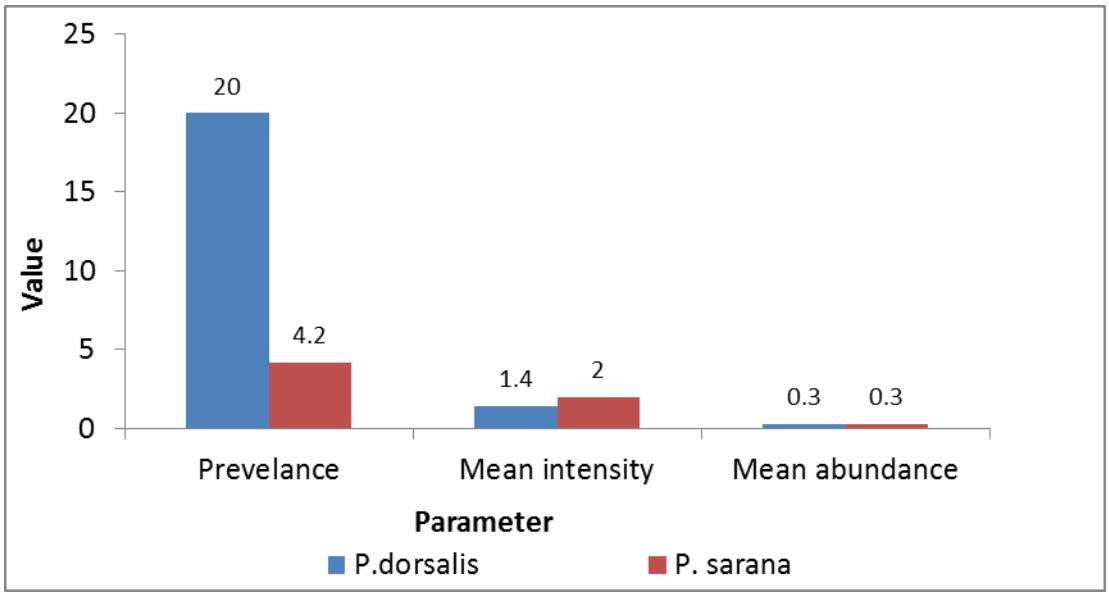

Figure 2: Ecological data of *C. fotedari* in its host populations

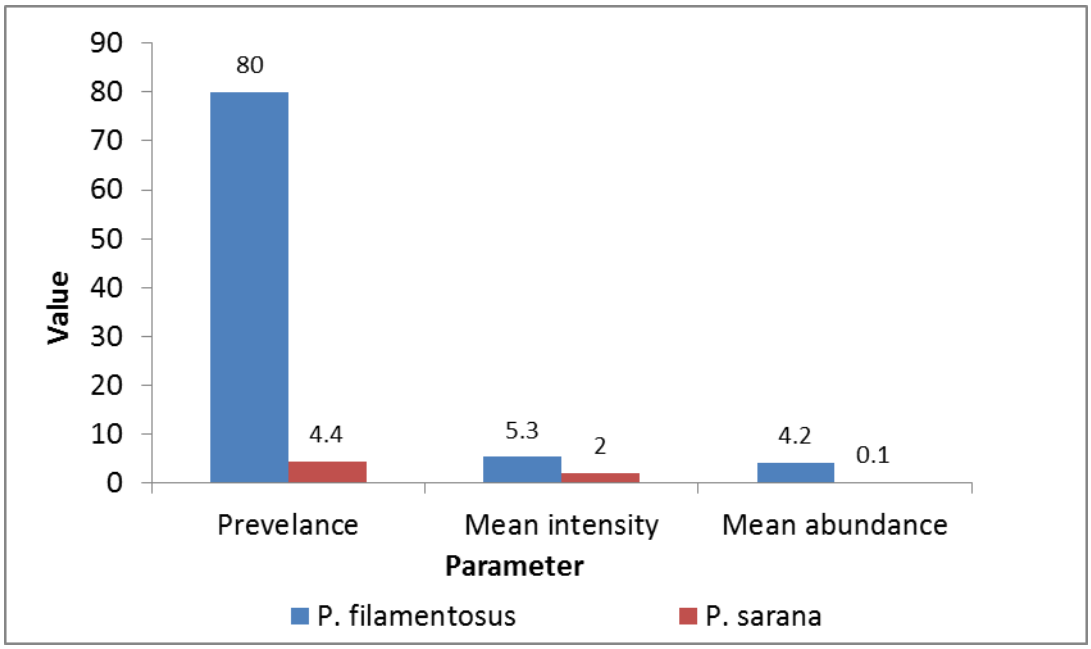

Figure 3: Ecological data of *R. sarana* in its host populations

Table 1: Comparative measurements of *C. fotedari* (male and female) with present material

	Raina and Dhar, 1972		**Present material**	
	Male	**Female**	**Male**	**Female**
Body length	2030 - 4950	1980 - 11920	2476	4715 (2143 - 6928)
Body width	90 - 280	120 - 520	116	194 (114 - 262)
Buccal capsule length	60 - 160	70 - 130	77	116 (88 - 130)
Buccal capsule width	90 - 100	50 - 160	81	119 (88 - 148)
Muscular esophagus	280 - 450	160 - 660	251	372 (246 - 452)
Glandular esophagus	290 - 490	280 - 870	325	459 (282 - 584)
Tail length	-	280 - 1450	-	860 (299 - 1339)
Vulva from anterior	-	2170 - 6820	-	2431 (1101 - 3476)
Small spicule	100 – 110	-	109	-
Large spicule	130 - 160	-	156	-
Caudal papillae	(6–8) + 2 + 6 = 14-16 pairs	-	7 + 2 + 6 = 15 pairs	-

Table 2: Comparative measurements of *R. Chodukini* (female and male) and *R. Sarana* (female only) with present material

	***R. chodukini* Osmanov, 1957**		***R. sarana* Karve and Naik, 1951**	**Present material**	
	Female	**Male**	**Female**	**Female**	**Male**
Body length	11720 - 13910	7500 - 8430	8551 - 12270	14305	6325
Body width	190 - 218	122 - 136	140 - 200	202	111
Prostom length	21 - 27	18	22 - 25	23	16
Prostom width	18	15	17 - 20	17	13
Vestibule including prostom	126 - 156	135 - 147	115 - 125	139	109
Muscular esophagus	342 - 384	258 - 288	260 - 290	234	185
Glandular esophagus	3670 - 4830	3020 - 3170	2440 - 3140	3699	2339
Nerve ring from anterior	195 - 222	204 - 210	130 - 150	151	121
Excretory pore from anterior	273 - 306	291 - 300	170 - 300	225	194
Deirids from anterior	84 - 120	102	-	60	53
Tail length	246 - 303	210 - 255	110 - 150	206	137
Crown length	4 - 6	-	5	9	-
Large spicule	-	411 - 420	-	-	203
Small spicule	-	120	-	-	69

IV. DISCUSSION

Of the nine *Puntius* species investigated, four fish species were parasitized with two nematode species, *Camallanus fotedari* and *Rhabdochona sarana*. *C. fotedari* was recovered from *P. dorsalis* and *P. titteya*, while *R. sarana* was recovered from *P. filamentosus* and *P. sarana*. Two species did not found coexisting in any infected fish host. Considering the importance of characterization of the parasites in wild freshwater fishes, present paper illustrates the morphological characters and describes the morphometric characters of the two nematodes recovered from *Puntius* species in Sri Lanka. Those will enable the parasitologists to identify the species and compare the conspecific species recovered from other studies.

The presence of main characters which Railliet and Henry (1915) used to define the genus *Camallanus* made it easy to place the nematode of family Camallanidae to the genus *Camallanus* Railliet and Henry, 1915. Using the key to the species of *Camallanus* reported from fishes in South Asia (Sood, 1988) these worms could be easily identified as *C. fotedari*, as they posses similar characters of *C. fotedari* described from *Nemacheilus kashmirensis* Hora. Measurements given to describe the *C. fotedari* Raina and Dhar, 1972, were nicely fit with those of present material, confirming the identification of the species (Table 1). All measurement of, both male and female, *C. fotedari* from *P. dorsalis* and *P. titteya* from Sri Lanka lie in between the measurements range of *C. fotedari* described from Srinagar, Kashmir. Moreover, present specimens are similar in all aspects to *C. fotedari* recorded from *Nemacheilus kashmirensis* Hora in Srinager, Kashmir.

Although six *Camallanus* species (including *Zeylanema* species, as suggested by Sood, 1988) have been recorded from Sri Lankan fresh water fishes (Kulasiri and Fernando, 1956, Fernando and Furtado, 1963), occurrence of *C. fotedari* in *P. dorsalis* and *P. titteya* species is a new record to Sri Lanka. Moreover, in Sri Lanka, only *Camallanus anabantis* has been previously recorded from a *Puntius* species; *P. filamentosus*. In India *Camallanus sweeti* has been recorded from *Puntius ticto*. As sited in Sood (1988), Campana-Rouget and others (1976) reported the *C. fotedari* in Guppies; *Lebistes reticulatus* and *Danio rero*, maintained in aquaria in France. It is evident that, *C. fortedari* seems a cosmopolitan species, which is probably spread throughout with the trade of guppies (*Poecilia* species). They may have entered to the Sri Lanka with guppy trade and now established even in the endemic species, *P. titteya*. As a widely distributed species even in non-cyprinid host, the guppies, inability of parasite to infect other *Puntius* species inhabiting in Nilwala river basin may relate to their food preference. *C. fotedari* also has low infection levels in both of its host, however, it has a little high preference to *P. dorsalis* (20%) than *P. titteya* (4.2%). The low values in mean intensity and abundance in both species may be due to its high dispersion in different host species. Parasite may have a very common intermediate host (copepod) to have a wide distribution in the world.

Due to presence of main characters which Moravec (1975) used to separate the genus *Rhabdochona* Raillet 1916, from other genera, the nematode recovered from *P. filamentosus* and *P. sarana* was belongs to genus *Rhabdochona*. The genus *Rhabdochona* that seems to be bound to fresh water only is widely distributed and contains a large number of species. Members of this genus are parasite of a number of fish species (largely in Cypriniformes but also in others), which are often of economic importance (Moravec, 1975). According to key provided by Morvec (1975) to Eurasian species of *Rhabdochona* these specimens should be either *R. chodukini* Osmanov, 1957 or *R. sarana* Karve & Naik, 1951. In this synthetic key, two species are differentiated only by the length of the female tail and by their locality. Our specimens are more closer to *R. chodukini* recorded from *Barbus brachycephalus & B. capito conocephalus*, and *R. sarana* recorded from *P. sarana*. However, Karve and Naik, 1951, have described only the female specimens of *R. sarana*. Males are not known. Therefore, measurements of our specimens were compared with the measurements of *R. chodukini* (both male and female) from *Barbus brachycephalus* and *Barbus capito conocephalus* from Tadzhikistan and those of the female *R. sarana* (Table 2).

Though, comparative measurement of female *R. chodukini* and *R. sarana* with present material did not give clear evidence to differentiate species as *R. chodukini* or *R. sarana*, males of present material gave the clear differentiate characters from *R. chodukini*. Of the anal papillae described for male *Rhabdochona chodukini*, the second pair of post anal papillae remains lateral and sub-ventral (counted from cloaca). In present specimen not the second pair, but first pair is lateral and remains sub-ventral. Of the pre-anal papillae of *R. chodukini*, 6 pairs remain sub-ventral and 2 pairs remain lateral. These lateral pairs are located between second and third and then at level of fifth sub-ventral pair. In present specimens also, 6 pairs are sub-ventral and 2 pairs remain lateral. But, lateral pairs are located between second and third and then between third and forth. Because of these characters of males, present specimens were different from *R. chodukini*. The dissimilarities with *R. chodukini*, especially on male, and the similarity of host with *R. sarana* made me to identify our specimens as *R. sarana*. Therefore, present paper describes the male's characters that can be easily used for identifying the *R. sarana* from *R. Chodukini*. *Rhabdochona sarana*, which is previously reported in *P. sarana* in India, was found in both *P. sarana* and *P. filamentosus* in present study, and high preference was reported not in *P. sarana* but in *P. filamentosus*. Probably it can also be present in other *Puntius* species as well. *R. sarana* in *P. filamentosus* has high prevalence infecting 80% of the population and about 5 individuals were present in infected host as shown in Figure 3. In *P. sarana*, its infection values are very low (prevalence 4.4%, mean intensity 2.0) compared to *P. filamentosus*. These common measurements of parasite population revealed that, of the *Puntius* species in Nilwala river basin of Sri Lanka, *P. filamentosus* were liable to infect *R. sarana* infecting 5 parasites per individuals of the fish population and may cause damage or deterious effect on their population. There was only one previous record of *Rhabdochona* species from Sri Lanka by Nilakarawasam (1993) in *Etroplus suratensis* Bloch. Hence, this is the first instance, *R. sarana* parasitizing in fishes of Sri Lanka.

In conclusion, occurrence of these two species, *Camallanus fotedari* and *Rhabdochona sarana* in *Puntius* species inhabiting Nilwala river basin is a new record to Sri Lanka. The restriction of present study to *Puntius* species in upstream tributaries of Nilwala river basin warrants the further investigations. It would be interesting to investigate whether the down streams have higher population numbers, whether there are other parasites on similar fish species in the other areas or any absence of the investigated species in them. Also, it would be interesting to investigate this two species coexist in single host and investigation of the parasite fauna of the non *Puntius* species in same areas would throw light on their host specificities.

ACKNOWLEDGEMENT

Dr. N. Nilakarawasam for her invaluable support to complete the laboratory work, and Mr. C.H. Priyantha and Mr. C. Krishan for their assistance during field sampling was gratefully acknowledged.

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Vocabulary Learning Strategies Employed by Form 6 Students

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Abstract- Vocabulary learning strategies are classified into 'incidental' and 'intentional' learning strategies that are present in taxonomies of VL strategies by Oxford (1990), Schmitt (1997), Sökmen (1997), etc. Notably, researchers have differing views on which strategy is the key to vocabulary acquisition. In recent years, researchers have begun to take into account all the strategies and recognize their influence on vocabulary learning (Gu & Johnson, 1996). In this study, a taxonomy of VL strategies by Gu & Johnson (1996) and Fan (2003) cited in Ming (2007) was used to identify the pattern of VL strategies of Form Six (Pre-university) students. The results revealed that the samples had a medium frequency of strategy use with an overall mean of M=3.21 (SD=.45). They had the highest frequency of use for guessing "I guess the meaning of words I don't know" (M=3.80; SD=.94) and the least "I carry a pocket dictionary to look up the words I don't know" (M=2.22; SD= 1.17). Guessing strategy was the most frequently used strategy, followed by perception and encoding strategies. In contrast with previous research, management strategy turned out to be the least frequently used strategy. There were significant differences in strategy use by field of study and gender and a moderate positive correlation between attitude towards VL and strategy use, but there was no significant difference in strategy use in terms of self-rated English proficiency and no correlation between perception of problems in VL and strategy use.

Index Terms- Vocabulary learning strategies, vocabulary acquisition, incidental learning, intentional learning, strategy use.

I. Introduction

The importance of the English Language continue to gain the attention of all parties - students, parents, teachers, politicians, educators and academicians in all education institutions. Apparently, Malaysians are concerned with the poor standard of English among educated learners, namely graduates. In order to function reasonably well in the second language, learners should at least have 2000 words. Thornbury (2002) asserts that there is a need to equip learners with a core vocabulary of 2000 high frequency words as soon as possible. He also contends that most researchers recommend a basic vocabulary of at least 3000 word families. Hence, without possessing the minimum thresholds of vocabulary learners will face difficulties in all the four language skills - listening, speaking, reading and writing. Lightbrown & Spada (2006) comment that the importance of vocabulary is very clear as communication is still possible by using words that are not placed in the proper order, pronounced perfectly, or marked with the proper grammatical morphemes, but communication often breaks down if we do not use the word correctly. Hence, we cannot deny the fact that vocabulary is indeed very important and today, vocabulary acquisition has become one of the most active areas in second language acquisition research (Lightbrown & Spada 2006). In Asian education scenario, this view is shared by Hamzah, Kafipour & Abdullah (2009) who reiterated that vocabulary acquisition is currently receiving attention in second language pedagogy and research.

1.1. The importance of vocabulary acquisition

Indeed, vocabulary acquisition plays a central role in second language acquisition. A linguist, David Wilkins, concluded the importance of vocabulary learning by saying "Without grammar very little can be conveyed, without vocabulary nothing can be conveyed" (Thornbury, 2002). Thus, acquiring ample vocabulary is crucial for learners to be proficient in the second language.

In connection to this, it is crucial to highlight a model of second language acquisition by Krashen (1982) called the Monitor model which consists of five hypotheses - the acquisition - learning hypothesis, the monitor hypothesis, the natural order hypothesis, the input hypothesis and the affective filter hypothesis. According to the first hypothesis, Krashen explains that acquisition takes place when learners are exposed to the samples of the second language that they understand similar to children acquiring their first language without consciously giving attention to its form. On the other hand, learning involves consciously paying attention to its form and rule. He added that this acquired system enables the speaker to produce utterances to be used spontaneously. Here, the learned system plays a role as an editor or 'monitor' for making minor changes and polishing the form produced by the acquired system. This is the monitor hypothesis whereby the monitoring takes place when the speaker/writer has plenty of time, has learned the rules required and concerned with the need to produce correct language. Next, according to the natural order hypothesis, acquisition should takes place naturally like the first language acquisition but this is not as simple as one expects as language features that look easy are not always easy to be acquired. Hence, even some advanced second language learners may fail to apply this simple rule in spontaneous conversation. The input hypothesis refers to an acquisition that takes place when one is exposed to language that is comprehensible and contains i + 1 where 'i' refers to the level of language already acquired and '+1' is a metaphor for language such as words, grammatical forms, aspects of pronunciation. Finally, the affective filter refers to a metaphorical barrier that causes the learners' failure to acquire language even when appropriate input is available (Lightbrown & Spada, 2006).

Krashen's ideas had great influence during a transition of approaches in second language teaching from learning rules or memorizing dialogues to emphasis using language with a focus

on meaning (Lightbrown & Spada, 2006). They also claim that students' exposure to comprehensible input can lead to a great deal of progress even without direct instruction. However, studies also showed that students might reach a point whereby they failed to make further progress on some features of the second language unless they were given direct instruction. With regards to second language acquisition, every student has their own individual learning strategies that they use to acquire the second language. Oxford (1990: 8) as cited in Richards (2005) defines learning strategies as "specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed, and more transferable to new situations."

In relation to the above, Hulstijn (2003) stated that there were two important learning strategies used by learners in vocabulary acquisitions, namely 'incidental' and 'intentional' or direct study. Incidental learning strategy means students learn vocabulary indirectly or by chance as they engaged in other learning experiences such as reading and listening activities. On the other hand, 'intentional' or direct study is a strategy used by learners to acquire vocabulary by learning it directly for instance by reading and memorising it, learning it by using a dictionary and etc. Past researchers have differing views about which strategy is the key to vocabulary acquisition. Some researchers said that the combination of both strategies is necessary to achieve efficiency in vocabulary acquisition.

Modern foreign language pedagogy stresses the importance of teaching students appropriate learning and studying strategies (Brown, 2002; Oxford, 1990). In reality, however, learners tend to use a variety of strategies in combination rather than as a single one.

1.2. Background of the study

English has gained importance and fair attention in the Malaysian education system. Hence, efforts have been geared to improve the teaching and learning of English Language in schools. Curriculum involving the English syllabus is revised from time to time to meet those needs and teachers are being equipped with the knowledge and skills to impart the knowledge to their students. Teachers are also taught the knowledge of Information Technology to enable them to carry out the teaching and learning processes by using information communication technology (ICT) tools in order to enhance students' understanding and acquisition. Despite these concerted efforts, there has been a great concern among Malaysians about the poor command of English among young Malaysians.

"The decline of proficiency in the English Language among young Malaysians is a cause for concern especially when the language continues to be an important communication tool in an increasingly competitive and borderless world (The Sunday Mail, August 8, 2004). It was reported that a poor command of English and the lack of ICT knowledge were among the reasons for over 44,000 unemployed graduates in the country (The Star, July 28, 2002). Amidst this scenario in our country's education system, the government introduced the teaching of Science and Mathematics in English which became effective in 2003 whereby students who were in the first batch were those in Year One, Form One and in the first year of pre-university level would study the two subjects in English (The Straits Times, January 6, 2003).

Although the government has made the stand that the policy is reversed i.e. Science and Mathematics will be taught in Bahasa Malaysia and vernacular languages in stages, from 2012, the importance of English will continue to be given attention. It was stated that bold and decisive measures will be put in place to strengthen the teaching of English at all levels of education – primary, secondary and matriculation (The Straits Times, July 9, 2009). The measures include increasing the English Language hours, English Children Contemporary Literature programme will be introduced to Level 2 primary students to instill reading interest, English language laboratories will be set up in schools to facilitate the learning of English more effectively, information technology will be utilised in the teaching and learning of English via suitable computer software, grammar will be given emphasis in the teaching and learning of English, etc.(The Straits Times, July 9, 2009). In relation to this, the Deputy Education Minister, Datuk Dr Puad Zarkashi said the government would spend RM5 billion in its effort to improve the teaching and learning of English in schools (The Straits Times, July 10, 2009). But, what really causes the poor proficiency of students in the English Language? One possible reason discovered is that students are lacking in vocabulary to function well in the stated four language skills. In order to function well, students need to acquire ample amount of vocabulary. In connection to this, included in every English syllabus for Primary or Secondary school is a word list that students need to acquire throughout a one year course of study. This word list is chosen based on the topics covered in the English syllabus, but have students learnt and acquired all the words listed in the word list? This decontextualised word lists have been used extensively to teach vocabulary. Presenting vocabulary in list form is an efficient study method in which students can learn a large number of words in a short time (Meara, 1995). The weakness with such lists, however, is that they present words that have been stripped of all context-based meaning. To enable students to use these lists more effectively, lists are now generally included in a reading passage to provide context which are easy to memorize. Hence, subsequent exposure to meaning in context will allow students to fine-tune the approximate meanings learned from the list .Through direct study or intentional learning students should be able to acquire these words and widen their vocabulary size. Besides, incidentally students also build up their vocabulary through their extensive reading. Notably, past researchers have differing views about which strategy is the key to vocabulary acquisition. In reality; however, learners tend to use a variety of strategies in combination rather than as a single one (Lachini, 2007). Therefore, the purpose of this study is to examine the learning strategies used by the Form Six (Pre-university) students in relation to their fields of study, gender, self-rated proficiency, attitudes and problems in vocabulary acquisition. It also aims to investigate the most and least frequently used categories of vocabulary learning strategies by the Form 6 students.

1.3. Research Objectives

The objectives of this study are as follows.

a. To identify the vocabulary learning strategies employed by the Form 6 students in their language learning?

b. To find out the most and the least frequently used categories of vocabulary learning strategies by Form 6 students.

c. To examine the differences in the use of vocabulary learning strategies among the Form 6 students in relation to field of study, gender, self-rated English proficiency and attitude towards vocabulary learning?

d. To investigate whether the problems experienced in vocabulary learning by Form 6 students are related to the strategy use of vocabulary learning?

1.4. Research questions

This study serves to research the following questions:

a. What vocabulary learning strategies do the Form students employ in their language learning?

b. What are the most and the least frequently used categories of vocabulary learning strategies by Form 6 students.

c. Are there any differences in the use of learning strategies among these students in relation to field of study, gender, self-rated English proficiency and attitude towards vocabulary learning?

d. Are the problems experienced in vocabulary learning by Form 6 students related to the strategy use of VL?

1.5. The significance of the study

Vocabulary acquisition is one of the important prerequisites for learners to function well in a language especially in relation to the four language skills – reading, speaking, listening and writing. Related studies on vocabulary acquisition show that students are unable to function well in L2 as their vocabulary size is limited. It is also found in studies that students are not ready for higher level of studies due to the said limitation and they face difficulties in the target language when they continue their studies to higher level of studies namely to Upper secondary school. Thus, a poor vocabulary acquisition in Lower secondary school has adverse effects on students' English Language learning in Upper Secondary school. Through random observation during lessons, it is discovered that these students have difficulties in reading and understanding more challenging and difficult reading texts. Their limited vocabulary size also affects other language skills such as speaking and writing. Above all, this deficiency leads to the lack of confidence in using the language in general and this, in the long run will hamper the second language acquisition. This study is chosen upon realizing its importance and contributions to teachers, the school, students and future research in relation to vocabulary acquisition.

First and foremost, teachers will benefit from the results of this study. It is significant for educators or teachers to know about the most frequently used strategies by students in vocabulary acquisition as this will be able to help them in building up their vocabulary. The results of this study will provide information to teachers about some suitable techniques which they can use to help students build up their vocabulary capacity. Based on the results of this study later teachers can take the necessary steps, which would be helpful in motivating and helping students to build up their vocabulary capacity. Besides, teachers will be able to obtain some crucial knowledge about the approaches students used for each learning strategy. With this knowledge, teachers will be able to take positive efforts especially in the classroom to implement these approaches obtained from this study in future. Hamzah, Kalipour & Abdullah (2009) contend that the understanding of the students' beliefs of vocabulary learning and their learning strategies use will provide teachers and researchers knowledge about the types of materials and activities to be designed to polish their vocabulary learning in order to enhance their lexical competence.

Secondly, the school will also benefit from this study. The school will be able to obtain useful statistics about the students' learning behavior, English proficiency and problems in connection to vocabulary acquisition. As information about the types of approaches students use to widen their vocabulary size can also be obtained, the school may be able to take a proactive efforts to implement them in the school curriculum. The school management can also work closely with teachers in the school by providing the necessary resources – whether financially or physically to develop a reading culture which can help to develop students' vocabulary thresholds.

Certainly, the students themselves will benefit from this study. Through the questionnaires given to them, students will be able to know about their own abilities in relation to vocabulary acquisition. Thus, it serves as a 'check and balance' effort to improve their vocabulary learning. They will be able to reflect how far they have progressed in building up their vocabulary and make the necessary adjustment in their reading habits. In the long run, they will be able to see the importance of vocabulary acquisition toward their proficiency in English and academic achievement. Nation (2001) and Scharle & Szabo (2000) as cited in Hamzah, Kalipour & Abdullah (2009) pointed that the benefits gained from vocabulary learning strategies is they enable learners to take more responsibility for their studies as they learnt to take control of their own learning.

Researchers of the second language acquisition will gain the advantage through this study. They will be able to explore deeper into this area of research or even dispatch a research on a more specific aspect of vocabulary acquisition. For instance, taking the most crucial and frequently used learning strategies to be researched upon. Thus, this research paper will serve as a stepping stone to achieve future endeavour in related field. This is especially meaningful for future development of the second language acquisition in Malaysian context of education, in line with the government effort to upgrade the standard of English amongst students in schools and the institution of higher learning. Certainly, vocabulary acquisition is a critical research area that needs to be studied further by local researchers to make the government's dream of uplifting the standard of English among Malaysians a success.

Thus, this study has its own significance to teachers, schools, students and future research. Above all, the results obtained from this study will help to suggest pertinent recommendations relating to pre-university students' vocabulary learning strategies.

1.6. The limitations of the study

However, there are some limitations of this study. First, it only uses questionnaires to obtain information about students' attitude, English proficiency, problems and the most and the least frequently used strategies to learn vocabulary. Thus, the results may not be conclusive. Second, this study is only involving the Form 6 (Pre-university) students of one selected secondary school in Samarahan, Sarawak. Thus, the results may not portray

the condition of other students' vocabulary learning strategies in other schools and cannot be generalised to a larger population.

II. LITERATURE REVIEW

This chapter provides evidence on the importance of vocabulary learning in the second language acquisition, the vocabulary size needed in order to be proficient users, intentional and incidental vocabulary learning, taxonomies of vocabulary learning strategies and related studies in vocabulary learning strategies.

2.1 Introduction

Past researchers have proven and recognised the importance of vocabulary in Second and Foreign Language learning and acquisition. Leaver, Ehrman & Shekhtman (2005) said that vocabulary has been called the building blocks of language learning and the proponents of some teaching approaches (e.g. the Natural Approach) believe that vocabulary is the most important thing in acquiring a language. They added that the more vocabulary ones know the more things ones will be able to talk about, read about, write about, and listen to well. Studies by previous researchers found that a considerable amount of vocabulary size is crucial for learners to function effectively in the four language skills - listening, speaking, reading and writing. Laufer & Sim (1985) and Qian (2002) cited in Tschirner (2004) asserted that an important predictor of efficient reading and of academic success in general, is vocabulary size.

2.2 Knowing a word

English vocabulary is expanding continuously with time as Pittman (2003) pointed out that English vocabulary is enormous and is growing steadily with the assimilation of technology and culture whereby there are large number of new words introduced from time to time. Thus, learning and knowing new words is crucial for learners of both EFL and ESL. But, what does knowing a word mean?

Generally people believe that knowing a word means knowing its meaning. Cook (2001) cited in Wa-Mbaleka (2002) explained that a word is more than its meaning because it involves 4 aspects of comprehension: form, grammatical properties, lexical properties and meaning. Similarly, Nation (1990) and Oxford & Scarcella (1994) cited in Ming (2007) commented that knowing a word involves more than the ability to recognize its form or its dictionary meaning but also includes knowledge of its grammatical properties and collocations, functions and the ability to use the word correctly in interactions. In connection to vocabulary learning, Oxford & Scarcella (1994) cited in Ming (2007) classified it into three types: decontextualized (e.g. word lists, flashcards, dictionary-lookup), partially decontextualized (e.g. word grouping, word association/elaboration, physical response) and fully contextualized (i.e. practicing the four language skills in authentic communication activities). On the other hand, Hatch & Brown (1995) cited in Wa-Mbaleka (2002) identified 5 steps to learning new words: encountering new words, learning word form and word meaning, remembering the word form and meaning in memory and finally using it in a language function. Based on this explanation, they reached an understanding that learners need to reach the receptive comprehension before they can achieve the production comprehension.

Thus, knowing a word requires considerable efforts on the part of the learners to go through quite a tedious process of learning the related elements to acquire a complete knowledge of a word.

2.3. Vocabulary size

Nation (2001) believed that a large amount of vocabulary could be acquired by using vocabulary learning strategies and they are useful for learners of different proficiency levels. Thus, it is crucial for learners to learn many words in order to be proficient in a foreign language. Waring (2002) points out that educated English native speakers have a vocabulary of about 20,000-25,000 word families (A 'word family' refers to a group of words that share the same basic meaning e.g. create, creation, creating, created, creative etc) but foreign learners of English need far fewer. The speaking vocabulary is usually said to be half of the reading and writing vocabulary. Basically, foreign learners of English only need about 3000-5000 word families to be quite competent in speaking and listening to English. However, Nation & Waring (1997) argued that it should not be assumed that if a learner has sufficient vocabulary then all other aspects of language usage are easy. Notably, vocabulary knowledge is only one component of language skills such as reading and speaking, hence, it should not be assumed that substantial vocabulary knowledge is always a prerequisite to the performance of language skills. Nevertheless, it is important to know that vocabulary knowledge enables language use, language use enables the increase of vocabulary knowledge, knowledge and language use and so on (Nation, 1993a) cited in Nation & Waring (1997). Thus, we cannot deny the crucial need of second language learners to acquire ample vocabulary size to enable comprehension and continuous learning to take place.

McCarthy & O'Dell (1999) suggested that to speak and write English in normal situations you need at least 1000-2000 words. On the other hand, Sheehan (2004) asserted that perhaps the most significant figure, however, is the one corresponding to the most frequent 2000 words. It is explained that the top 2000 words account for about 80% of reading texts. In other words, a learner who knows the most frequent 2000 words will be able to understand about 80% of a text (one in five words, or 20%, will be unknown). From this evidence, we can conclude that 2000 words is the absolute minimum a language learner needs in order to be able to process a text. Any fewer than that, the unknown gaps in the text will be too many to enable the learner to deduce meaning from context. Analysis also shows that "knowing" 10,000 words means that 93% of a text will be understood. This is recommended as the next ideal vocabulary size for a proficient language learner.

It is clear from the above that learners are not going to get very far or be a proficient user without ample vocabulary size. Hence, a program of systematic learning will enable learners to acquire measurable language gains which will give a sense of accomplishment, achievement, and building confidence. Research evidence shows that we don't start speaking in sentences until a critical threshold of language has been learned (in both 1st and 2nd languages). A larger vocabulary allows learners to get to the point where they understand most of a text.

Only when about 98-99% (1 new word in 100 or 1 in 50) of a text is understood can one consistently and successfully guess new word meanings from the context. Research shows that below this level, successful guessing without the need to turn to a dictionary is extremely difficult (Waring, 2002).

2.4. Intentional and incidental vocabulary learning.

Hulstijn (2003) pointed out that there are two popular views on what it means to learn a second language. One view holds that it means months and even years of 'intentional' study, involving the deliberate efforts done to remember thousands of words (their meaning, sound, and spelling) and dozens of grammar rules. The other, 'incidental' learning' involving the 'picking up' of words and structures, simply by engaging in a variety of communicative activities, in particular reading and listening activities, during which the learner's attention is focused on the meaning rather than on the form of language. In short, intentional learning is defined as a learning process that is being designed, planned for, or intended by a teacher or a student and incidental learning as the type of learning that is a byproduct of doing or learning something else (Hatch & Brown, 2000).

Research by Nagy and colleagues claimed that learning from context is one of the most significant aspects of incidental learning. This laid the groundwork for the belief that authentic context is a particularly powerful source of incidental language learning (Krashen, 1989; Pitts, White & Krashen, 1989) cited in Smith, Kilgarriff & Sommers (2008). Incidental vocabulary acquisition is a common mean of learning new vocabulary, especially for proficient readers. Students with strong reading skills who read a variety of texts may realize substantial gains in their vocabulary without direct instruction. The incidental learning of vocabulary requires that teachers provide opportunities for extensive reading and listening. As cited in Hunt & Beglar (2002), in the long run, most words in both first and second languages are probably learned incidentally, through extensive reading and listening (Nagy, Herman, & Anderson, 1985).

However, there is little doubt that incidental learning, particularly, that is acquired through reading is key to learning the vocabulary necessary for functioning in an English environment. Some researchers have argued that this form of acquisition has limitations and that an essential role is played by the direct instruction of strategies for learning vocabulary and meaning. Without these, they believe long-term retention of new vocabulary rarely follows. They emphasize the role of dictionaries and other word reference books, and note that direct instruction is important in fostering an interest in words (Smith, Kilgarriff & Sommers, 2008). According to Chaffin (1997) and Zechmeister, Chronis, Cull, D'Anna & Healy (1995) cited in Shostak (2002), research has shown that although reading is essential for vocabulary growth and development, it is not sufficient for most students because the meanings they take away from their readings will not be deep and enduring: nor does it help them gain strategies for becoming independent word learners. Researchers agree that although reading is indeed important to achieve deeper, richer levels of lasting vocabulary understanding, direct instruction is more effective and more efficient than incidental learning (McKeown & Beck, 1988).

What is actually meant by "intentional learning" or "direct study"? In the literature on vocabulary learning, "intentional learning" is commonly given a cognitive interpretation, as the rehearsal and memorizing techniques invoked by learners when they have the explicit intention of learning and retaining lexical information (Schmitt,1997) as cited in Hulstijn (2005). Direct acquisition studies recognize that vocabulary can be learnt using tools that bring the learner's attention into direct contact with the form and meaning of words, such as dictionaries and vocabulary lists. Leaver, Ehrman & Shekhtman (2005) assured that certainly one could seek to gain a large vocabulary by memorizing the dictionary. However, the question of how best to use these tools for direct vocabulary acquisition remains unanswered.

In Taiwan, and other parts of Asia, the traditional (and intuitively suboptimal) approach has been simply to memorize the vocabulary item along with one or two possible L1 translations (Smith, Kilgarriff & Sommers 2008). Of the two ways students acquire vocabulary, direct study is the more efficient, particularly for high-risk students with poor vocabulary (McGraw-Hill, 2005). This is supported by Shostak (2002) who said that the teaching of vocabulary should be systematic, repetitive and eclectic. In introducing new words, teachers should be guided by three principles that Stahl (1986) recommends that other research supports: (1) use both a definitional and a contextual approach. (2) strive for "deep processing" and (3) provide multiple exposures (Baumann & Kameenui, 1991).

In general, emphasizing explicit instruction is probably best for beginning and intermediate students who have limited vocabulary. On the other hand, extensive reading and listening might receive more attention for more proficient intermediate and advanced students. In view of the important role played by vocabulary in Second language acquisition, Hamzah, Kafipour & Abdullah (2009) contended that a number of linguists have recognized the importance of learner independence in vocabulary acquisition for many years. Hence, it is vital to help L2 learners to be independent learners in order to speed up their vocabulary acquisition process.

2.5 Implicit and explicit learning

Apparently, there are several interpretations of the terms "implicit" and "explicit" learning. One important characteristic feature that differentiates implicit and explicit learning is the absence or presence of "conscious operations" (Ellis, 1994) and as the absence or presence of "awareness at the point of learning" (Schmidt, 1994) cited in (Doughty & Long, 2003). Hence, an implicit vocabulary learning learners are engaged in activities that do not focus attention on vocabulary (Mohseni-Far, 2008). The implicit vocabulary learning hypothesis has its roots in Krashen's Seminal Input Hypothesis (Krashen, 1989) which maintains that the meanings of new words are acquired subconsciously as a result of repeated exposure in a range of contexts, where the conscious focus is not on form, but on the message. On the other hand, the explicit vocabulary learning hypothesis holds that the employment of a range of vocabulary learning strategies can greatly facilitate and enhance vocabulary acquisition; in this view, learners are seen as active processors of information (Ellis, 1995). From a pedagogically oriented perspective, the goal of explicit teaching is 'to lead the learner's attention', whereas the aim of an implicit focus on form is 'to

draw the learner's attention'. In fact, there is evidence in recent studies of second language learning learners that a combined approach is superior to a single learning method. Most researchers have recognized that a well-structured vocabulary programme needs a balanced approach that includes explicit teaching together with activities providing appropriate contexts for incidental learning (Celce-Murcia, 2001: 286). Hunt & Beglar (2005: 3) also highlighted the point that the most efficient learning involves a carefully selected combination of both explicit and implicit instruction and learning.

2.6 Taxonomies of Vocabulary learning strategies and related studies

The above incidental and intentional vocabulary learning are present in taxonomies of vocabulary learning strategies such as Schmitt's (1997) taxonomy of VLS is based on Oxford's (1990) division of language learning strategies into direct (memory, cognitive, and compensation) and indirect (metacognitive, affective, and social) strategies. Catalan (2003) cited in Ruutmets (2005) contended that VLS constitute knowledge about what students do to find out the meaning of new words, retain them in long-term memory, recall them when needed in comprehension, and use them in language production.

Several VLS taxonomies have been proposed (Gu & Johnson, 1996; Schmitt, 1997; Nation, 2001; all in: Segler et al., 2001) and they classified L2 vocabulary learning strategies in several different ways. As stated earlier, Oxford, (1990) classified the strategies into two main dimensions: direct and indirect. Sökmen (1997) categorizes vocabulary learning strategies into implicit and explicit teaching of words. Implicit teaching includes inferring of words from context. Explicit teaching consists of several strategies such as building a large size of vocabulary, integrating new words with the old ones, providing adequate amount of encounters with a word, promoting deep level processing, using different techniques, encouraging independent learner strategies, etc. In addition, Sökmen (1997) cited in Schmitt (1997) also iterated that in the 1970s and 1980s vocabulary learning focused mainly on implicit and incidental strategies and it was not given much attention as other language aspects, for instance, grammar. Nevertheless, the use of explicit vocabulary teaching is growing nowadays. Vocabulary learning strategies can also be divided into two groups; the first group concentrates on understanding the meaning of words and the other includes the strategies for acquiring words (Cook, 2001).

Sanaoui (1995) introduced two different approaches to vocabulary learning: a structured and an unstructured approach which differ along 5 dimensions. Schmitt (1997) adopted Oxford's (1990) VLS to develop a comprehensive inventory of individual vocabulary learning strategies. In order to include the case where meanings of new words are discovered without the help of other people's expertise, Schmitt introduced a fifth category, determination (DET) strategies. Schmitt's taxonomy of vocabulary learning strategies is grouped into 5 main categories with 58 individual strategies in total. The strategies are determination strategies, social strategies, memory strategies, cognitive strategies, and metacognitive strategies.

Gu & Johnson (1996) created a taxonomy on the basis of the responses to their self-reporting questionnaire. The researchers identified six types of strategy: Guessing strategies (using background knowledge/wider context, using linguistic cues/immediate context), Dictionary strategies (Dictionary strategies for comprehension, extended dictionary strategies, looking-up strategies), Note-taking strategies (Meaning-oriented note-taking strategies, usage-oriented note-taking strategies), Rehearsal strategies (Using word lists, oral repetition, visual repetition), Encoding strategies (Association/ Elaboration, imagery, visual encoding, auditory encoding, using word-structure, semantic encoding, contextual encoding) and Activation strategies (Memorising lists of facts by linking them to familiar words or numbers by means of an image, remembering lists by picturing them in specific locations, establishing an acoustic and image link between an L2 word to be learned and a word in L2 that sounds similar).

Notably, most of the studies conducted on vocabulary learning have examined the effectiveness of the individual strategies (Cohen & Aphek, 1980) or have compared the results of the application of two or three strategies (Royer, 1973; Atkinston, 1975; Crow & Quigley, 1985). In addition, Edar (2008) contends that the research which has been done on vocabulary learning strategies has predominantly tended to deal with individual or small number of strategies, with very few studies looking at the group of vocabulary learning strategies as a whole. Fewer studies can be found on learner-related vocabulary learning strategies. Only in recent years have researchers begun to consider all the strategies and recognize their influence on language/vocabulary learning (Gu & Johnson, 1996). This approach seems to be more realistic because no language learners use just a single strategy for vocabulary acquisition. Therefore, researchers have taken an alternative approach to vocabulary acquisition research, i.e., a holistic/integrated approach which incorporates all the strategies that have their role in the expansion of vocabulary (Gu & Johnson, 1996) as cited in Lachini (2007)

Besides, (Gu, 2003) also comments that research efforts have largely been directed towards discovering the "best" strategy for vocabulary retention. In reality, however, learners tend to utilize a variety of strategies in combination. Recent research (e.g., Ahmed, 1989; Gu & Johnson, 1996; Parry, 1997; Sanaoui, 1995) indicates that these approaches to, or styles of vocabulary acquisition, which may relate more to the learner than to the task, may be more potent predictors of success than individual vocabulary learning strategies. Mohseni-Far (2007) reveals that most of the noted recent researchers came to this conclusion that the most efficient and practical learning approach involves a carefully selected combination of both explicit and implicit instruction and learning.

The field of research on vocabulary learning strategies needs a diversification of approaches. This includes continuous efforts in theory building so that future empirical research receives clearer guidance (Laufer & Hulstijn, 2001; Meara, 1998), more bottom-up empirical effort on different aspects of vocabulary learning at different stages of acquisition for different learners in various cultural and educational contexts will help us answer so many other research questions beyond the presentation and retention of words. After all, a full-fledged, interrelated, functional, and dynamic L2 vocabulary is developed, gradually, and grows by itself, if the learner makes use of strategies that aim for the use, rather than retention, of words. Mohseni-Far (2008)

commented that in spite of the expansion in the amount of empirical research on vocabulary acquisition, consensus is lacking over issues such as the conceptualization of the process by which vocabulary acquisition occurs, the importance of context for acquiring vocabulary, and the extent to which learners build up specific strategies for vocabulary learning during their language acquisition.

Based on this literature review, this study focuses on the examination of vocabulary learning strategies of Form 6 (Pre-university) students. A relatively comprehensive taxonomy of vocabulary learning strategies by Gu & Johnson (1996) and Fan (2003) as cited in Ming (2007) were identified and evaluated with respect to several important dimensions of vocabulary acquisition and their suitability with the participants of the study.

III. THE RESEARCH METHODOLOGY

This chapter explains the type of research employed, the population and samples involved in this study, the data collection method, procedures involved in the data collection and the analysis.

3.1. Research Design

3.1.1 Type of research

This is a survey Research (Cross-sectional design) which requires the collection of information about variables or phenomenon within a population through the use of questionnaires (Heppner et al., 1992; Garson, 2006). A cross-sectional design involves data collection at a single point in time from samples representing a population (Babbie, 1990)

3.1.2 Population and samples

A simple random sampling technique is used to randomly select the samples. There are about 156 Form 6 (Pre-university) students at SMK Sungai Tapang, Samarahan (44 Science students and 112 Arts students) for the academic year 2009-2010 and 2010-2011. For the purpose of this study, 88 students who were made up of all the 44 Science students and 44 Arts students were selected randomly from the total of 112 students who studied in four different classes namely Upper Six Science One and Two, Upper Six Arts One and Upper Six Arts Two, Lower Six Science One and Two and Lower Six Arts One and Two. In this academic year (2009-2010), the researcher was teaching MUET (Malaysian University English Test) to two classes (Lower Six Arts One and one Upper Six Science One). The students chosen as samples were made up of 5 different races: 53 Chinese, 20 Bidayuhs, 6 Ibans, 6 Malays and 3 others (1 Kayan, 1 Melanau and 1 Indian) who lived in Kota Sentosa, Bau and Samarahan. Fifty-two were females and 36 were males and the age of the students ranged from 17 to 20 years old. They had studied English as second language between 11 and 12 years. Both students from the Science and Arts streams were taking MUET (Malaysian University English Test) as a compulsory subject to take in Form Six because it was necessary for them to have a MUET exam slip as a requirement to further their studies to the university.

3.1.3. Data collection method.

The data for this study was collected using Self-administered questionnaires which consist of two sections. The first section is a vocabulary learning questionnaire adapted from Gu & Johnson (1996) and Fan (2003) as cited in Ming (2007). It contains 28 statements on students' approaches to vocabulary learning which are divided into eight categories.

There are four statements on dictionary use (DIC), two statements on rehearsal (REH), five statement on management (MAN), four statements on sources (SOU), two statements on guessing (GUE), five statements on encoding (ENC), two statements on activation (ACT) and four statements on vocabulary perceptions (PER). The respondents were required to rate their frequency of use which was measured by 5-point Likert scales (1=Never, 2 = Rarely, 3 = Sometimes, 4 = Very often and 5 = Always). As measured by Cronbach's alpha, this instrument has an internal consistency of .87 (Ming, 2007). The second section contains a series of demographic questions about the respondents' age, sex, field of study, etc and questions about students' self-rated proficiency, attitudes towards vocabulary and vocabulary learning and their perceptions of problems about vocabulary learning.

Despite its high validity and reliability, a pilot testing was carried out with 20 samples. It was done with the reason that one item was missing in the questionnaire and it was replaced with an item of the same category which was taken from another research paper. The pilot testing was also done as it was used in a different setting and with different samples. The pilot testing as computed by Cronbach's alpha showed that the instrument had high validity and reliability of .85.

3.1.4. Procedures

Several procedures were followed in order to collect the relevant data required for this research. They are as follows;

(i) Permission was obtained from the Principal of the school to carry out this research with the specified sample of students.

(ii) Adapting and constructing questionnaires - A set of questionnaires used by previous researcher was adapted by taking only relevant questions, doing modifications such as replacing one missing item and simplifying difficult questions.

(iii) Pilot Testing - When the questionnaires were ready, pilot testing was carried out with 20 Form Six students of the same school. This was carried out to test its validity, reliability and practicality based on local context.

(iv) Analysing data to test reliability using Cronbach's alpha and doing modification where necessary.

(v) Distributing questionnaires to students – The standardized questionnaires were distributed to all the 88 samples who were selected using random sampling. The samples took 15-20 minutes to complete the questionnaires. Before answering the questionnaires, students were told that their participation was voluntary and their responses would be kept confidential. Besides, they were told to give their opinions as honestly as possible as it was vital for the success of this study.

(vi) Questionnaires were collected and analysed. Results required were stated and highlighted for the purpose of the research.

(vii) The responses obtained were then computed into raw data and analysed in the form of tables. The quantitative data was then interpreted and the results were generated.

3.2. Data Analysis

The data obtained from the questionnaire was coded for statistical analysis to answer the research questions. The Statistical Package for the Social Sciences (SPSS, version 17.0) was used for statistical analysis. Descriptive statistics (means, standard deviation, etc.) were applied to obtain patterns of demographic information from the questionnaires and strategies use. Specifically, to identify the vocabulary learning strategies employed and to find out the most and least frequently used categories of vocabulary learning strategies by the sample students in their language learning, data obtained was analysed by comparing the central tendencies; means and standard deviation. In addition, two- Independent-Samples tests using Mann-Whitney U test and Spearman's Rho Correlation Coefficient were computed to determine whether there were any significant differences in the strategies use in relation to samples' field of study, gender, self-rated proficiency, attitude towards VL and perceptions of VL problems (Wei, 2007). The data obtained was conceptualized in the form of tables and the results of the study were noted quantitatively and qualitatively.

IV. RESULTS AND DISCUSSION

This chapter presents the results of the research study. The results presented are based on the data analysis obtained and they are presented both quantitatively and qualitatively. The data is presented in the form of tables and the key features highlighted and discussed to provide answers for the research questions. Then, comparison of results of the present study with previous studies is done to generate new understanding and knowledge about the Form Six students' vocabulary learning strategies in relation to their field of study, gender, self-rated proficiency, attitude and perceptions of problems in vocabulary learning.

4.1. Introduction

The data obtained from the questionnaire was analysed using SPSS 17.0 and the results noted quantitatively and conceptualized in the form of tables. Then, the researcher highlighted the quantitative data obtained to generate the results of the study to answer the research questions. The results obtained exhibited some of previous research findings and also demonstrated some contrasts which gave new insights and knowledge about a pre-university students' vocabulary learning strategies in second language acquisition.

4.2. Results

4.2.1 The vocabulary learning strategies employed.

Table 4.2.1 below shows the vocabulary learning strategies employed by the eighty-eight samples of the Form Six students under study. It is listed in a descending order based on the means and standard deviations obtained using descriptive statistics.

Table 4.2.1Means of Vocabulary Learning Strategies used by the Sample Students in Descending Order

Cate-gory	Strategy	N	Mean	Std. Deviation
GUE	I guess the meaning of words I don't know.	88	3.8068	.94514
SOU	I listen to English songs, radio programs, watch English movies, etc to increase my vocabulary.	88	3.7727	1.07988
ENC	I try to remember the BM or Chinese equivalent of the word.	88	3.7159	1.11364
GUE	I check to see if my guesses about the words are right or wrong.	88	3.6818	.95346
PER	I pay attention to the pronunciation of new word.	88	3.6477	.92276
MAN	I highlight the words that seem important to me.	88	3.6250	1.03182
DIC	I look up new words in an English-Bahasa Malaysia or English-Chinese dictionary.	88	3.6250	1.22533
PER	I pay attention to the example of how a word is used in English.	88	3.6136	.90251
DIC	When I look up a word in the dictionary, I read all the meanings of new words.	88	3.6136	1.10829
PER	I pay attention to the unfamiliar usage of a known word.	88	3.5341	.94624
ENC	I try to remember the sentence in which the word is used to remember it.	88	3.3864	.99922
ACT	I use the newly-learned words as much as possible in speaking and writing.	88	3.2386	.95886
ENC	I associate new words with those I already know.	88	3.2386	.83038

SOU	I read stories, magazines etc outside class to increase my vocabulary.	88	3.1591	1.13347
SOU	When I come across a new word, I make a note of it.	88	3.1364	.99634
ENC	I distinguish words with similar meanings.	88	3.1250	.78510
DIC	I look up new words in an English-English dictionary.	88	3.1023	1.24143
REH	I repeatedly visualize the new word to remember it.	88	3.1023	.98307
PER	I pay attention to the grammatical patterns of a new word	88	3.0455	.82920
REH	I repeat a new word out loud several times to remember it	88	3.0455	1.12351
SOU	I use textbook to learn new words.	88	2.9659	.77976
ENC	I analyse the structure of a word to remember it.	88	2.9091	.95456
MAN	I keep a vocabulary notebook to jot down new words I want to learn.	88	2.8636	1.08471
ACT	I make up my own sentences using the words I just learnt.	88	2.6591	.98128
MAN	I review my vocabulary regularly	88	2.6477	.88460
MAN	I group words in my own way to remember them.	88	2.4773	1.00547
MAN	I make plans for my vocabulary learning	88	2.2841	.88342
DIC	I carry a pocket dictionary to look up the words I don't know.	88	2.2273	1.17177
	Overall	88	3.2103	.45179

Table 4.2.1 shows the mean values of all the 28 strategies used by the samples selected for this study. It is discovered that the average mean of frequency of strategy ranged from 2.22 to 3.80, with an overall mean of 3.21 (*SD*= .45) indicating a medium strategy use. The students preferred Vocabulary Learning strategies that involved guessing, listening, perceptions and dictionary use. Hence, they chose to guess the meaning of new words that they did not know and this had the highest mean in terms of its frequency of use i.e. *M*=3.80 and a standard deviation of *SD*=0.94. The second frequently used strategy is "I listen to English songs, radio programs, watch English movies, etc to increase my vocabulary" (*M* = 3.77; *SD* = 1.07). The third frequently used strategy with a mean slightly lower than the second highest mean is "I try to remember the Bahasa Malaysia or Chinese equivalent of the word" (*M* = 3.71; *SD* = 1.11). This is followed by six other strategies that had an average mean between *M*=3.61 to *M*=3.68. This includes "I check to see if my guesses about the words are right or wrong" (*M* = 3.68; *SD* = .95), "I pay attention to the pronunciation of new word" (*M* = 3.64; *SD* = .92), "I highlight the words that seem important to me" (*M* = 3.62: *SD* = 1.03), "I look up new words in an English-Bahasa Malaysia or English-Chinese dictionary" (*M* = 3.62: *SD* = 1.22), " I pay attention to the example of how a word is used in English" (*M* = 3.61: *SD* = .90) and " When I look up a word in the dictionary, I read all the meanings of new words" (*M* = 3.61: *SD* = 1.10).

Still significant, 12 other frequently used strategies had an average mean ranging between *M*= 3.53; *SD* = .94 and *M* = 3.04; *SD* = 1.12. Only 8 strategies had an average mean lower than 3.00 i.e. ranging between *M* = 2.96; *SD* = .77 and *M* = 2.22; *SD* 1.17. The least frequently used strategy being "I carry a pocket dictionary to look up the words I don't know." (*M* = 2.22; *SD* 1.17)

4.2.2 The most and the least frequently used categories of vocabulary learning strategies.

Table 4.2.2 shows the means and standard deviations of frequently used categories of vocabulary learning strategies by the samples selected for this study. This is listed in descending order.

Table 4.2.2
The Categories of Vocabulary Learning Strategies used in Descending Order

Category	N	Mean	Std. Deviation
GUESSING	88	3.7443	.73498
PERCEPTION	88	3.4602	.64426
ENCODING	88	3.2750	.50951
SOURCES	88	3.2585	.60464
DICTIONARY	88	3.1420	.76074

REHEARSAL	88	3.0739	.84941
ACTIVATION	88	2.9489	.82015
MANAGEMENT	88	2.7795	.65953
Valid N (listwise)	88		

The first four most frequently used categories of vocabulary learning strategy were Guessing with an average mean *M* = 3.74; *SD* = .73, Perception (*M* = 3.46; *SD* = .64), Encoding (*M* = 3.27; *SD* = .50) and Sources (*M* = 3.25; *SD* = .60). This is followed by 3 other categories which had an average mean closed to 3.00 - Dictionary (*M* = 3.14; *SD* = .76), Rehearsal (*M* = 3.07; *SD* = .84) and Activation (*M* = 2.94; *SD* = .82) The least used category of vocabulary learning strategy is Management which had an average mean of 2.77 and a standard deviation of .65.

4.2.3 The differences in vocabulary learning strategies in relation to field of study, gender, self-rated English proficiency and attitude toward vocabulary learning.

4.2.3.1. Field of study

The students were divided into two fields of studies. One group consists of 44 students taking Arts studies and another 44 students were taking Science studies. The Arts students were consisted of two groups – one group was taking General Knowledge, Bahasa Melayu, History, Business Studies and Muet. The other group was taking General Knowledge, Economics, Bahasa Melayu, Business Studies and MUET. The Science students were also made up of two groups; one group was taking General Knowledge, Biology, Additional Maths, Chemistry and MUET while the other group was taking General Knowledge, Chemistry, Physics, Additional Maths and MUET. All the Science subjects were taught in English and the Science students had been using English in learning Science subjects since they were in Form One. Hence, in terms of contact hours in using English, they had more than students who were taking Arts Studies. Nevertheless, both groups (Arts and Science students) had been learning English subject in schools for more than 11 years i.e. from Primary One to Form Six.

For the purpose of comparison, two-independent samples tests (Mann-Whitney U test) was used to generate data for the analysis. Table 4.2.3.1(a) shows that there were significant differences in Vocabulary Learning strategies employed between the two fields of studies: Science Majors (English as medium of instruction for all Science subjects) and Arts Majors (BM as medium of instructions for all subjects except for MUET) with a p-value less than $p < .05$ i.e. $z = -2.06$ and $p = .04$.

Table 4.2.3.1(a)
Significant of Difference according to Fields of Study

	Summary of strategy
Mann-Whitney U	721.000
Wilcoxon W	1711.000
Z	-2.061
Asymp. Sig. (2-tailed)	.039
a. Grouping Variable: Field_study	

On the other hand, Table 4.2.3.1(b) shows that students majoring in Arts had higher mean rank of 50.11 than students majoring in Science who only had a mean rank of 38.89. Besides, Arts students also had higher Sum of ranks than Science Majors.

Table 4.2.3.1(b)
Mean Rank and Sum of Rank according to Fields of Study

	Field of study	N	Mean Rank	Sum of Ranks
Summary of strategy	Arts	44	50.11	2205.00
	Science	44	38.89	1711.00
	Total	88		

Table 4.2.3.1(c) shows that students majoring in Arts had significantly higher mean rank of 50.86 than Science majors who had a mean rank of only 38.14 and this difference was significant at a *p*-value of *p*=.01 for Dictionary strategy. Although insignificant, Arts majors had slightly higher mean ranks and sum of ranks than Science Majors for almost all the other categories of Vocabulary learning strategy, except for Perception strategy where Science Majors had a slightly higher mean rank than Arts Majors i.e. 45.97 vs 43.03 but this difference was insignificant. Notably, Arts majors had insignificantly slightly higher mean ranks and sum of ranks than Science majors in six other categories of vocabulary learning strategy. For Sources, Arts majors had a mean rank of 48.78 vs 40.22, Encoding 47.93 vs 41.07, Rehearsal 47.74 vs 41.26, Guessing 47.61 vs 41.39, Management 47.78 vs 41.28 and Activation 48.55 vs 40.45.

Table 4.2.3.1(c) Mean Rank and Sum of Rank according to Category of Vocabulary Learning Strategy based on Fields of Study

	Field of study	N	Mean Rank	Sum of Ranks
PERCEPTION	Arts	44	43.03	1893.50
	Science	44	45.97	2022.50
	Total	88		
SOURCES	Arts	44	48.78	2146.50
	Science	44	40.22	1769.50
	Total	88		
ENCODING	Arts	44	47.93	2109.00
	Science	44	41.07	1807.00
	Total	88		
REHEARSAL	Arts	44	47.74	2100.50
	Science	44	41.26	1815.50
	Total	88		
DICTIONARY	Arts	44	50.86	2238.00
	Science	44	38.14	1678.00
	Total	88		
GUESS	Arts	44	47.61	2095.00
	Science	44	41.39	1821.00
	Total	88		
MANAGE	Arts	44	47.72	2099.50
	Science	44	41.28	1816.50
	Total	88		
ACTIVATION	Arts	44	48.55	2136.00
	Science	44	40.45	1780.00
	Total	88		

4.2.3.2 Gender

There were 36 male students and 52 female students. For the purpose of comparison, two-sample t-test using Mann-Whitney U test was done to identify significant differences. In Table 4.2.3.2(a), the test shows that there was a significant difference between gender and strategy use with a *p*-value less than $p<.05$ i.e. $p=.00$ and $z=-3.67$.

Table 4.2.3.2(a)
Significant of Difference according to Gender

	Summary of strategy
Mann-Whitney U	502.500
Wilcoxon W	1168.500
Z	-3.679
Asymp. Sig. (2-tailed)	.000
a. Grouping Variable: Gender	

The female students had higher mean rank of 52.84 than male students who had only 32.46 in strategy use. Table 4.2.3.2(b) below shows that female students had higher mean rank in almost all the categories of strategy use. They had significantly higher frequency of strategy use than male students in Dictionary use with a mean rank of 53.47 vs 31.54, Management 51.70 vs 34.10, Sources 51.26 vs 34.74, Encoding 50.27 vs 36.17, Rehearsal 49.01 vs 37.99 and Perception 48.89 vs38.15. However, there were no significant differences between gender and strategy use for Guessing and Activation as they showed a *p*-value of $P=.86$ and $p=.12$ respectively which were more than the significant *p*-value of $p<.05$.

Table 4.2.3.2 (b)
Frequency of Strategy use based on Category of Vocabulary Learning Strategies

Category	Gender	N	Mean Rank	Sum of Ranks
PERCEPTION	male	36	38.15	1373.50
	female	52	48.89	2542.50
	Total	88		
SOURCES	male	36	34.74	1250.50
	female	52	51.26	2665.50
	Total	88		
ENCODING	male	36	36.17	1302.00
	female	52	50.27	2614.00
	Total	88		
REHEARSAL	male	36	37.99	1367.50
	female	52	49.01	2548.50
	Total	88		
DICTIONARY	male	36	31.54	1135.50
	female	52	53.47	2780.50
	Total	88		
GUESS	male	36	43.94	1582.00
	female	52	44.88	2334.00
	Total	88		
MANAGE	male	36	34.10	1227.50
	female	52	51.70	2688.50
	Total	88		
ACTIVATION	male	36	39.50	1422.00
	female	52	47.96	2494.00
	Total	88		

4.2.3.3 Self-Rated English Fluency

A majority of the students rated their English proficiency as average. Only 5 students rated their English proficiency as poor and only 7 students rated it as above average. Comparison of means of these two groups of proficiency levels was done using Two- independent samples *t*-test (Mann-Whitney U Test).

Table 4.2.3.3
Significant Difference between the Poor and Above Average English Proficiency Students.

	Summary of strategy
Mann-Whitney U	**10.500**
Wilcoxon W	**25.500**
Z	**-1.139**
Asymp. Sig. (2-tailed)	**.255**
Exact Sig. [2*(1-tailed Sig.)]	**.268[a]**

a. Not corrected for ties.

b. Grouping Variable: English proficiency

Table 4.2.3.3 above shows that there was no significant difference in Vocabulary learning strategy between the poor and above average English Proficiency students. Although the z-value was significant, the *p*-value was taken for this comparison due to the small number of samples i.e. n1 = 5; n2 = 7. There was no statistical significant as *p*-value was more than $p < .05$ i.e. $p = .25$.

4.2.3.4 Attitude toward vocabulary learning.

Analysing the data obtained from the respondents, it was discovered that only one of them had negative attitude toward vocabulary learning i.e. "I hate it". A majority of 52 respondents had neutral attitude that was neither like nor dislike vocabulary learning and 29 respondents had a positive attitude i.e "Like it" and 6 respondents rated their attitude as "Like it very much". Since only one respondent had negative attitude, comparison could not be done between respondents with negative attitude and positive attitude. Hence, evaluation was done between respondents with neutral attitude and positive attitude towards vocabulary learning.

In order to evaluate the relationship between attitude toward vocabulary learning and strategy use by the samples under study, a Spearman's rho correlation coefficient was generated between the attitude rating and frequency of strategy use. The results, as indicated in Table 4.2.3.4(a) shows that there was a moderate positive correlation of $r = .539$ and *p*-value of $p = .00$.

Table 4.2.3.4(a)
The Correlation Coefficient between Attitudes toward Vocabulary Learning.

			Summary of strategy	Attitude
Spearman's rho	Summary of strategy	Correlation Coefficient	1.000	.539**
		Sig. (2-tailed)	.	.000
		N	88	88
	Attitude towards vocabulary	Correlation Coefficient	.539**	1.000
		Sig. (2-tailed)	.000	.
		N	88	88

**. Correlation is significant at the 0.01 level (2-tailed).

To evaluate the relationship between attitude toward vocabulary learning and categories of strategy use, a two-independent *t*-test (Mann-Whitney U test) was computed. Table 4.2.3.4(b) shows that the respondents with a positive attitude (4 "I like it") had significantly higher use of strategies than those with a neutral attitude (3 "Neutral") in almost all the categories except for guessing. They showed higher mean ranks in Perception (49.31vs 36.37), Sources (53.21 vs 34.19), Encoding (49.78 vs 36.11), Rehearsal (52.57 vs 34.55), Dictionary (51.26 vs 35.26), Management (49.83 vs 36.08) and Activation (52.95 vs 34.34).

Table 4.2.3.4(b)
Mean Rank and Sum Rank for Category of Vocabulary Learning Strategies by Attitude

	Attitude	N	Mean Rank	Sum of Ranks
PERCEPTION	Neutral	52	36.37	1891.00
	I like it	29	49.31	1430.00
	Total	81		
SOURCES	Neutral	52	34.19	1778.00
	I like it	29	53.21	1543.00
	Total	81		
ENCODING	Neutral	52	36.11	1877.50
	I like it	29	49.78	1443.50
	Total	81		
REHEARSAL	Neutral	52	34.55	1796.50
	I like it	29	52.57	1524.50
	Total	81		
DICTIONARY	Neutral	52	35.28	1834.50
	I like it	29	51.26	1486.50
	Total	81		
GUESS	Neutral	52	41.09	2136.50
	I like it	29	40.84	1184.50
	Total	81		
MANAGE	Neutral	52	36.08	1876.00
	I like it	29	49.83	1445.00
	Total	81		
ACTIVATION	Neutral	52	34.34	1785.50
	I like it	29	52.95	1535.50
	Total	81		

4.2.4. The vocabulary learning ltrategies employed in relation to students' perceptions of problems in vocabulary learning.

In order to find out about the problems faced by the Form 6 students in vocabulary learning, the respondents in this study were asked to rate the problems they faced in a five-point interval scale. The scales ranged from 1 ("not a problem"), 2 ("Quite a problem"), 3 ("Neutral"), 4 ("a problem") and 5 ("a major problem"). Table 4.4(a) shows an overall medium rating of the five problems with a mean of *M*=2.88 and a standard deviation of *SD*=.82.

Table 4.2.4(a)
Overall Perception of Problems

	N	Mean	Std. Deviation
Summary of problems	88	2.8864	.82031
Valid N (listwise)	88		

Table 4.2.4(b)
Perceptions of Problems

	N	Mean	Std. Deviation
I cannot handle multiple meanings of words.	88	2.9886	1.03384
I forget words I've learned.	88	2.9773	1.08254
I cannot use words properly.	88	2.9318	1.11206
I have difficulties increasing my vocabulary.	88	2.9091	1.05739
I cannot remember new words.	88	2.6250	1.04290
Valid N (listwise)	88		

Table 4.2.4(b) shows the ratings of the problems in descending order based on their means. This can be presented as follows: "I cannot handle multiple meanings of words" (*M* = 2.99; *SD* = 1.03), "I forget words I have learnt" (*M*=2.98; *SD* = 1.08), "I cannot use words properly" (*M* = 2.93; *SD* = 1.11), "I have difficulties increasing my vocabulary" (*M* = 2.90; *SD* = 1.05) and "I cannot remember new words" (*M* = 2.62; *SD* = 1.04)

Table 4.2.4(c)
Correlation Coefficient between Perception of Problems and Strategy use

			Summary of strategy	Summary of problem
Spearman's rho	Summary of strategy	Correlation Coefficient	1.000	-.158
		Sig. (2-tailed)	.	.141
		N	88	88
	Summary of problem	Correlation Coefficient	-.158	1.000
		Sig. (2-tailed)	.141	.
		N	88	88

Table 4.2.4(c) above shows that there is no correlation between students' perception of problems and strategy use with a very low negative correlation coefficient of r = -0.15 and the relationship was insignificant with a p-value = .14. This signifies that students' perceptions of problems on vocabulary learning had very little or no effect on their strategy use. Taking a closer look, Table 4.2.4(d) shows that almost all the students' perceptions of problems had no correlation with the students' vocabulary learning strategy use except for problem no.4 "I cannot handle multiple meanings of words" with a correlation coefficient of r = .04 but it was insignificant with a p-value = .71. There were no correlations and statistical significant of relationships between students' perceptions of problems and strategy use in the following: "I have difficulties increasing my vocabulary" (r = -0.10; p = .35), "I forget words I've learned" (r = -0.02; p = .84), "I cannot use words properly" (r = - 0.15; p = .15) and "I cannot remember new words" (r = - 0.28; p = .00).

Table 4.2.4(d)
The Correlation Coefficient between Students' perceptions of Problems and Strategy use

			Summary of strategy
Spearman's rho	Summary of strategy	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	88
	I have difficulties increasing my vocabulary.	Correlation Coefficient	-.100
		Sig. (2-tailed)	.354
		N	88
	I forget words I've learned.	Correlation Coefficient	-.021
		Sig. (2-tailed)	.843
		N	88
	I cannot use words properly.	Correlation Coefficient	-.151
		Sig. (2-tailed)	.159
		N	88
	I cannot handle multiple meanings of words.	Correlation Coefficient	.040
		Sig. (2-tailed)	.714
		N	88
	I cannot remember new words.	Correlation Coefficient	-.283**
		Sig. (2-tailed)	.007
		N	88

4.3. Discussion

1.3.1. The vocabulary learning strategy pattern of Form Six students.

The results of the study showed that the Form Six students chosen as samples for this study had a moderate frequency of strategy use in their efforts to learn new vocabulary. They demonstrated a peculiar pattern in vocabulary learning by employing more frequently strategies that were related to incidental vocabulary learning.

Comparison in terms of category showed that guessing strategy as the most frequently used category of strategy, followed by perception and encoding strategies and management strategy as the least. This finding is in contrary with the findings by Gu & Johnson (1996) and Ming (2007) who found that activation strategy as the least whereby Ming (2007) carried out a study with College-level learners of English in China. This portrayed that the respondents of the present study preferred to learn new vocabulary through indirect study or incidental learning. In short, they preferred to learn vocabulary using contextualization as they guessed the meanings of new vocabulary according to how they were used in context. This ascertained the finding by Cohen & Aphek (1981) that contextualization strategies work better for learners who already possess a fair level of L2 knowledge. Having learnt English for 11 or 12 years, the students to a certain extent had acquired the skill of contextualization in giving or finding for meanings of new vocabulary. Moreover, they had learnt this skill in MUET (Malaysian University English Test) class i.e. using contextual clues to guess meanings of new words. In this skill, they can guess the meaning of new words according to how they are used in contexts.

Thus, this study also revealed that the students had acquired the skill of learning new words as used in context as learnt in their MUET lesson. Besides, it also showed that the students had selected the most important source of vocabulary learning as Nation (2005) stated that incidental learning through guessing from context was the most important of all sources of vocabulary learning particularly for native speakers and also true for second language learners. Nevertheless, these Form Six students did not solely depend on guessing strategy in their vocabulary learning because they also employed other strategies which were also given considerable emphasis. This is ascertained as the difference in the mean of guessing strategy and other strategies was very small. Nation (2005) also argued that incidental and direct intentional learning and teaching of vocabulary should be taken as complementary activities as each one enhancing the learning that comes from the other.

Hence, the results also showed that the Form Six students still paid attention to word formation such as its pronunciation, grammatical patterns, example of how the words is used in English and by paying attention to the unfamiliar usage of a known word which are categorised under Perception strategy which was the second most frequently used strategy. Encoding strategy was another strategy that was also given a fair emphasis after Perception strategy in the students' efforts to learn new words. This strategy includes trying to remember the Bahasa Malaysia (BM) or Chinese equivalent of the new word, trying to remember the sentence in which the word is used to remember it, associating new words with those already known and distinguishing words with similar meanings, analyzing the structure of a word to remember it. Obviously this pattern in students' vocabulary learning portrayed that they were making considerable efforts to learn new English vocabulary to build up their vocabulary size partly to improve their comprehension and production which are vital to do well in MUET exam. Production which is termed as 'encoding' by Nation (2001) is required by learners to function in a language such as to speak, write or translate.

Comparing individual vocabulary learning strategy use, it was revealed that they had the highest mean for the category of guessing "I guess the meaning of words I don't know" (*M*=3.80; *SD*=0.94). The second frequently used strategy was "I listen to English songs, radio programs, watch English movies, etc to increase my vocabulary" (*M* = 3.77; *SD* = 1.07). This was also in contrast with previous finding by Ming (2007) who found that learners were less likely to use extracurricular sources (such as listening to English songs, radio programs, watching English movies, reading stories, magazines, etc). Surprisingly, listening to extracurricular sources became the second most frequently used strategy by Form Six students of the present study. This shows that the students are very much influenced by their MUET Listening lessons as they are usually given listening exercises which are made up of different types of listening texts. MUET teachers usually encouraged their students to listen to variety of extracurricular sources to sharpen their listening skill in order to do well in their MUET Listening paper. The third frequently used strategy with a mean slightly lower than the second highest mean is "I try to remember the Bahasa Malaysia or Chinese equivalent of the word" (*M* = 3.71; *SD* = 1.11). This revealed that the Form Six students of the present study paid particular emphasis to remember the translation of the words learnt in their first language i.e. either in BM or Chinese. Hence, denoting that translation is still a beneficial technique used in learning vocabulary and it is proven effective especially for better comprehension. Hayati & Mohammadi (2009) in their study on task-based instruction vs. translation method in teaching vocabulary among Iranian secondary school students found that using translation in a communicative framework enhanced vocabulary learning at deeper levels of cognitive processing leading to deeper vocabulary gains for unknown words. They contended that their findings showed the use of translation as a cognitive strategy to help learners make effective cross-lingual comparisons at different stages of language learning to comprehend, to remember, and even produce target language.

This is followed by six other strategies that had an average mean of between *M*=3.61 to *M*=3.68 which was still significant as they demonstrated an average frequency of sub-strategy use. This includes "I check to see if my guesses about the words are right or wrong" (*M* = 3.68; *SD* = .95), "I pay attention to the pronunciation of new word" (*M* = 3.64; *SD* = .92), "I highlight the words that seem important to me" (*M* = 3.62: *SD* = 1.03), "I look up new words in an English-Bahasa Malaysia or English-Chinese dictionary" (*M* = 3.62: *SD* = 1.22), " I pay attention to the example of how a word is used in English" (*M* = 3.61: *SD* = .90) and " When I look up a word in the dictionary, I read all the meanings of new words" (*M* = 3.61: *SD* = 1.10). Eleven other sub-strategies were employed by these students with an average mean of between *M*=3.04 and *M*=3.53 and only eight sub-strategies attracted students with an average mean of between *M*=2.22 and *M*=2.96. These eight sub-strategies consisted of mainly Management strategy showing that the students did not frequently employ this strategy in their vocabulary learning. This is probably because they used guessing strategy, perception and encoding strategies more frequently as discussed earlier. Furthermore, using management strategy would require students to spend a considerable amount of time for managing their vocabulary learning such as jotting down new words that they want to learn, reviewing and making plans for their vocabulary learning, etc. which can be very tedious.

Interestingly, quite a significant contrast also could be seen between "I look up new words in an English-Bahasa Malaysia or English-Chinese dictionary" (*M* = 3.62: *SD* = 1.22), and "I look up new words in an English-English dictionary" (*M*=3.10; *SD*=1.24) implying that the Form Six students preferred to use a bilingual dictionary than a monolingual dictionary. This also implies that the students were more inclined to think in their first language i.e. either BM or Chinese than in the target language. This reconfirms the results of previous findings by Gu & Johnson (1996), Fan (2003) and Ming (2007). Surprisingly, the sample students did not seem to prefer reading as their popular source of learning new vocabulary. It was found that reading outside class hours, " I read stories, magazines etc outside class to increase my vocabulary (SOU)" was the 14th frequently used strategy with a mean of *M*=3.15; *SD* = 1.13.

1.3.2. Vocabulary Learning Strategies in relation to field of study.

Although there was a significant difference between students majoring in Science (English as the medium of instruction for all Science subjects) and students majoring in Arts (BM as the medium of instruction for all Arts subjects except for MUET), the results of the study did not correlate with the findings in previous studies. Chiang (2004) and Ming (2007) found that the English majors generally exceeded non-English majors in their overall frequency of vocabulary learning strategy use. In contrast, in the present study the Arts majors who used BM as their medium of instructions for their Arts subjects had higher frequency of vocabulary learning strategy use than Science majors who used English for all their Science subjects as they had a mean rank of 50.11 while the latter only had 38.89. However, Arts majors had significantly higher mean ranks and sum of ranks than Science majors only in Dictionary use with a significant *p*-value of *p*=.01 while in seven other categories of vocabulary learning strategy namely Sources, Activation,

Encoding, Rehearsal, Management, Guessing and Perception, the differences were insignificant.

Science majors only had a slightly higher frequency of VL strategy use in Perception strategy than Arts majors with a mean rank of 45.97 than 43.03 for the latter but this difference was insignificant as it had a *p*-value of *p*=.58. Specifically, this group of students (Science students) preferred learning new vocabulary more by paying attention to the pronunciation of new word, unfamiliar usage of a known word and the grammatical pattern of a new word with mean ranks of 47.60, 47.15 and 45.66 respectively versus 41.40, 41.85 and 43.34 respectively for Arts majors. Besides, they also frequently used (See Table 1 in Appendices) "I analyse the structure (root and affix) of a word to remember it (e.g. in-formal, color-less, etc) that had a high mean rank of 45.78 as compared to 43.22 for Arts majors. This implies that they learnt new words in the target language by frequently focusing more on the word-formation or form than using other strategies such as dictionary use which constituted a mean rank of only 38.14 as compared to Arts majors who have 50.86. The rationale of employing this strategy according to Mohseni-Far (2008) is because knowledge of lexical roots (etymological information and morphological origins), for instance, can assist in vocabulary development in that it helps learners predict or guess what a word means, explains why a word is spelt the way it is, and remember the word by knowing how its current meaning develops from its morphological roots.

Significantly, as stated earlier, Arts majors had the highest mean rank in Dictionary strategy use i.e. about 50.86 as compared to Science majors with a mean rank of only 38.14. Hence, Arts majors use dictionary more frequently than Science majors when learning new words in the target language. Specifically, they preferred to use bilingual dictionary (I look up new word in an English-BM or English-Chinese dictionary) more frequently than Science majors with a mean rank of 50.89 as compared to only 38.11 for the latter (See Table 1 in Appendices). This wide difference in the mean ranks between the two groups of students also revealed that Arts majors were more inclined to think in BM when learning new words. Nevertheless, the Arts majors still showed a slightly higher mean rank in the use of monolingual dictionary or English-English dictionary (I look up new words in English-English dictionary) with a mean rank of 46.61 than 42.39 for Science majors. Considerably, they (Arts majors) also had a slightly higher mean rank of about 46.19 in "I carry a pocket dictionary to look up new words I don't know" than Science majors who have 42.81. An obvious significant difference could be seen between the two majors in "When I look up a word in the dictionary, I read all the meanings of new words" where Arts majors had a mean rank of 49.80 whereas Science majors had a mean rank of 39.20 (See Table 1 in Appendices).

There are three types of dictionaries: bilingual, monolingual and bilingualized and can be found in either paper or electronic form. Using dictionaries i.e. either bilingual or monolingual, has its own strengths and weaknesses in building students' vocabulary knowledge. Hunt, Beglar (2005) as cited in Mohseni-Far (2008) contended that bilingual dictionaries have short and easy to understand definitions and they can be used to improve the reading comprehension of lower proficiency L2 learners and assist vocabulary learning at all levels of proficiency.

All this suggests that this group of students really made considerable efforts to learn new words in the target language by frequently using their dictionary. This is probably because they needed to build up their vocabulary since they were taking MUET at STPM level. As compared with the Science majors, they (Arts majors) had less contact hours in the target language in their present academic years since they were using BM as their medium of instruction for all their STPM subjects except for MUET. Thus, they needed to put in considerable efforts to learn new words in order to improve their English and scored good band for their MUET.

1.3.3. Vocabulary learning strategies by gender

A significant difference was discovered between vocabulary learning strategy use and gender. This finding did not correlate with the finding by Zhang (2009) who found that there were only slight differences between male and female subjects' perspective and Strategy use of vocabulary learning in his study among undergraduate English majors in Western China. Nevertheless, this finding correlated with the findings by Oxford, Nyikos & Ehman (1988) as cited in Zhang (2009) that the use of learning strategies significantly correlates with gender and they found that the females were generally more skillful than males at using learning strategies. This is ascertained by the present study as the females outperformed the males in frequency of strategy use.

The present study revealed that female students had higher use of learning strategy than male students as female students had higher mean rank of 52.84 than male students who had only 32.46 in strategy use. Significantly, it was ascertained that female students had better frequency of strategy use in vocabulary learning as they had higher mean rank in almost all the categories of strategy use. They had significantly higher frequency of strategy use than male students in Dictionary use with a mean rank of 53.47 vs 31.54, Management 51.70 vs 34.10, Sources 51.26 vs 34.74, Encoding 50.27 vs 36.17, Rehearsal 49.01 vs 37.99 and Perception 48.89 vs38.15. However, there were no significant differences between gender and strategy use for Guessing and Activation as they showed *p*-value of *P*=.86 and *p*=.12 respectively which were more than the significant *p*-value of *p*<.05 (See Table 2 in Appendices). The result of the present study seemed to show that the females organized their vocabulary learning better than the males as they had higher frequency of use in Dictionary use, Management, Sources, Encoding, Rehearsal and Perception strategy. Nation (2005) said that learners who organized their vocabulary learning made better progress than those who did not. Through the researcher's observation as an English and MUET teacher, it was discovered that the females were better language users as they usually outperformed their male counterparts in writing, speaking, listening and reading in school assessments or exams.

Looking at the significant differences between the two gender in terms of frequency of sub-strategy use (See Table 2 and Table 3 in Appendices), it was found that the females had higher frequency of use in "I highlight the words that seem important to me (MAN)" with a mean rank of 52.13 than 33.49 for males and a *p*-value of *p*=<.05. Secondly, the female students also showed higher frequency of use for "I carry a pocket dictionary to look up a word I don't know (DIC)" with a mean rank of 51.06 than 35.03 for males and a significant difference of

p= .003. Closely to this, with a significant difference of *p*=005, the females also outperformed the males in "When I look up a word in the dictionary, I read all the meanings of new words (DIC)" with a mean rank of 50.68 vs 35.57 for males. Besides, the females also showed a higher mean rank of 50.92 in "I keep a vocabulary notebook to jot down new words I want to learn (MAN)" than 35.22 for males with a significant difference of *p*=003. Still significant, the females also outperformed the males in "When I come across a new word, I make a note of it (SOU)" with a mean rank of 50.48 than 35.86 and a significant *p*-value of *p*=.005. From this finding, it was learnt that the female respondents used a lot of direct intentional study in their attempt to acquire new vocabulary as they carefully planned their vocabulary learning by highlighting important words, looking up for meanings of words in a dictionary, jotting new words in a vocabulary notebook, etc. The male respondents only showed a higher mean rank of 49.21 in "I guess the meaning of words I don't know (GUE)" than females who have 41.24 but this difference was insignificant as it had a *P*-value of *p*=0.13.

Both gender used textbook as an important resource for them to learn new words as they had almost similar mean rank of 42.8 for males and 45.7 for females for the strategy "I use textbook to learn new words (SOU)". This revealed that the use of textbook for MUET lessons was still beneficial as teachers usually highlighted to students new words in a particular text and discussed the meanings or asked students to give the meanings according to context. Next, they also both showed almost similar mean rank for "I make up my own sentences using the words I just learn (ACT)" with a mean rank of 42.15 and 46.13 respectively. Making sentences using the newly learnt words is vital as it can help to ensure better comprehension and retention. They also both paid attention to the pronunciation of new words (PER) with a mean rank of 41.50 and 46.58 and paid attention to the grammatical patterns of a new word with a mean rank of 41.97 and 46.25 for male and female respectively. All these learning strategies are related to the learning experiences they experienced in a MUET class. It is also significant to note here about the important role played by their first language namely Bahasa Malaysia (BM) and Chinese. The result of the study relating to this showed that both genders paid particular importance to "I try to remember the Chinese or BM equivalent of the words" (ENC) with a mean rank of 41.31 and 46.71 and "I group word in my own way to remember them" (MAN) with a mean rank of 41.83 and 46.35 for males and females respectively.

1.3.4. Vocabulary use by self-rated English proficiency

As a majority of the students rated their English proficiency as average, comparison could not be done in depth as only 5 students rated their English proficiency as poor and only 7 students rated it as above average. Nevertheless, there was no significant difference in Vocabulary learning strategy between the poor (n= 5) and above average (n=7) English Proficiency students. Although the z-value was significant, the *p*-value was taken for this comparison due to the small number of samples that was n1 = 5; n2 = 7. There was no statistical significant as *p*-value was more than $p < .05$ i.e. $p = .26$. Thus, the vocabulary learning strategy patterns of these two groups of students could not be identified in this study. Besides, comparison with other research studies could not be done. But, interestingly, almost all the samples for this study rated their English proficiency as average showing that they had an average level of proficiency in the target language.

1.3.5. Attitude towards Vocabulary Learning.

Apparently, a majority of the samples taken for this study had an undecided attitude towards vocabulary learning as 52 of them rated a "neutral" attitude i.e. neither like nor dislike vocabulary learning. As only one student rated a dislike towards vocabulary learning, comparison could not be done between those who liked and those who disliked. Therefore, comparison was done between those students who had neutral attitude and those who liked vocabulary learning. The results indicated that there was a moderate positive correlation of $r = .539$ and *p*-value = 0.000.

The two-independent *t*-test (Mann-Whitney U test) shows that the respondents with a positive attitude (4 "I like it") had significantly higher use of strategies than those with a neutral attitude (3 "Neutral") in almost all the categories except for guessing where those who had a neutral attitude had a slightly higher frequency of use with a mean rank of 41.09 than 40.84 for students with positive attitude. The results of the study showed that students who had positive attitude had the highest mean rank in Sources (53.21 vs 34.19) revealing that they frequently used strategies that involved reading, listening and watching. This is followed by Activation (52.95 vs 34.34), Rehearsal (52.57 vs 34.55), Dictionary use (51.26 vs 35.26), Management (49.83 vs 36.08) and Encoding (49.78 vs 36.11) and Perception (49.31vs 36.37) strategies. This correlated with studies by previous researchers such as Ming (2007) who found that students with a positive attitude expressed a frequent use in all categories and that learner attitude directly affected the learning process.

The high number of about 52 respondents who classified their attitude as 'neutral' toward vocabulary learning portrayed that many of the Form Six students under study were not sure about the need to take positive efforts to improve their vocabulary learning. This is ascertained as this group of students preferred to use guessing strategy and used less frequently the sources strategy which required them to read English resources such as stories, magazines, etc outside class, listening to English songs, radio programs and watching to English movies. Obviously, they were lacking in the necessary inputs to increase their vocabulary compared to respondents who had a positive attitude. Wen & Johnson (1997) as cited in Critchley (1998) found that while all learners consistently used guessing as a strategy, the high achievers tended to guess according to the reading context. Notably, when reading for pleasure, high achievers often guessed word meaning without referring a dictionary but during intensive reading, guesses "were consistently checked against the dictionary" (Wen & Johnson, 1997, p. 37). On the other hand, lower level readers tended to depend more heavily on guessing from context in every situation. These findings were supported by qualitative results which showed that the highest achievers were those most skeptical of guessing strategies, as opposed to low achievers, who approved strongly to guessing in all contexts (Critchley, 1998).

The result of previous study by Ming (2007) is also repeated as it was discovered that students with a negative (in the present

study: neutral attitude) attitude also showed a significantly low use of Activation and dictionary use. Hence, this reveals that students with negative attitude did not really make efforts to learn the new words that they came across in reading compared to students who had positive attitude. Knight (1994) as cited in Gu (2003) discovered that students who used a dictionary as well as guessed through context learned more words immediately after reading and also remembered more after two weeks. Besides, she also discovered that low verbal ability participants benefited more from the dictionary and contextual guessing than high verbal ability participants. Significantly, another finding by Knight was in line with Hulstijn (1993) who found that high verbal ability students would look up a word even if they had successfully guessed its meaning (Gu, 2003).

1.3.6. Vocabulary learning strategy use in relation to students' perceptions of problems.

Consistent with previous study by Ming (2007), the respondents of the present study showed an overall medium rating of perceptions of problem in vocabulary learning. They rated all the problems with almost similar means. In contrast with Ming's (2007) study who found that the Chinese learners had problem in increasing their vocabulary, in the present study respondents rated "I cannot handle multiple meanings of words" as the biggest problem. This reflects the need of these Form Six students to have more practice in using the new vocabulary learnt in context to enable them to understand the differences in meaning of this word. This also shows the dire need for them to use dictionary to see differences in meanings either using monolingual or bilingual dictionary. With slightly lower mean, this is followed by "I forget words I have learnt", "I cannot use words properly" , "I have difficulties increasing my vocabulary" and "I cannot remember new words" These problems in vocabulary learning still need to be addressed although they did not directly affect their frequency of vocabulary strategy use.
Nevertheless, in contrast with findings by previous researchers such as Ming (2007), the present study shows that there was no correlation between students' perception of problems and strategy use. Thus, students' perceptions of problems on vocabulary learning had very little or no effect on their strategy use. In other words, there was no significant relationship between students' perceptions of problems on vocabulary learning strategy use. Taking a closer look, almost all the students' perceptions of problems had no correlation with the students' vocabulary learning strategy use except for problem no.4 "I cannot handle multiple meanings of words" with a correlation coefficient of r = .04 but it was insignificant with a *p*-value = .71. In short, there were no correlations and statistical significant of relationships between students' perceptions of problems and strategy use in the following: "I have difficulties increasing my vocabulary" (r = -0.10; p = .35), "I forget words I've learned" (r = -0.02; p = .84), "I cannot use words properly" (r = - 0.15; p = .16) and "I cannot remember new words" (r = - 0.28; p = .00). Hence, students' perception of problems did not hinder students from learning new vocabulary.

5. Summary of findings

The results of this study revealed that the respondents chosen for this study had a medium frequency of vocabulary learning strategy use employing both intentional and incidental strategies of vocabulary learning. Apparently, their overall pattern of strategy use was very much influenced by the reading skills that they had learnt in their MUET lessons. Guessing strategy for instance is related to using contextual clues when giving meanings of new words which involved guessing those meanings based on how the words are used in context. Besides, they also frequently learnt new vocabulary by paying attention to the formation of the new words such as their pronunciation, grammatical patterns, etc. Dictionary use also became an important strategy in students' efforts to learn new words especially using bilingual dictionary. Significantly, there was a significant difference of strategy use between the two fields of studies – Arts and Science majors whereby Arts majors who used BM as their medium of instruction for all subjects except for MUET had higher frequency of strategy use than Science majors. However, there was no significant difference in frequency of strategy use in terms of self-rated English proficiency. This could not be done in depth due to the small samples and as a result the pattern of relationship between the poor proficiency group and above average group could not be established. Nevertheless, comparison in terms of attitude towards vocabulary learning showed that the positive respondents had higher frequency of strategy use than the students with neutral attitude. Surprisingly, students' perceptions of problems in vocabulary learning did not have any significant effects on student frequency of strategy use.

V. CONCLUSION

The results of this present study leave some pedagogical implications that are beneficial for Form Six (Pre-university) curriculum. MUET teachers teaching Form Six students should continue to help these students build their vocabulary by exposing them to varieties of reading materials which require students to do inferring or learning words from context. Mohseni-Far (2008) contended that the vast majority of words learned in L1 result from extensive and manifold exposures rather than direct instruction, therefore successful vocabulary learning in a L2 should proceed in the same way. He also assured that reading is one of the most important ways that learners gain lexical knowledge incidentally and thus, concentration on meaning-focused reading will result in incremental increases in vocabulary size, the elaboration of lexical knowledge and development of reading fluency.

Despite the importance of learning words from context, teachers should not neglect the use of direct intentional study such as the use of dictionary and other strategies to build up vocabulary knowledge. Nation (2005) argued that although learning vocabulary from context appeared to be largely incidental learning, a deliberate, intentional focus on developing the skills and strategies needed to carry out such learning is required. He also reiterated that because of the importance of guessing from context, it is worthwhile for both teachers and learners to spend time working on guessing strategies. Fraser (1999) as cited in Nation (2005) found that more vocabulary was retained from inferring from context (in this study termed as contextualization) when: it was followed up by consulting a dictionary and first language based word identification was used that is, the learners retrieved an L1 synonym for the unknown

word. As cited in Shostak (2002) that researchers agree that although reading is indeed important, to achieve deeper, richer levels of lasting vocabulary understanding, direct instruction is more effective and more efficient than incidental learning (McKeown & Beck, 1988). Planned vocabulary instruction in specific words is what is needed, including specialized vocabulary instruction in the content areas (Baker, Simmons, and Kameenui, 1995b).

Notably, as recommendation for future studies, future researchers interested in doing similar study can employ bigger samples and more defined dependent variables. Besides, other methods of data collection can be employed such as interviews and observations to obtain more detailed and reliable data concerning respondents' pattern of vocabulary learning strategy use to obtain more thorough and conclusive study. Despite the limitations underlying this exploratory research, its findings leave some significance understanding and knowledge about the pattern of vocabulary learning strategies of pre-university students that may bring new impetus for future research studies.

Appendix 1

Questionnaire

Vocabulary learning strategies employed by the Form 6 students

Researcher

FRANKIE SUBON

MARA UNIVERSITY OF TECHNOLOGY

KOTA SAMARAHAN

SARAWAK

Dear respondent,

This survey is carried out to examine vocabulary learning strategies of the Form 6 students of SMK Sungai Tapang, Samarahan. Your kind co-operation in responding to this questionnaire sincerely is very much appreciated. All the information given will be kept confidential.

Section A: Vocabulary Learning strategies

Rate the following vocabulary learning strategies that you use to learn new words according to the frequency scales below. Circle the number in the box for your choice.

1 - Never 2 – Rarely 3 – Sometimes 4 - Very often 5 - Always

	Vocabulary learning strategies	1	2	3	4	5
1	I pay attention to the pronunciation of a new word.	1	2	3	4	5
2	I use my textbook to learn new words.	1	2	3	4	5
3	I try to remember the sentence in which the word is used to remember the word.	1	2	3	4	5
4	I repeat a new word out loud several times to remember it.	1	2	3	4	5
5	I pay attention to the examples of how a word is used in					

	English.	1	2	3	4	5
6	I carry a pocket dictionary (including an electronic dictionary) to look up the words I don't know.	1	2	3	4	5
7	I pay attention to the grammatical patterns (e.g. parts of speech, countable/uncountable) of a new word.	1	2	3	4	5
8	I analyze the structure (root and affix) of a new word to remember it (e.g. in-formal, color-less).	1	2	3	4	5
9	I associate new words with those I already know.	1	2	3	4	5
10	I guess the meaning of words I don't know.	1	2	3	4	5
11	I pay attention to the unfamiliar usage of a known word.	1	2	3	4	5
12	I highlight the words that seem important to me.	1	2	3	4	5
13	When I look up a word in the dictionary, I read all the meanings of new words.	1	2	3	4	5
14	I check to see if my guesses about the words are right or wrong.	1	2	3	4	5
15	I look up new words in an English-Chinese dictionary.	1	2	3	4	5
16	I try to remember the Chinese equivalent of the word.	1	2	3	4	5
17	I distinguish words with similar meanings.	1	2	3	4	5
18	I listen to English songs, radio programs, watch English movies etc. to increase my vocabulary.	1	2	3	4	5
19	I read stories, magazines etc. outside class to increase my vocabulary.	1	2	3	4	5
20	I use the newly-learned words as much as possible in speaking and writing.	1	2	3	4	5
21	When I come across a new word, I make a note of it.	1	2	3	4	5
22	I review my vocabulary regularly.	1	2	3	4	5
23	I make plans for my vocabulary learning.	1	2	3	4	5
24	I make up my own sentences using the words I just learnt.	1	2	3	4	5
25	I group words in my own way to remember them.	1	2	3	4	5
26	I keep a vocabulary notebook to jot down new words I want to learn.	1	2	3	4	5
27	I look up new words in an English-English dictionary.	1	2	3	4	5
28	I repeatedly visualize the new word to remember it.	1	2	3	4	5

Section B/Bahagian B (Demographic)

Tick [/] the boxes and fill in the blanks with the required information.

1. Race

Malay ☐

Iban ☐

Bidayuh ☐

Chinese

Others (Please state): ……..

2. Gender

Male

Female

3. Age: ……..years/tahun

4. The class you are in now: Form …….

5. The most preferred hobby.

Watching television.

Surfing the internet

Reading

Gardening

Fishing

Others (Please state)

……..

6. Rate your proficiency in English by making a X in the box

Excellent

Above average

Average

Below average

Poor

7. Rate your attitude towards vocabulary learning by making a X in the box provided.

1. I don't like it
2. I hate it
3. Neutral
4. I like it
5. I like it very much

8. Rate your perceptions of problems in vocabulary learning according to the following rating. Mark a X in the box provided.

1 - Not a problem

2 - Quite a problem

3 - Neutral

4 - A problem

5 - A major problem

	Problems	1	2	3	4	5
a	I have difficulties increasing my vocabulary					
b	I forget words I've learned					
c	I cannot use words properly					
d	I cannot handle multiple meanings of words					
e	I cannot remember new words.					

THANK YOU

Appendix 2

Table 1
Mean Rank and Sum Rank according to Field of study

	Field_study	N	Mean Rank	Sum of Rank
I pay attention to the pron of new word (PER)	Arts	44	41.40	1821.50
	Science	44	47.60	2094.50
	Total	88		
I use textbook to lern new words (SOU)	Arts	44	46.19	2032.50
	Science	44	42.81	1883.50
	Total	88		
I try to remember the sentence in which the word is used to remember it (ENC)	Arts	44	46.84	2061.00
	Science	44	42.16	1855.00
	Total	88		
I repeat a new word out loud several times to remember it (REH)	Arts	44	46.86	2062.00
	Science	44	42.14	1854.00
	Total	88		
I pay attentn to the eg of how a word is used in English (PER)	Arts	44	47.97	2110.50
	Science	44	41.03	1805.50
	Total	88		
I carry a pocket dic to look up the words I don't know (DIC)	Arts	44	46.19	2032.50
	Science	44	42.81	1883.50
	Total	88		
I pay attention to the grammatical patterns of a new word (PER)	Arts	44	43.34	1907.00
	Science	44	45.66	2009.00
	Total	88		
I analyse the structure of a word to remember it.(ENC)	Arts	44	43.22	1901.50
	Science	44	45.78	2014.50
	Total	88		
I associate new words with those I already know (ENC)	Arts	44	47.38	2084.50
	Science	44	41.63	1831.50
	Total	88		
I guess the meaning of words I don't know (GUE)	Arts	44	43.33	1906.50
	Science	44	45.67	2009.50
	Total	88		
I pay attention to the unfamiliar usage of a known word (PER)	Arts	44	41.85	1841.50
	Science	44	47.15	2074.50
	Total	88		
I highlight the words that seem important to me.(MAN)	Arts	44	49.56	2180.50
	Science	44	39.44	1735.50
	Total	88		
When I look up a word in the dictionary, I read all the	Arts	44	49.80	2191.00
	Science	44	39.20	1725.00

meanings of new words.(DIC)	Total	88		
I check to see if my guesses abt the words are right or wrong (GUE)	Arts	44	51.90	2283.50
	Science	44	37.10	1632.50
	Total	88		
I look up new words in an English-BM or English-Chinese dic.(DIC)	Arts	44	50.89	2239.00
	Science	44	38.11	1677.00
	Total	88		
I try to remember the BM or Chinese equivalent of the word. (ENC)	Arts	44	49.06	2158.50
	Science	44	39.94	1757.50
	Total	88		
I distinguish words with similar meanings.(ENC)	Arts	44	42.89	1887.00
	Science	44	46.11	2029.00
	Total	88		
I listen to English songs, radio programs, watch English movies, etc to increase my vocab.(SOU)	Arts	44	51.10	2248.50
	Science	44	37.90	1667.50
	Total	88		
I read stories, magazines etc outside class to increase my vocabulary.(SOU)	Arts	44	46.40	2041.50
	Science	44	42.60	1874.50
	Total	88		
I use the newly-learned words as much as possible in speaking and writing.(ACT)	Arts	44	48.20	2121.00
	Science	44	40.80	1795.00
	Total	88		
When I come across a new word, I make a note of it (SOU)	Arts	44	43.99	1935.50
	Science	44	45.01	1980.50
	Total	88		
I review my vocabulary regularly (MAN)	Arts	44	46.02	2025.00
	Science	44	42.98	1891.00
	Total	88		
I make plans for my vocabulary learning (MAN)	Arts	44	49.27	2168.00
	Science	44	39.73	1748.00
	Total	88		
I make up my own sentences using the words I just learnt.(ACT)	Arts	44	47.14	2074.00
	Science	44	41.86	1842.00
	Total	88		
I group words in my own way to	Arts	44	47.05	2070.00

remember them.(MAN)	Science	44	41.95	1846.00
	Total	88		
I keep a vocabulary notebook to jot down new words I want to learn.(MAN)	Arts	44	43.18	1900.00
	Science	44	45.82	2016.00
	Total	88		
I look up new words in an English-English dictionary.(DIC)	Arts	44	46.61	2051.00
	Science	44	42.39	1865.00
	Total	88		
I repeatedly visualize the new word to remember it.(REH)	Arts	44	47.58	2093.50
	Science	44	41.42	1822.50
	Total	88		

Appendix 3

Table 2
Significant Differences of Vocabulary Learning Strategy use by Gender

	PER	SOU	ENC	REH	DIC	GUE	MAN	ACT
Mann-Whitney U	707.500	584.500	636.000	701.500	469.500	916.000	561.500	756.000
Wilcoxon W	1373.500	1250.500	1302.000	1367.500	1135.500	1582.000	1227.500	1422.000
Z	-1.956	-3.005	-2.570	-2.029	-3.987	-.174	-3.199	-1.559
Asymp. Sig. (2-tailed)	.050	.003	.010	.042	.000	.862	.001	.119

a. Grouping Variable: Gender

Appendix 4

Table 3

Mean Ranks and Sum Ranks of Vocabulary Learning Strategies by Gender

	Gender	N	Mean Rank	Sum of Ranks
I pay attention to the pron of new word (PER)	male	36	41.50	1494.00
	female	52	46.58	2422.00
	Total	88		
I use textbook to lern new words (SOU)	male	36	42.79	1540.50
	female	52	45.68	2375.50
	Total	88		
I try to remember the sentence in which the word is used to remember it (ENC)	male	36	40.42	1455.00
	female	52	47.33	2461.00
	Total	88		
I repeat a new word out loud several times to remember it (REH)	male	36	38.32	1379.50
	female	52	48.78	2536.50
	Total	88		
I pay attentn to the eg of how a word is used in English (PER)	male	36	39.32	1415.50
	female	52	48.09	2500.50
	Total	88		
I carry a pocket dic to look up the words I don't know (DIC)	male	36	35.03	1261.00
	female	52	51.06	2655.00
	Total	88		
I pay attention to the grammatical patterns of a new word (PER)	male	36	41.97	1511.00
	female	52	46.25	2405.00
	Total	88		
I analyse the structure of a word to remember it.(ENC)	male	36	39.38	1417.50
	female	52	48.05	2498.50
	Total	88		
I associate new words with those I already know (ENC)	male	36	40.93	1473.50
	female	52	46.97	2442.50
	Total	88		
I guess the meaning of words I don't know (GUE)	male	36	49.21	1771.50
	female	52	41.24	2144.50
	Total	88		
I pay attention to the unfamiliar usage of a known word (PER)	male	36	38.64	1391.00
	female	52	48.56	2525.00
	Total	88		
I highlight the words that seem important to me.(MAN)	male	36	33.49	1205.50
	female	52	52.13	2710.50
	Total	88		
When I look up a word in the dictionary, I read all the meanings of new words.(DIC)	male	36	35.57	1280.50
	female	52	50.68	2635.50
	Total	88		
I check to see if my guesses abt the words are right or	male	36	40.56	1460.00
	female	52	47.23	2456.00

wrong (GUE)	Total	88		
I look up new words in an English-BM or English-Chinese dic.(DIC)	male	36	38.56	1388.00
	female	52	48.62	2528.00
	Total	88		
I try to remember the BM or Chinese equivalent of the word. (ENC)	male	36	41.31	1487.00
	female	52	46.71	2429.00
	Total	88		
I distinguish words with similar meanings.(ENC)	male	36	40.90	1472.50
	female	52	46.99	2443.50
	Total	88		
I listen to English songs, radio programs, watch English movies, etc to increase my vocab.(SOU)	male	36	40.18	1446.50
	female	52	47.49	2469.50
	Total	88		
I read stories, magazines etc outside class to increase my vocabulary.(SOU)	male	36	37.17	1338.00
	female	52	49.58	2578.00
	Total	88		
I use the newly-learned words as much as possible in speaking and writing.(ACT)	male	36	40.25	1449.00
	female	52	47.44	2467.00
	Total	88		
When I come across a new word, I make a note of it (SOU)	male	36	35.86	1291.00
	female	52	50.48	2625.00
	Total	88		
I review my vocabulary regularly (MAN)	male	36	36.88	1327.50
	female	52	49.78	2588.50
	Total	88		
I make plans for my vocabulary learning (MAN)	male	36	40.69	1465.00
	female	52	47.13	2451.00
	Total	88		
I make up my own sentences using the words I just learnt.(ACT)	male	36	42.15	1517.50
	female	52	46.13	2398.50
	Total	88		
I group words in my own way to remember them.(MAN)	male	36	41.83	1506.00
	female	52	46.35	2410.00
	Total	88		
I keep a vocabulary notebook to jot down new words I want to learn.(MAN)	male	36	35.22	1268.00
	female	52	50.92	2648.00
	Total	88		
I look up new words in an English-English dictionary.(DIC)	male	36	37.64	1355.00
	female	52	49.25	2561.00
	Total	88		
I repeatedly visualize the new word to remember it.(REH)	male	36	40.64	1463.00
	female	52	47.17	2453.00
	Total	88		

ACKNOWLEDGMENT

This dissertation would not have materialised without the undivided cooperation of all those who have contributed directly or indirectly towards its completion. First and foremost, I would like to extend my heartiest gratitude to my supervisor, Dr Bromeley Philip for his continuous support, advice, patience and guidance. Without him by my side, I would not be able to complete this dissertation as planned. Next, my sincere thanks to twenty Form 6 students for their cooperation and kindness in answering the questionnaires during the pilot testing on 12 July 2010 and the eighty-eight Form Six students for the academic year 2009-2010 and 2010-2011 who were involved as samples for this study. Not forgetting my family; wife and children, for their prayers and supports. Above all, I would like to offer my thanks and glory to God for the wisdom granted to me in completing this dissertation.

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Continuing Medical Education for Rural Public Health Centers

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Abstract- CME (continuing medical education) is a key concept of national strategies in health. A study was undertaken of the current knowledge and continuing future training requirements of nurses, Inspectors CME to inform policy to meet national goals of healthcare. Questionnaire distributed to nurses, pharmacist, doctors and health inspectors in rural hospital who practice Traditional Indian Medicine Technologies were used by 221% of respondents as part of their work-related activities. This paper describes health in India that increase provider and patient access to health information.

Index Terms: *CME, M-health, P2P, Public* health

I. INTRODUCTION

Before the development of Information technology, generally in every hospital they were maintaining their patient recodes in a paper based format. There were serious drawbacks encountered in traditional paper based patient records management systems, such as that the record can only be stored at one specific location in a hospital. A lot of storage space and personnel were needed to take care of the patient records. Moreover, it can only be accessed by one person at a time. There was a big risk of losing the records because those records were not well organized. Sometimes patient information was often incomplete and it was very difficult to understand for other medical practitioners. Finally, the doctor had to collect all the paper based patient record to write a discharge summary report manually about a particular Later due to the rapid development of technology like fast internet access and massive storage capacity. Most of the hospitals maintain their patient records in electronic format which is usually represented in semi-structured or free text form. The medical practitioner, who has permission to access the system, can easily store the patient records without any lose of data and also facilitates ease of access to patient records. But still medical practitioners have to spend significant amounts of time to write discharge summary report manually for a particular patient data, even though all patient record stored electronically. It is a time consuming job for physicians. Computer based techniques can used as an alternative method to overcome the above problem by creating system which can produce automatic discharge summaries. Discharge summary is a clinical report produced by the doctors or other medical practitioners after the end of patients stay at the hospitals. Discharge summaries are constructed by medical practitioners by aggregating important information during the period of patient stay at the hospital. Some of the information which is usually found in the discharge summaries is the patient's medical condition, disease finding, medicines administered and the response of the medicine to the patient. The discharge summaries are used as a tool to obtain patients background medical information when a patient comes again to the hospital for some other medical conditions.Text summarization is the process to produce a shortened version of the original document preserving its information content and overall meaning in a form readable by humans. When this is done by means of computer, automatically, we can call this automatic text summarization. Input to a summarization process it can be one or more text documents. When the system takes only one document as an input, it is called single document text summarization and when the system takes a group of related text documents as an input, it is called multi-document text summarization. Depending upon on the text representation of the output summary, it can be categorized as an extract and an abstract. An abstract is a summary, which are generated by reformulating the salient text units selected from the input text document and it may contain some text units, which are not present in the input text document. An extract is a summary consisting of a number of salient text units selected from the input text document (Mani, I., 2001).From 1950's, various automatic text summarization system has been applied in different domain like news articles, scientific articles etc whereas it has not been applied extensively in medical domain. Most recently many researchers focusing more on medical domain there are lot of information in electronic format which could be exploited in better manner to understand patient's records.

Continuing Medical Education:

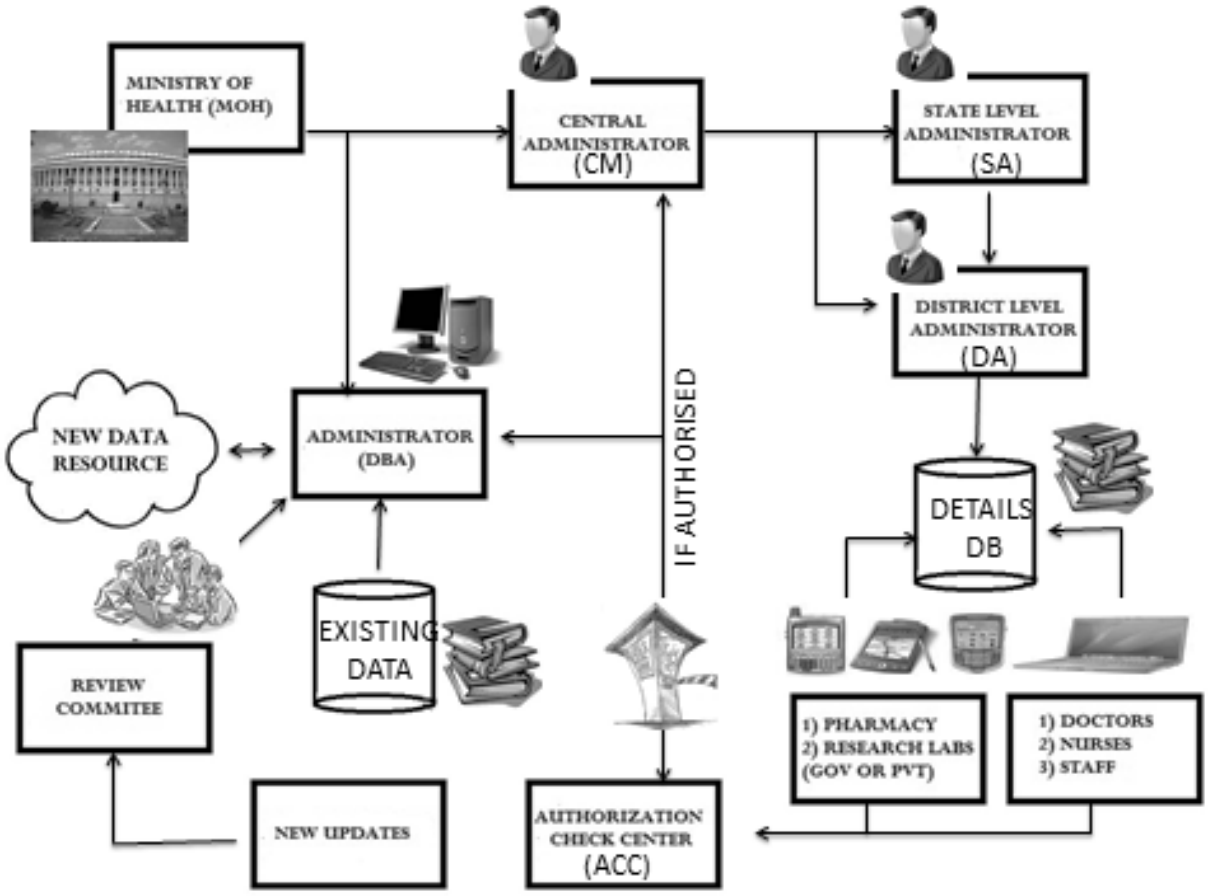

Fig:1 CME for Rural Health centers

The central administrator will control the data exchange at the country level. He will be appointed by the MOH (Ministry Of Health). Roles and Responsibilities: He will be responsible for keeping a record and track of activities performed by the SAs'. He will also be officially responsible for checking the authentication of data forwarded by the SA and will authorize them access (as and when the request for accession is received). He will also be in-charge of sending periodic reports to MOH for license renewal and cancellation (as per the credit system).:The State Administrator will be responsible for the maintenance of data in all the districts of the state. There will be one SA for each state and each SA will be appointed by the CA.Roles and Responsibilities: The state Administrator or the SA will be responsible for keeping a record and track of activities performed by the District Administrators (DAs). He will appoint the DAs' and will check the data/information forwarded by them for further authentication by the CA. The SAs' will be eligible for defining and following a protocol for data exchange between the DAs of the state and between the DAs and the CA.
District Level Administrator they are the smallest but the most important part of the hierarchy as they will be in direct contact with the database containing the details of all the registered users (doctors) in the district.Roles and Responsibilities: They will be approachable by the users for registration. They will lay down the format for information intake and will act as a bridge between the SAs and the users of the district. They will ensure the enforcement of protocols in hospitals and will forward license renewal/cancellation reports (as per the credit system; 'n' credits in 'x' years) to the respective SAs.

Details Database a database that will be maintained for storing user's personal information including the ID, password, credit bank (as per time period decided by the review committee) and personal information (eg. Name, age, sex, qualification, experience, etc.)
For example: if a neurologist wants to access some information regarding the There can be a wide range of users for CME which may include doctors, staff, nurses, lab technicians and will cover pharmacies, research laboratories, pathology laboratories, etc. These registered users will be allowed access to the Data Warehouse containing existing data and also the cloud with latest updates available. They will have a username and a password that would authenticate their access (ACC).

Authorization Check Centre This centre will be responsible for the security of the information on the cloud. The centre will check for authorization of the users who are trying to access the data on the cloud. The user name and password will be verified for authorization by the CA and only registered users will be granted access to the next level i.e the Data Base Administrator (DBA).

ADMINISTRATOR (DBA)

As the name suggests, administrator acts as a link between the resources and rest of the system. Any request which is been processed and sent from the ACC with a positive review is processed by the administrator and the immediate response is carried out. Administrator can be a group of authority which has the complete control over the information resources. For instance three universities act as administrators. All these three university will have the authority to update or delete or modify the information present in the data storage area. The further points will clarify the exact purpose of an administrator.

EXIXTING DATA

The design proposed is new to the community. Many of the researches have already been performed. Hence to facilitate the user, in a way not to surf the internet for different data; this system has a provision of linking up with existing data on the web. For example, a neurobiologist wants to search a research article on Alzheimer's disease, instead of searching it in any of a general search engine; the system designed can be used. The system will immediately surf through the existing data and display the result.

NEW UPDATES

Any new research performed or any new article which is to be published can be updated to the data storage area though a different and very simple method. The information in along with a set of protocols can be submitted directly on the site of the system. These information need not be given by a authorized person but anyone can update the new work done by them. Moreover hospital's authorities will be having a compulsory updating policy, under which the hospital authority for example the chief medical officer will have to update the new cases registered in their respected hospitals for further reference of other doctors throughout the web.

The new updates can be for example a research paper, a mandatory protocol for the completion of the submission of the paper is that the author will have to frame a set of minimum n multiple choice questions based on his article or paper. This will have its role in the credit system for the authorized health workers like doctors, nurses etc

REVIEW COMMITTEE

The all new updates are sent to the review committee for validation. Review committee can be at different locations. For instance in India, each state has its own review committee. For example a update of a research article is give by XYZ university in Vellore,

This data will be sent to the Tamil Nadu review committee. After the validation of the data provided and checking whether the submission is done without violation of any of the protocol, the data is forwarded to administrators or else is rejected.

NEW DATA RESOURCE

The all new data is stored here, in the cloud. Cloud computing is the latest technology which is catching fire on ground in the field of web technologies. It is a space taken up on the internet in a definite amount and all the information is stored here itself. Cloud computing is implemented here for its durability and fast access capabilities. As it is difficult to send and resend the data from a server which is located far of, cloud is used to fasten the access speed.

The administrator hence has the following functions:

I. To maintain the new data resource, i.e., any new data from two different review committees are not the same or the new updating is not present as such in the existing data. In other words it checks that the data is not repeated in the data base.
II. It manages the access given to any of the user to the information present in the cloud.
III. It also acts as a link between the MOH and the data information. This is a legalized procedure through which the government is given access to the information.

CASE STUDY

India has 28 states and each state has many pharmacists, research labs, doctors, nurses and medical staff. CME is a legalized forum which is implemented on all the medical workers as mentioned above, to update their knowledge according to the development of technology.For instance, Dr. X is a cardiologist. He has been given a target of completion of 50 credits in 1 year under tech CME program system. Dr. X has to collect at least 20 credits of his specialization and rest is general credits. Dr. X supposes requests for an article named "effect of Cadmium on heart attack by abc ". This request id forwarded to the ACC. The ACC asks the personal details of the Dr. X corresponding to his user ID and password, from the CM. the CM will extract the data from DETAILS DB through the state or district data and return the information to ACC. If the ID is found out to be genuine the request is forwarded to DBA or else is rejected. The DBA grant access to the user to search the information in the EXIXTING DATA as well as in the NEW DATA RESOURCES. Eventually the article where ever if found is sent back to the user i.e., Dr. X. Now after reading the article Dr. X

answer to the questions along with it. The answers again is sent back to the ACC and then to the administrator. The answers along with the response are directly transferred to the CM, which will match the answers to the response and decide whether to award credit to Dr. X or not. In case yes, the DETAIL DB section that contains credit option for each account is updated. a monthly webcast series designed to provide continuing education opportunities on public health issues. Broadcasts are free and available to all who are interested in furthering their knowledge of public health. The live webcast is always held from 9:00 - 10:00 a.m. ET on the third Thursday of each month.

CONCLUSION

In this paper, we proposed a CME for rural health centers based on the drawbacks we have analyzed the performance with the existing system. The proposed system give a good performance measures when compared to the traditional

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Study, Implementation and Comparison of Different Multipliers based on Array, KCM and Vedic Mathematics Using EDA Tools

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Abstract- As multiplication dominates the execution time of the most Digital Signal Processing algorithms, so there is a need of high speed multiplier. This paper presents the detailed study of different multipliers based on Array Multiplier, Constant coefficient multiplication (KCM) and multiplication based on vedic mathematics. All these multipliers are coded in Verilog HDL (Hardware Description Language) and simulated in ModelSimXEIII6.4b and synthesized in EDA tool Xilinx_ISE12. All multipliers are then compared based on LUTs (Look up table) and path delays. Results show that Vedic Urdhva Tiryakbhyam sutra is the fastest Multiplier with least path delay.

Index Terms- Array Multiplier, Constant Coefficient Multiplier (KCM), Vedic Mathematics, Urdhva Tiryakbhyam sutra.

I. INTRODUCTION

Multiplication is an important fundamental function in arithmetic operations. Multiplication-based operations such as Multiply and Accumulate(MAC) and inner product are among some of the frequently used Computation Intensive Arithmetic Functions(CIAF) currently implemented in many Digital Signal Processing (DSP) applications such as convolution, Fast Fourier Transform(FFT), filtering and in ALU of microprocessors. Since multiplication dominates the execution time of most DSP algorithms, so there is a need of high speed multiplier. Multiplication time is still the dominant factor in determining the instruction cycle time of a DSP chip.

The demand for high speed processing has been increasing as a result of expanding computer and signal processing applications. Higher throughput arithmetic operations are important to achieve the desired performance in many real-time signal and image processing applications [2]. One of the key arithmetic operations in such applications is multiplication and the development of fast multiplier circuit has been a subject of interest over decades. Reducing the time delay and power consumption are very essential requirements for many applications [2, 3]**.** This paper presents the study of different multipliers. Multiplier based on Vedic Mathematics is the fastest multiplier**.**

Digital multipliers are the most commonly used components in any digital circuit design. They are fast, reliable and efficient components that are utilized to implement any operation. Depending upon the arrangement of the components, there are different types of multipliers available. Particular multiplier architecture is chosen based on the application.

In many DSP algorithms, the multiplier lies in the critical delay path and ultimately determines the performance of the algorithm. The speed of multiplication operation is of great importance in DSP as well as in general processor. In the past, multiplication was implemented generally with a sequence of addition, subtraction and shift operations. There are many algorithms proposed in literature to perform multiplication, each offering different advantages and having trade off in terms of speed, circuit complexity, area and power consumption.

Different multipliers are discussed in below sections.

II. ARRAY MULTIPLIER

An array multiplier is a digital combinational circuit that is used for the multiplication of two binary numbers by employing an array of full adders and half adders. This array is used for the nearly simultaneous addition of the various product terms involved. To form the various product terms, an array of AND gates is used before the Adder array.

To clarify more on the concept, let us consider a 2X2 bit multiplication with A and B being the multiplicand and the multiplier respectively. Assuming A = a(1)a(0) and B= b(1)b(0), the various bits of the final product term P can be written as:-

P(0)= a(0)b(0)
P(1)=a(1)b(0) + b(1)a(0)
P(2) = a(1)b(1) + C1 where C1 is the carry generated during the addition for the P(1) term.
P(3)=C2 where C2 is the carry generated during the addition for the P(2) term.

For the above multiplication, an array of four AND gates is required to form the various product terms like a(0)b(0) etc. and then an Adder array is required to calculate the sums involving the various product terms and carry combinations mentioned in the above equations in order to get the final Product bits.

The Hardware requirement for an m x n bit array multiplier is given as:-
(m x n) AND gates,
(m-1).n Adders in which n HA(Half Adders) and
(m-2).n FA(full adders).

Example 1 describes the multiplication process using array multiplier. Instead of Ripple Carry Adder (RCA), here Carry Save Adder (CSA) is used for adding each group of partial product terms, because RCA is the slowest adder among all other types of adders available. In case of multiplier with CSA, partial product addition is carried out in Carry save form and RCA is used only in final addition.

Example 1: (1 0 0 1 x 1 0 1 0) = 1011010

```
1 0 0 1
      x1 0 1 0
0 0 0 0
    1 0 0 1    ← Left Shift by 1 bit
  0 0 0 0      ← Left Shift by 2 bit
1 0 0 1        ← Left Shift by 3 bit
1 0 1 1 0 1 0
```

Here from the above example it is inferred that partial products are generated sequentially, which reduces the speed of the multiplier. However the structure of the multiplier is regular.

Consider 4x4 multiplications, say A= A_3 A_2 A_1 A_0 and B= B_3 B_2 B_1 B_0. The output line for this multiplication is P_7 P_6 $P_5P_4P_3P_2$ P_1 P_0. Using the fundamental of Array Multiplication, taking partial product addition is carried out in Carry save form; we can have the following structure for multiplication as shown in Fig. 1.

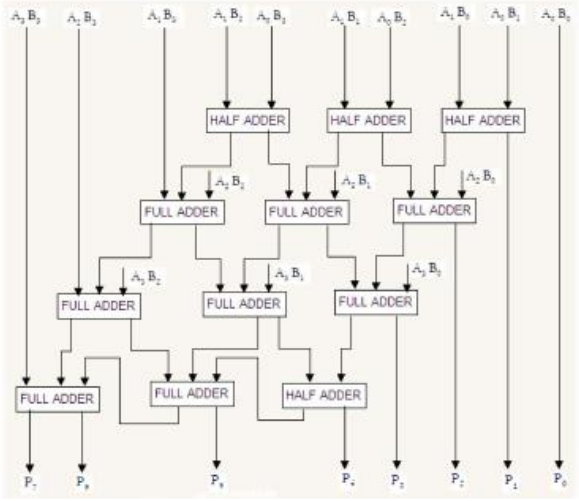


Fig. 1. A 4-Bit Array multiplier.

III. CONSTANT COEFFICINET MULTIPLIER

This method is based on ROM approach. In conventional KCM, one input is fixed but here, both the inputs for the multiplier can be variables. In this method, a ROM is used for storing the squares of numbers as compared to KCM where the multiples are stored.

The sample ROM content is given in Table 1.

Table 1

Address	Content(Square)
1	1
2	4
3	9
4	16
…	…

Fig.2: A sample ROM content of KCM.

Method:

To find (a x b), first we have to find whether the difference between 'a' and 'b' is odd or even. Based on the difference, the product is calculated using equations (1) and (2).

i. In case of Even Difference

Result of Multiplication= $[\text{Average}]^2$- $[\text{Deviation}]^2$ ….... (1)

ii. In case of Odd Difference

Result of Multiplication = [Average x (Average + 1)] - [Deviation x (Deviation+ 1)] …….(2)

Where, Average = [(a+b)/2] and Deviation = [Average - smallest(a, b)]

Example 2 (Even difference) and Example 3 (Odd difference) depict the multiplication process. Thus the two variable multiplication is performedby averaging, squaring and subtraction. To find the average[(a+b)/2], which involves division by 2 is performed by right shifting the sum by one bit. If the squares of the numbers are stored in a ROM, the result can be instantaneously calculated.

However, in case of Odd difference, the process is different as the average is a floating point number. In order to handle floating point arithmetic, Ekadikena Purvena - the Vedic Sutra which is used to find the square of numbers end with 5 is applied. Example 4 illustrates this. In this case, instead of squaring the average and deviation, [Average x (Average + 1)] - [Deviation x (Deviation+ 1)] is used. However, instead of performing the multiplications, the same ROM is used and using equation (3) the result of multiplication is obtained.

$n(n+l) = (n^2+n)$ ... (3)

Here n^2 is obtained from the ROM and is added with the address which is equal to n(n+l). The sample ROM contents are given in Table 1.

Thus, division and multiplication operations are effectively converted to subtraction and addition operations using Vedic Maths. Square of both Average and Deviation is read out simultaneously by using a two port memory to reduce memory access time.

Example 2: 16 x 14 = 224

1) Find the difference between (16-14) = 2 , Even Number
2) For Even Difference, Product = $[\text{Average}]^2$- $[\text{Deviation}]^2$
i. Average = [(a+b)/2] = [(16+14)/2] = [30/2] = 15
ii. Smallest(a,b) = smallest(l6,14) =14
iii. Deviation = Average - Smallest (a,b) =15 -14=1
3) Product = 15^2- 1^2= 225 - 1 = 224

Example 3: 15 x 12 = 180

1) Find the difference between (15-12)=3, Odd Number
2) For Odd Number Difference find the Average and Deviation.
i.Average = [(a+b)/2] = [(12+15)/2] = 13.5
ii.Deviation = [Average - smallest(a, b)] =
[12.5 - smallest(l3,12)] = [13.5 - 12] = 1.5
3)Product = (l3x14) - (lx2) = 182 - 2 =180

Example 5: 25^2= 625

1) To find the square of 25, first find the square of 5 which is 25 and put 2 in the tens place and 5 inthe ones place of the answer respectively.

2) To find the number in the hundreds place, multiply 2 by its immediate next number, 3, which is equal to (2x3) = 6

3) Answer 25^2= 625

IV. VEDIC MATHEMATICS

Vedic mathematics - a gift given to this world by the ancient sages of India. A system which is far simpler and more enjoyable than modern mathematics. The simplicity of Vedic Mathematics means that calculations can be carried out mentally though the methods can also be written down. There are many advantages in using a flexible, mental system. Pupils can invent their own methods, they are not limited to one method. This leads to more creative, interested and intelligent pupils. Vedic Mathematics refers to the technique of Calculations based on a set of 16 Sutras, or aphorisms, as algorithms and their upa-sutras or corollaries derived from these Sutras. Any mathematical problems (algebra, arithmetic, geometry or trigonometry) can be solved mentally with these sutras. Vedic Mathematics is more coherent than modern mathematics.

Vedic Mathematics offers a fresh and highly efficient approach to mathematics covering a wide range - starts with elementary multiplication and concludes with a relatively advanced topic, the solution of non-linear partial differential equations. But the Vedic scheme is not simply a collection of rapid methods; it is a system, a unified approach. Vedic Mathematics extensively exploits the properties of numbers in every practical application.

Vedic mathematics is part of four Vedas (books of wisdom). It is part of Sthapatya- Veda (book on civil engineering and architecture), which is an upa-veda (supplement) of Atharva Veda. It covers explanation of several modern mathematical terms including arithmetic, geometry (plane, co-ordinate), trigonometry, quadratic equations, factorization and even calculus.

His Holiness Jagadguru Shankaracharya Bharati Krishna Teerthaji Maharaja (1884-1960) comprised all this work together and gave its mathematical explanation while discussing it for various applications. Swamiji constructed 16 sutras (formulae) and 16 Upa sutras (sub formulae) after extensive research in Atharva Veda. Obviously these formulae are not to be found in present text of Atharva Veda because these formulae were constructed by Swamiji himself. Vedic mathematics is not only a mathematical wonder but also it is logical. That's why Vedic Mathematics has such a degree of eminence which cannot be disapproved. Due these phenomenal characteristic, Vedic Mathematics has already crossed the boundaries of India and has become a leading topic of research abroad. Vedic Mathematics deals with several basic as well as complex mathematical operations. Especially, methods of basic arithmetic are extremely simple and powerful [4, 9].

The word Vedic is derived from the word "veda" which means the store-house of all knowledge. Vedic mathematics is mainly based on 16 Sutras (or aphorisms) dealing with various branches of mathematics like arithmetic, algebra, geometry etc.

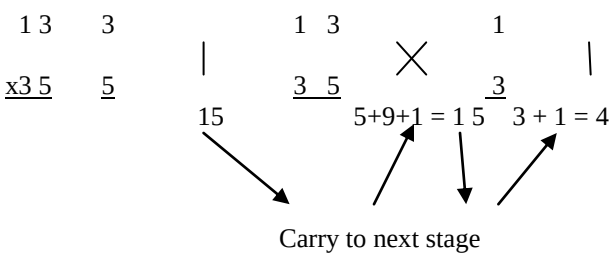
Vedic Urdhva Tiryabhyam Multiplier

The multiplier is based on an algorithm Urdhva Tiryakbhyam (Vertical & Crosswise) of ancient Indian Vedic Mathematics. Urdhva Tiryakbhyam Sutra is a general multiplication formula applicable to all cases of multiplication. It literally means "Vertically and crosswise". It is based on a novel concept through which the generation of all partial products can be done with the concurrent addition of these partial products. The parallelism in generation of partial products and their summation is obtained using Urdhva Triyakbhyam explained in next chapter. The algorithm can be generalized for n x n bit number.

Since the partial products and their sums are calculated in parallel, the multiplier is independent of the clock frequency of the processor. Thus the multiplier will require the same amount of time to calculate the product and hence is independent of the clock frequency. The net advantage is that it reduces the need of microprocessors to operate at increasingly high clock frequencies. While a higher clock frequency generally results in increased processing power, its disadvantage is that it also increases power dissipation which results in higher device operating temperatures.

By adopting the Vedic multiplier, microprocessors designers can easily circumvent these problems to avoid catastrophic device failures. The processing power of multiplier can easily be increased by increasing the input and output data bus widths since it has a quite a regular structure. Due to its regular structure, it can be easily layout in a silicon chip. The Multiplier has the advantage that as the number of bits increases, gate delay and area increases very slowly as compared to other multipliers. Therefore it is time, space and power efficient. It is demonstrated that this architecture is quite efficient in terms of silicon area/speed [10, 4].

Multiplication of two digit decimal numbers an example- 13 x 35 = 455



Answer = 13x35 = 455

The above discussions can now be extended to multiplication of binary number system with the preliminary knowledge that the multiplication of two bits $\mathbf{a_0}$ and $\mathbf{b_0}$ is just an AND operation and can be implemented using simple AND gate. To illustrate this multiplication scheme in binary number system, consider the multiplication of two binary numbers $\mathbf{a_3a_2a_1a_0}$ and $\mathbf{b_3b_2b_1b_0}$. As the result of this multiplication would be more than 4 bits, the product is expressed as $\mathbf{r_7r_6r_5r_4r_3r_2r_1r_0}$. Least significant bit r_0 is obtained by multiplying the least significant bits of the multiplicand and the multiplier as shown in the Fig.2. The digits on both sides of the line are multiplied and added with the carry from the previous step. This generates one of the bits of the result (r_n) and a carry (C_n). This carry is added in the next step and thus the process goes on. If more than one line are there in one step, all the results are added to the previous carry. In each step, least significant bit acts as the result bit and the other entire bits act as carry. For example, if in some intermediate step, we get **110**, then **0** will act as result bit and **11** as the carry (referred to as C_n in this text). It should be clearly noted that C_n may be a multi-bit number.

Thus the following expressions (1) to (7) are derived:

$r_0 = a_0\, b_0$ …(1)
$c_1\, r_1 = a_1\, b_0 + a_0\, b_1$ …(2)
$c_2\, r_2 = c_1 + a_2\, b_0 + a_1\, b_1 + a_0\, b_2$ …(3)
$c_3\, r_3 = c_2 + a_3\, b_0 + a_2\, b_1 + a_1\, b_2 + a_0\, b_3$ …(4)
$c_4\, r_4 = c_3 + a_3\, b_1 + a_2\, b_2 + a_1\, b_3$ …(5)
$c_5\, r_5 = c_4 + a_3\, b_2 + a_2\, b_3$ …(6)
$c_6\, r_6 = c_5 + a_3\, b_3$ …(7)

Here $c_6\mathbf{r_6r_5r_4r_3r_2r_1r_0}$ is the final product. Partial products are calculated in parallel and hence the delay involved is just the time it takes for the signal to propagate through the gates.

The main advantage of the Vedic Multiplication algorithm (Urdhva Tiryakbhyam Sutra) stems from the fact that it can be easily implemented in FPGA due to its simplicity and regularity [3]. The digital hardware realization of a 4-bit multiplier using this Sutra is shown in next chapter. This hardware design is very similar to that of the array multiplier where an array of adders is required to arrive at the final product. Here in Urdhva, all the partial products are calculated in parallel and the delay associated is mainly the time taken by the carry to propagate through the adders.

V. IMPLEMENTATION OF VEDIC URDHVA TIRYAKBHYAM MULTILPIERS

A. 2x2 Bit Vedic Urdhva Tiryakbham Multiplier

Consider 2 Bit number 'a1a0' and 'b1 b0' to be calculated. Using Urdhva sutra, a line diagram may be drawn as:

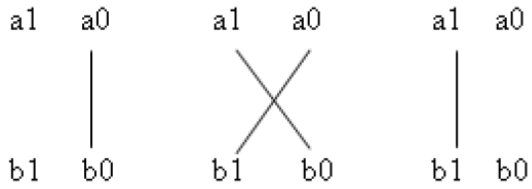


Fig 4. Line Diagram for 2x2 Bit binary multiplication usin Urdhva Tiryakbhyam Sutra.

The 2X2 Vedic multiplier module is implemented using four input AND gates & two half-adders which is displayed in its block diagram in Fig. 5.

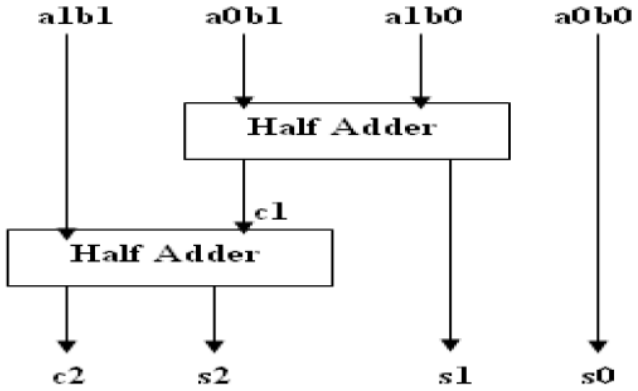


Fig 5. 2x2 Vedic Urdhva Tiryakbhyam multiplier.

B. 4x4 Bit Vedic Urdhva Tiryakbham Multiplier

The 4x4 bit Vedic multiplier module is implemented using four 2x2 bit Vedic multiplier modules as discussed in Fig. 5. Let's analyze 4x4 multiplications, say A= A3 A2 A1 A0 and B= B3 B2 B1 B0. The output line for the multiplication result is S7S6S5S4S3S2S1S0 .Let's divide A and B into two parts, say A3 A2 & A1 A0 for A and B3 B2 & B1B0 for B. Using the fundamental of Vedic multiplication, taking two bit at a time and using 2 bit multiplier block, we can have the following structure for multiplication as shown in Fig. 6.

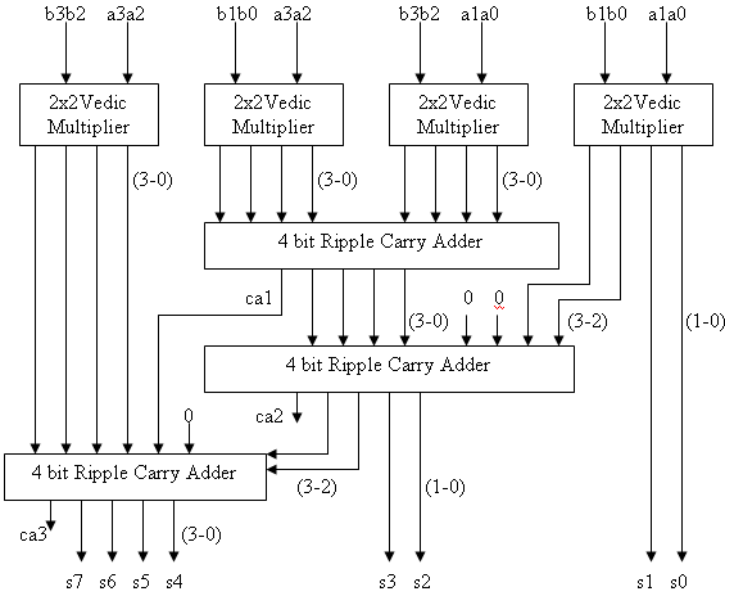


Fig 8. Hardware implementation of 4x4 Bit Vedic Multiplier

Also from the above explained method of multiplication using Urdhva Tiryakbhyam Multiplier for 4x4 Bit multiplication can also be implemented using expressions (1) to (7) as:

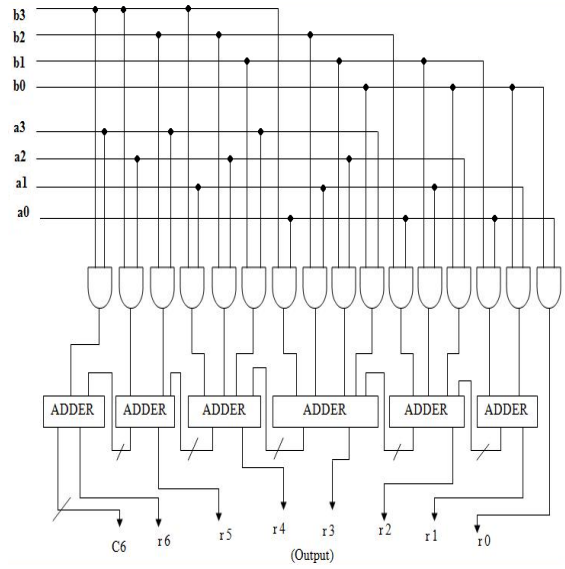


Fig 7. Hardware implementation of 4x4 Bit Vedic Urdhva Tiryakbhyam Multiplier

C. 8x8 Bit Vedic Urdhva Tiryakbhyam Multiplier

The 8x8 bit Vedic multiplier module as shown in the block diagram in Fig. 8. It can be easily implemented by using four 4x4 bit Vedic multiplier modules as discussed in the previous section. Let's analyze 8x8 multiplications, say A= A7 A6 A5 A4 A3 A2 A1 A0 and B= B7 B6 B5B4 B3 B2 B1B0. The output line for the multiplication result will be of 16 bits as P = S15 S14 S13 S12 S11 S10 S9 S8 S7 S6S5S4 S3 S2 S1 S0. In this figure the 8 bit multiplicand A can be decomposed into pair of 4 bits AH-AL. Similarly multiplicand B can be decomposed into BH-BL. The 16 bit product can be written as:

P=AxB= (AH-AL)x(BH-BL)
=AHxBH+AHxBL+ALxBH+ALxBL

Using the fundamental of Vedic multiplication, taking four bits at a time and using 4 bit multiplier block as discussed we can perform the multiplication. The outputs of 4X4 bit multipliers are added accordingly to obtain the final product. Thus, in the final stage two adders are also required. Here four 4x4 Bit Vedic Multiplier and two carry save adder is used to implement the 8x8 Vedic Multiplier.

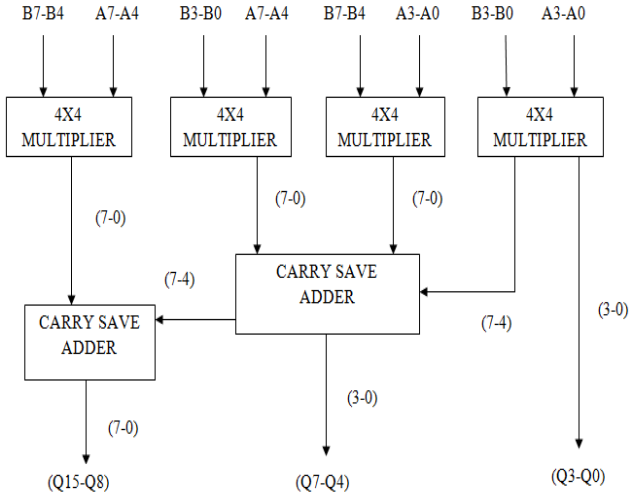


Fig 9. Implementation of 8x8 Vedic Urdhva Tiryabhyam Multiplier.

VI. SIMULATIONS AND RESULTS

Different multipliers and proposed architecture process and the developed architecture for the required functionality were discussed in the previous chapters. Now this chapter deals with the simulation and synthesis results of the proposed architecture process. Here **ModelSimXEIII6.4b** tool is used in order to simulate the design and checks the functionality of the design. Vedic multiplier is designed in **Verilog HDL** (Hardware Description Language). Logic synthesis and simulation was done using EDA (Electronic Design Automation) tool in **XilinxISE12.1i .**

A. Simulation Result of Array Multiplier

Simulation is tested for 8x8 bit Array multiplier for input as the multiplier 'a'="00110010" (decimal number system '50') and multiplicand 'b'="00010100" (decimal number system '20') and we get 16-bit output= "0000001111101000" (decimal number system 1000).

The screenshot of result is shown in fig. 9.

B. Simulation Result of KCM

Simulation is tested for 8x8 bit KCM for input as the multiplier ‘a’=“00001010” (decimal number system ‘10’) and multiplicand ‘b’=“00001001” (decimal number system ‘9’) and we get 16-bit output= “0000000001011010” (decimal number system 90).

The screenshot of result is shown in fig. 10.

C. Simulation Result of Vedic Urdhva Tiryakbhyam Multiplier

Simulation is tested for 8x8 bit bit Vedic Urdhva Tiryakbhyam multiplier input as the multiplier ‘a’=“00001100” (decimal number system ‘12’) and multiplicand ‘b’=“00000100” (decimal number system ‘4’) and we get 16-bit output= “0000000000110000” (decimal number system 48).

The screenshot of result is shown in fig. 11.

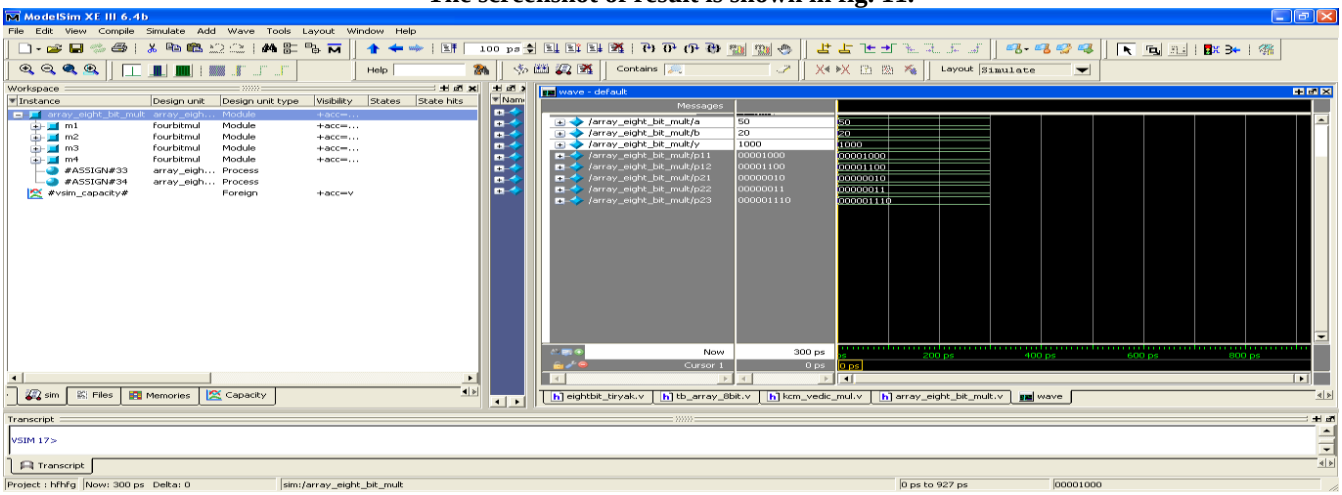


Fig 10. Simulation result of Array Multiplier

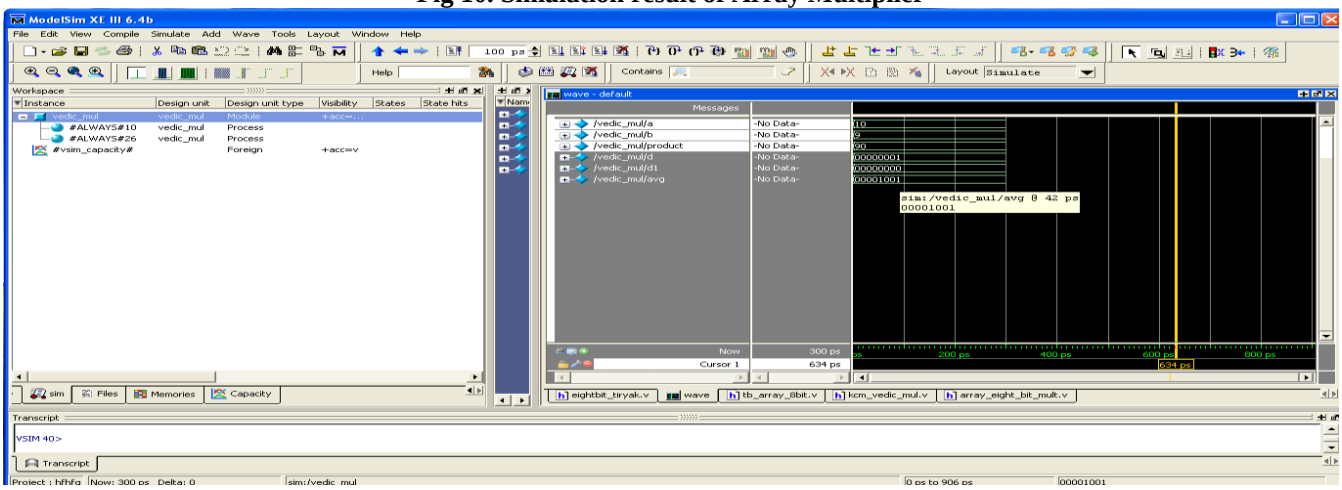


Fig 10. Simulation result of KCM

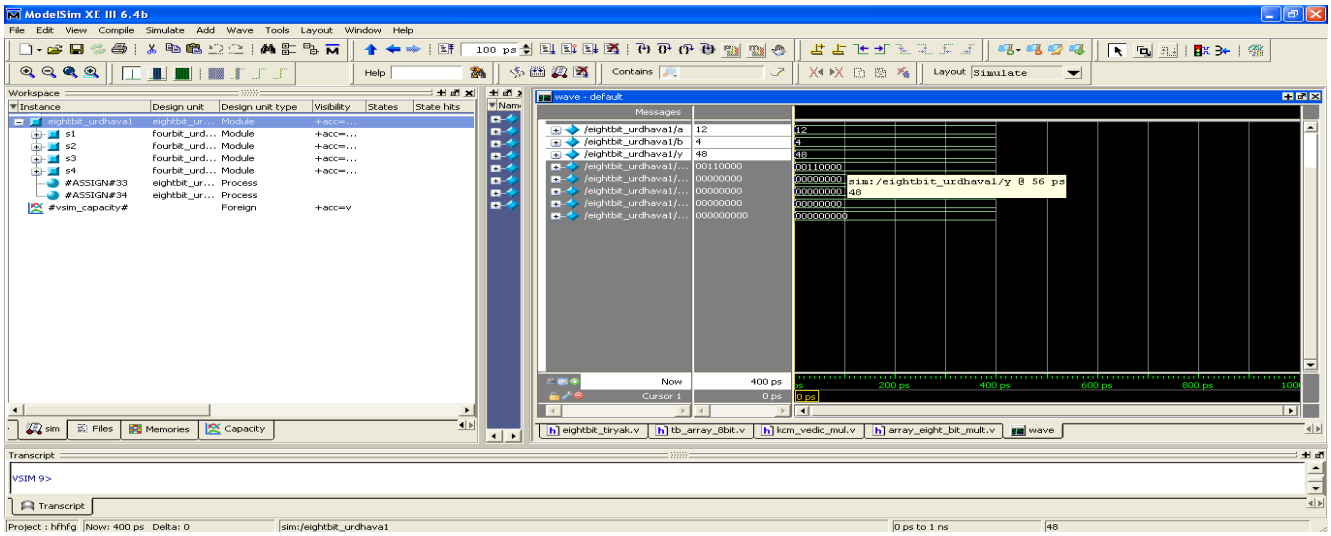


Fig 10. Simulation result of Vedic Urdhva Tiryakbhyam Multiplier

VII. DISCUSSION AND COMPARISON

All the three multipliers are synthesized in EDA (Electronic Design Automation) tool in XilinxISE12.1i software.

Two parameters LUTs and Path Delay are taken into considerations for the comparison of different multipliers.

Table 2. Comparison of Multipliers

XilinxISE12.1i software	Array Multiplier	KCM	Vedic Urdhva Tiryakbhyam Multiplier
No. of LUTs used	146	79	136
Path delay (In Nanoseconds)	18.792	22.864	17.995

Table 2 shows that Urdhva Tiryakbhyam Multiplier based on Vedic Mathematics uses only 136 LUTs which is very less as comparison to array Multiplier.

KCM uses only 79 LUTs but it uses ROM of 8KB space for an 8x8 Multiplier which is not desirable at all!

Table 2 shows that Urdhva Tiryakbhyam Multiplier takes **17.995** nanoseconds only which is the fastest of all other multipliers.

VIII. CONCLUSION

The computational path delay for proposed 8x8 bit Vedic Urdhava Tiryakbhyam multiplier is found to be **17.995ns** as shown in Table 2 which is the least time delay of all the multipliers**.** Hence our motivation to reduce delay is finely fulfilled. Therefore, we observed that the Vedic Urdhava multiplier is much more efficient than Array and Constant Coefficient Multiplier (KCM) in terms of execution time (speed). Effective memory implementation and deployment of memory compression algorithms can yield even better results.

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PID Controller Tuning in Reverse Osmosis System based on Particle Swarm Optimization

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Abstract- This paper describes PID Controller tuning based on Particle Swarm Optimization in the Reverse Osmosis application. Particle Swarm Optimization is powerful method for tuning PID controller comparison to other conventional optimization techniques. It has some advance features such as easy implementation, stable characteristics; self-tuning, flexible design In this paper a model has presented that focus on the PH and Conductivity control in the Reverse Osmosis (RO). PSO algorithm is presented to tune the parameters of PID controller used in the RO Model. Computer Simulation in terms of a virtual process is designed to check the algorithm and compare the results with other optimization techniques.

Index Terms — Particle Swarm Optimization (PSO), Reverse osmosis (RO), PID Tuning, Membrane

I. INTRODUCTION

The availability of fresh water is becoming an increasingly important issue in many areas of the world. Desalination of sea water is the only solution to provide fresh water for drinking and industrial purpose [1]. Today when there is intensive demand of fresh water at a low cost and high quality, modeling, simulation and control of large scale desalinations plants have become increasingly evident. When there is high demand of fresh water due to increasing world population and social changes, desalination of seawater and brackish water gives the required demand.

During last four decades researchers have proposed many "model based" control strategies[2]-[4]. In general, these design approaches involve many phases such as modeling, analysis, simulation, implementation and verification. Many of these conventional and model based methods have found their way into practice and involve satisfactory results to the spectrum of complex systems under various uncertainties.

Reverse osmosis is a membrane based filtration process in which high pressure is applied on the feed side that gives the pure solvent after passing through semipermeable membrane while retaining the solute on another side. More eventually, the high pressure use in this process must be high enough to overcome normal osmotic pressure of the solution then solvent will pass from high solute concentration to low solute concentration through semipermeable membrane. The portion of water that passes through the semi-permeable membrane is pure solvent called as permeate. The remaining waste water discharged by the waste pipeline attached before the membrane side.

The membrane used in the reverse osmosis process has made up of cellulose acetate.

The membrane assembly must have high rejection, permeability to water, resistant to oxidizing agents and Chemically, physically, and thermally stable in saline water againtst high pressure. RO membranes are made in a variety of configurations, with the most common configurations are tabular, spiral-wound and a hollow-fiber.[13]

This membrane is facing the problem of forming concentration polarization layer near the membrane and scaling formation due high value pH of the raw water used at the feed side. Due to this the membrane life is reduced and we need to replace the membrane.

The problem of membrane damage can be solved with the adjustment of the pH value at the feed side and the conductivity value that is use to control impurities.

In this paper a model has been presented that resolve this problem by adjusting the values of PID Controller. The tuning of PID controller is done with the particle swarm Optimization algorithm. Particle swarm optimization has received the great attention in optimal control problems and giving a global optimizes solution of the problem.

II. REVERSE OSMOSIS PLANT MODEL

The general Block diagram of the R O system is shown in the Fig.1 A reverse osmosis system consists of four major components as shown follow -

1) Pre-treatment
2) High Pressure Pump
3) Membrane assembly Post Treatment

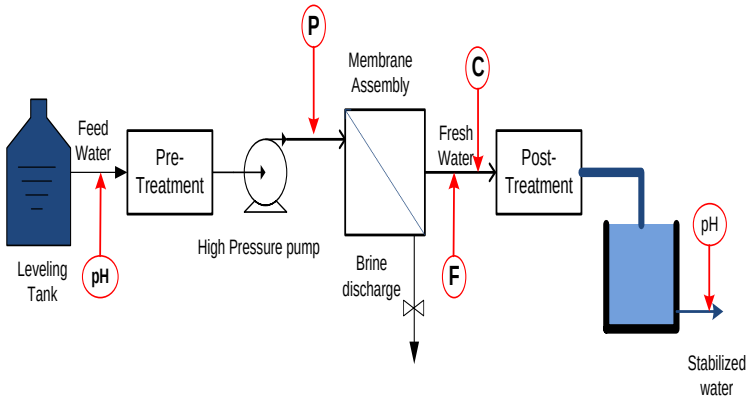


Figure 1: Reverse Osmosis system

III. MODELING OF REVERSE OSMOSIS SYSTEM

The model equations used in the RO system is taken from Doha Reverse Osmosis Plant (DROP) as a reference [5]. The transfer function used in this process can be represented as Equations:

$$\begin{pmatrix} F \\ C \end{pmatrix} = \begin{pmatrix} G_{11} & G_{12} \\ G_{12} & G_{22} \end{pmatrix} \begin{pmatrix} P \\ pH \end{pmatrix} \quad (1)$$

where

$$G_{11} = \frac{F}{P} = \frac{0.002(0.056s+1)}{(0.003s^2+0.1s+1)} \quad (2)$$

$$G_{12} = \frac{F}{pH} = 0 \quad (3)$$

$$G_{21} = \frac{C}{P} = \frac{-0.51(0.36s+1)}{(0.213s^2+0.7s+1)} \quad (4)$$

$$G_{22} = \frac{C}{pH} = \frac{-57(0.32s+1)}{(0.6s^2+1.8s+1)} \quad (5)$$

TABLE I: Ranges for Linear Approximation

Variable	**Linear Range**
Flux, gpm(m^3/s)	0.85-1.25 (0.2-0.3)
Pressure , Kpa (psig)	800-1000 (5500-7000)
Conductivity (µs/cm)	400-500
pH	6-7

A. Modal design of Membrane

The model design for the RO membrane as follow

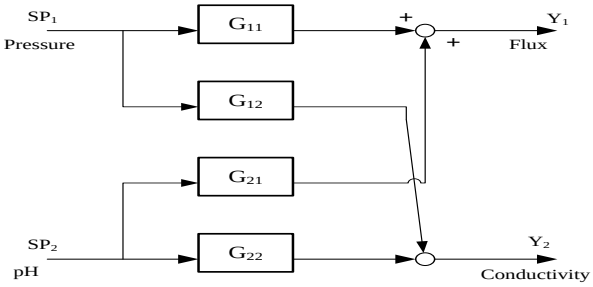
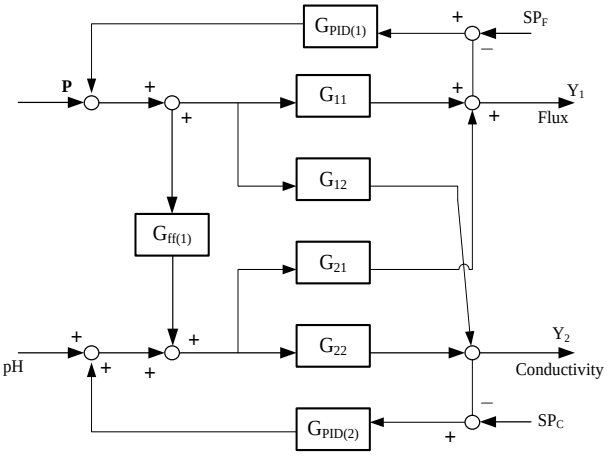


Figure 2: Model design of the RO Membrane

The RO membrane degradation mainly effect with the pH and conductivity of the water. A change in pressure causes a negative effect on conductivity but changing pH has no effect on the flux but there is negative effect on conductivity. If there is high pH of water, it will result in loss of efficiency and scaling formation on the membrane. Another factor is dissolved solids in the feed water which causes membrane damage. For this the conductivity parameter for the measurement of the amount of solids dissolved in the water. In this paper these two parameters i.e. Flux and conductivity are discussed. The manipulated variable is Pressure and pH.

B. Designing of the control system

As in the reverse osmosis system plant, one manipulated input variable effect more than one control output. As in the present study DROP system is taken which is a MIMO system. The transfer functions for the MIMO system should be open loop stable. One way of solving this problem is known as decoupling.[6]. In the decoupled system manipulated inputs affect only one process output. This approach is shown in fig.



. Figure 3: Total decoupled system structure

The total structure for the RO system is stable because each subsystem of the block is open loop stable because each have negative real pole. Fig.3. represent the feed forward compensator is added in the system to make it decoupled [7],[8]. The Transfer function is finally represented in the following manner.

$$G_{ff(1)} = -\frac{G_{21}}{G_{22}} \quad (6)$$

$$G_{ff(2)} = -\frac{G_{12}}{G_{11}} = 0 \quad (7)$$

Controllers are now properly tuned even if one control loop is open.

IV. PARTICLE OPTIMIZATION ALGORITHM

Particle swarm optimization first introduced by Kennedy and Eberhart in 1995[1]. It is the most advanced optimization technique using today. PSO is found best in solving many linear, nonlinear problems and given the best optimize global solution of the problem [9]. It is the method which optimizes a problem by iteratively trying to improve a candidate best solution to respect to given measure of quality. It is basically work with simple mathematical formulae which trying to get best possible value by updating the particle's velocity and position in the search-space. The search method is similar to the bird flocking and fish schooling. Each particle updates its position according to its local best known position and best known position in the search space. Particle then move through some fitness function defined for the problem and find its fittest value within the group.

PSO has many similarities with the conventional optimization algorithms such as Genetic Algorithms as both are based on population-search methods. But recently PSO proven itself more computationally efficient solutions than the Genetic i.e. use less numbers of function. More ever PSO does not use the gradient of the problem being optimized. It means it does not require that the optimization problem be differentiable as in conventional methods. Instead of using manipulation of individual particles like in other evolutionary optimizing techniques, in PSO files particles dynamically adjusted according to its own flying conditions and experience in search space.

Let f: $R^n \rightarrow R$ be the fitness function which must be minimized.

The goal is to find the solution of the function defined above **a** for which $f(\mathbf{a}) \leq f(\mathbf{b})$ for all **b** in the search space, which means that **a** is the global minimum. Maximization of the same problem can be achieved by taking function h= *-f*.

The basic algorithm is then, for example the j^{th} particle represented as $x_j = (x_{j1}, x_{j2}, x_{j3}, x_{j4} \ldots\ldots x_{jn})$ in the g dimensional space. Then initialize the particle's position with a uniformly distributed random vector with lower and upper boundaries in the search space. Initialize the particle's best known position to its initial position $p_j = x_j$. Then if $(f(p_j) \leq f(x_j))$ found then update the swarm's best known position : $g \leftarrow p_j$

Each particle keep track of its coordinate in the problem space, and find the best known position updated so far. This value is called as the pbest which it passed. The best previous value of the j^{th} particle is saved and can be represented as $pbest_j = (pbest_{j1}, pbest_{j2}\ pbest_{j3} \ldots\ldots\ pbest_{jg})$. Now comparing the fitness of each particle with fitness of the global optimal position called as gbest is passed in the population as the current current global optimal position gbest. Velocity of the j^{th} particle change is represented by $v_j = (v_{j1}, v_{j2}, v_{j3}\ v_{jg})$. Until a termination criterion is found i.e. after a number of iteration when a adequate fitness is reached, we keep on repeating the procedure by updating position and velocity with following formulas [12]:

$$v_{jg}^{(t+1)} = w.v_{jg}^{(t)} + c_1 * rand() * (pbest_{jg} - x_{jg}^{(t)}) + c_2 * rand() * (gbest_g - x_{jg}^{(t)}) \quad (8)$$

$$x_{jg}^{(t+1)} = x_{jg}^{(t)} + v_{jg}^{(t+1)} \quad (9)$$

j =1,2…….n

g=1,2……..m

Where

n= number of particle in group;

m= number of members in a particle;

t=pointer of iterations (generations);

$v_{jg}^{(t+1)}$ =velocity of particle j at iteration t, $Vg^{min} \leq v_{jg}^{(t)} \leq Vg^{max}$

w= inertia weight factor;

c_1 , c_2 = acceleration constants

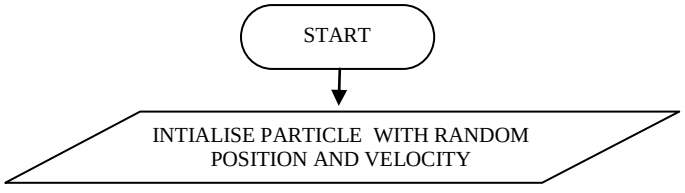
rand(),Rand () = random variable

$x_{jg}^{(t)}$ = current position of particle j at iteration t;

$pbest_j$ = p best of particle j

gbest = g best of group upto k iterations

The flowchart of the scheme is as shown in fig.4.



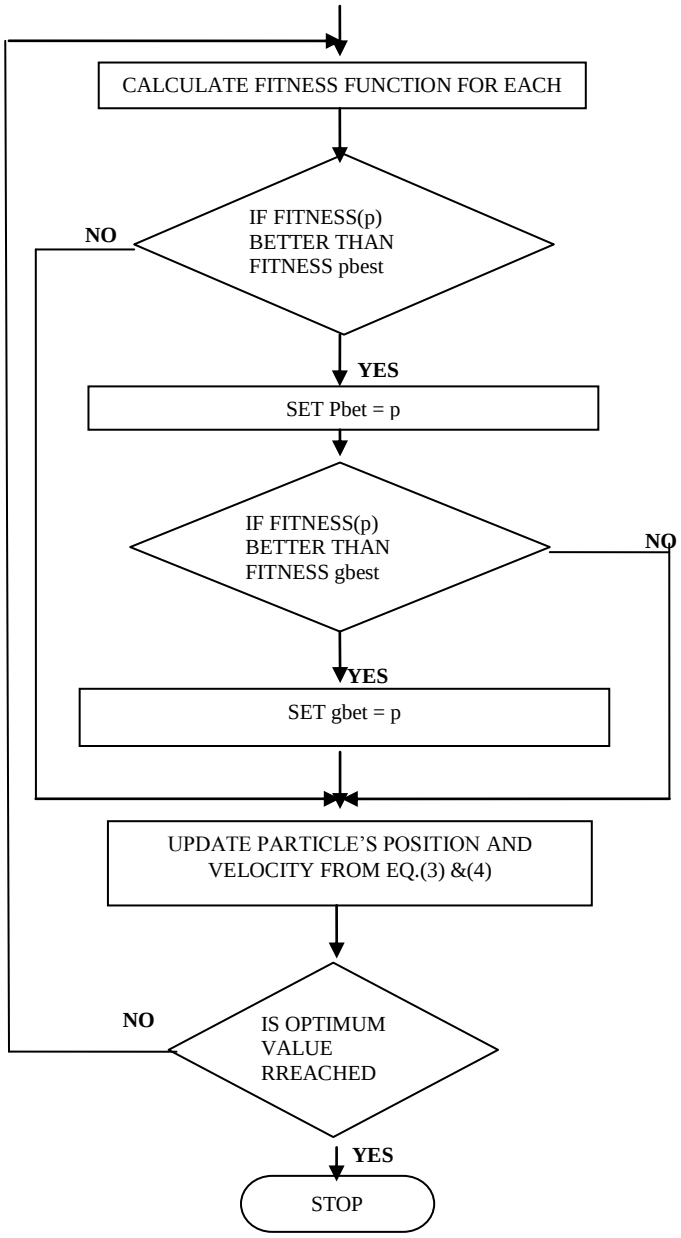


Figure 4: Flow chart of particle swarm optimization

A scheme of controller tuning was proposed by Shi and Eberhart in which inertia term is weighted by a weighting factor which is given by following equation [10], [11].

$$w = w_{\max} = \left(\frac{w_{\max} - w_{\min}}{itr_{\max}} \right) * itr \qquad (10)$$

Where $w_{\max}$ =0.9 and $w_{\min}$ =0.4

The value of "inertia weight" is large at beginning but gradually it becomes smaller as the number of iterations increases. The velocity and the position update according to equation (8) and (9) respectively

V. PROPOSED SCHEME OF PID TUNING

As mentioned previously Particle swarm optimization is a powerful technique for solving optimization problems. In this paper PSO algorithm is applied for the optimal control performance of the PID controller. PSO is used to tune the PID parameters (K_p, Ki, Kd) in offline using the model in as presented in Fig.(3). Initially PSO produces swarm of the particles in the space matrix and for each

particle it selects the PID parameters. The controller parameters adjusted to minimize the objective function to obtain a good system response and result in minimization of performance index taken.

Selection of parameters for PSO:

To start with the PSO certain parameters are to be selected for the optimum results. Initially the values of the population size and iteration are taken as 100. And velocity constant c1 and c2 are taken as 2. Fitness function for PSO is performance criteria which is Integral of Time multiplied by absolute Error (ITAE) is taken. The error criterion is given by the equation;

$$J_{ITAE} = \int_0^T t\,|e(t)|\,dt \qquad (11)$$

VI. SIMULATION RESULTS AND COMPARISON

In the conventional Ziegler-Nichols tuned PID controller, the RO plant system response for Flux and conductivity produces high overshoot, rising time and settling time. But using PSO based PID controller tuning gives the better response for the system.

In the present study a comparison is made with result of Ziegler-Nichols PID tuning and PSO based tuning as shown in table I. A comparison of time domain performance specifications peak overshoot, rise time and settling time is tabulated in table II.

TABLE II: PID gains comparison

System	**Ziegler-Nichols**			**PSO**		
	P	**I**	**D**	**P**	**I**	**D**
G_{11}	535.71	0.1048	0.022	5.9619	42.28	58.22
G_{22}	-0.059	-1.801	0.047	-0.0259	-0.02	-0.005

TABLE III: Comparison of performance for flux

PSO scheme	**Z-N**	**PSO**
Performance Index (ITAE)	0.02884	0.03037
Rise time (sec)	15500	27.3
Settling time (sec)	31400	46.3
Peak Overshoot (%)	Nun	Nun
Final value	1.25	1.25

TABLE IV: Comparison of performance for conductivity

PSO scheme	**Z-N**	**PSO**
Performance Index (ITAE)	0.9378	0.2430
Rise time (sec)	0.106	0.968
Settling time (sec)	3.93	3.61
Peak Overshoot (%)	79.5	6.69
Final value	430	430

The step response of G_{11} and G_{22} Ziegler –Nichols method and proposed method PSO are plotted in Fig.5-6 respectively. As seen from the response the present technique gives the better response in terms of overshoot, rising time and settling time.

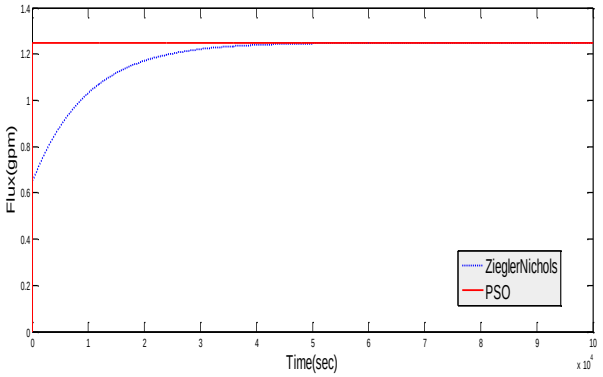


Figure 5: Flux Output Response Comparison

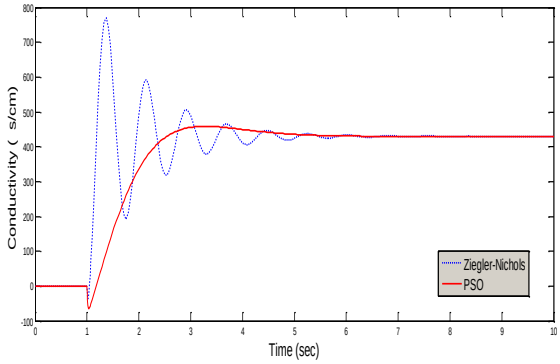


Figure 6: Conductivity Output Response Comparison

VII. CONCLUSION

In this paper analyses has been done with the Reverse Osmosis system, and the MATLAB-SIMULINK software tool is used for finding the behavior flux and conductivity for reverse osmosis membrane. It is easy to observe from response that as the conductivity is affected with change of pH, however flux is not affected for the pH, such that the conductivity is controlled with the pH and flux is control with the pressure. A computer is done to see the results for the flux and conductivity using Ziegler-Nichols based and PSO based PID tuning, Comparing the system response using proposed technique are far better improved. Since lots of non-linearity's and uncertainties in the real plant has not taken in this study, implementation of PSO to real plant is being scheduled.

ACKNOWLEDGMENT

The authors would like to gratefully acknowledge Central Electronics Engineering Research Institute Pilani(CSIR) for their valuable support and guidance to conduct this research. The authors are also thankful to Head and group members AEG, CEERI for their help and support for the work. The present work is a part of project GAP 3118 at CEERI Pilani.

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A Counter Based Approach for Mitigation of Grayhole Attack in VANETs: Comparison and Analysis

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Abstract- Vehicular Ad-hoc Networks (VANETs) are highly dynamic network and prone to many kinds of attacks. One class of attacks known as routing misbehavior targets the routing process of the networks. Grayhole attack is a malicious change in the routing process of effected nodes. Such node takes part in routing process but drops the packet when it is required to forward the packet to other nodes. This attack changes the performance of the network. Ad-hoc On-Demand Distance Vector (AODV) is prone to grayhole attack due to lack of central control and security. In this paper, we have proposed a counter based approach for mitigation of grayhole attack using freeway mobility model for highway scenario which is most suited for VANETs. Simulation results and analysis of proposed work has been carried out using NS-2. Further, the performance of the proposed work has been compared in terms of packet delivery ratio, normalized routing load, end to end delay and average throughput with grayhole attack in AODV and normal AODV protocol.

Index Terms- MANET, VANET, Freeway Mobility Model, AODV, Routing Misbehavior, Grayhole Attack.

I. INTRODUCTION

A VANET is a special type of Mobile Ad hoc Network (MANET). It is a self configuring network of mobile routers connected by wireless links which use vehicles as mobile nodes. VANETs enable the exchange of information between vehicles without any fixed infrastructure. It can be classified according to the type of infrastructure that is being used for communication. A Vehicle-2-Vehicle (V2V) communication is a pure ad-hoc communication in VANET consisted of vehicles mounted with communication devices. A Vehicle-2-Infrastructure (V2I) communication is infrastructure based communication in VANET which consists of vehicular nodes as well as fixed infrastructure along the road to deal with connectivity issues in VANET. The communication is carried using electromagnetic waves e.g. infrared, microwaves, VHF radio waves and short range radio waves. Mostly the VANET system is implemented using the IEEE 802.11 standard which is a class of standards for wireless communication. Some experiments also show that Universal Mobile Telecommunications System *(*UMTS*)* can also be used for communication in VANETs. IEEE P1609.1 is the standard for Wireless Access in Vehicular Environment (WAVE) based on DSRC. WAVE uses a modified version of IEEE 802.11a for MAC known as IEEE 802.11p. The IEEE 802.11p MAC/PHY layer standard is specially meant for VANETs which operate in wireless access for vehicular environment and uses a frequency band of 5.9 GHz and supports high mobility up to 150 kmph [8]. Routing is the integral part of ad-hoc networks. A routing protocol governs the way that two communication entities exchange information. It includes the procedure in establishing a route, decision in forwarding, and action in maintaining the route or recovering from routing failure. The two routing approaches that are being used for ad-hoc networks are reactive and proactive routing. In addition to both these approaches VANETs require some geographical information for efficient routing. This leads us to use location based routing in VANETs. Many researchers have proposed and simulated various routing protocols for VANET. Routing protocol must be designed carefully to serve the data dissemination issues such as reliability, minimum delay, efficiency and so on. The routing protocols may be classified as unicast and multicast routing. Some examples of unicast geographic routing protocols are Location Aided Routing (LAR), Most Forward progress within Radius (MFR), Border- node based MFR (B-MFR), Greedy Perimeter Stateless Routing (GPSR) etc. [9].

Routing misbehavior is the category of attacks in which the malicious node intentionally or unintentionally hinders the routing of data or control packets which may lead to collapse in a part or total network. One more important aspect in analyzing the VANETs is the mobility scenario. It determines the pattern of mobile node movement in the environment. A mobility model is representation of the mobility scenario in logical terms. As vehicles are generally used on roads, we will assume the scenario to be similar to the Yamuna Expressway in India. Traffic scenario determines the type of communication that is ongoing between the vehicular nodes in VANETs. Generally, traffic includes the type of data, protocols for transmitting packets, bit rates, and MAC characteristics of the communication. A traffic model represents traffic scenario in logical terms.

In this paper, we have proposed a counter based approach for mitigation of grayhole attack using freeway mobility model for highway scenario which is most suited for VANETs. This proposed algorithm overcomes the incapability of AODV to identify, block and mitigate grayhole attack in AODV. The rest of the paper is organized as following: section 2 introduces the related work. In section 3, the working of AODV and freeway mobility model is presented. Section 4 introduces the grayhole attack in AODV. In section 5, we have introduces the proposed work and its algorithms in brief. Section 6 shows the simulation and result analysis of the proposed work. Finally, we conclude the paper in section 7.

II. Related work

Piyush et.al [10] proposed a solution where source and destination nodes carry out end-to-end checking to determine whether the data packets have reached the destination or not. If the checking fails then the backbone network initiates a protocol for detecting malicious nodes. But, it works on assumption that any node in the network has more trusted nodes than malicious nodes which may not be likely in many scenarios. If malicious nodes are more in numbers, this solution becomes vulnerable.

A mechanism is proposed by Sukla et. al [11] in which before sending any block, source sends a prelude message to destination to make it aware about communication where neighbors monitor flow of traffic. After end of transmission, destination sends postlude message containing the number of packets received. If the data loss is out of acceptable range, the process of detecting and removing all malicious nodes is initiated by collecting response from monitoring nodes and the network. The mechanism has routing overhead increased due to additional routing packets.

For detecting packet forwarding misbehavior, Oscar et. al [4] proposed an algorithm that use the principle of flow conservation and accusation of nodes that are constantly misbehaving. Selecting correct threshold of misbehavior allows distinguishing well-behaved and misbehaved nodes. However, the average throughput cannot reach that of a network where there is no misbehaving node present because the algorithm requires definite time to gather the required data to identify and to accuse misbehaving nodes. Therefore, misbehaving nodes can drop packets before being accused and isolated from the network during the preliminary phase.

Payal et. al [5] suggested a protocol DPRAODV that finds a threshold value and compares that with difference of sequence number of reply packet and route table entry. If it is higher than the threshold value, the node sending reply is added to a list of blacklisted nodes. Also an ALARM packet containing blacklisted node is sent to its neighbors to inform that reply packets from the malicious node are to be discarded. This protocol has higher routing overhead due to addition of the ALARM packets.

An algorithm is proposed by Deng et. al [6] in which when a source node receives a route reply packet, it cross checks with the previous node on the route to the destination to verify that the node sending reply packet indeed has a route to the destination as well as to the intermediate node. If it does not have, the node that sent the reply packet is judged as malicious node. The mechanism, though, increases end-to-end delay and due to the addition of further request and further reply packets in the algorithm, routing overhead also gets increased.

In [13] Jhaveri et al. proposed a scheme in which an intermediate node detects the malicious node sending false routing information. Routing packets are used not only to pass routing information, but also to pass information about malicious nodes. The proposed scheme not only detects but also removes malicious node by isolating it to make safe and secure communication in the network.

In [14] Bindra et al. proposed a mechanism to detect and remove the blackhole and grayhole attacks. The solution tackles these attacks by maintaining an Extended Data Routing Information (EDRI) table at each node in addition to the routing table of the AODV protocol. This mechanism is capable of detecting a malicious node. It also maintains a history of the node's previous malicious instances to account for the gray behavior.

III. AODV and Freeway mobility model

The framework proposed in this paper makes use of AODV protocol. In AODV the source node and the intermediate nodes store the next hop for each flow for data packet transmission. AODV uses a destination sequence number (DSN) for every route entry to resolve up-to-date and fresh path to destination [9]. During Route Discovery process, DSN is created by the destination. The DSN and the respective route information should be included by the nodes to find out the routes to destination nodes. Routes with the higher DSN are preferred in selecting the route to destination. Figure 1 shows AODV route discovery process. AODV uses Route Request (RREQ), Route Replies (RREP) and Route Error (RERR) in finding the route from source to destination by using UDP (user datagram protocol) packets. In the figure, a source node 'S' aiming to communicate with destination 'I' using the RREQ containing the source address and the broadcast ID address to its neighboring nodes to find the route to the destination. This broadcast ID is incremented by 1 for every new RREQ. When a neighbor notices a destination route it responds with RREP to the source. If the destination route cannot be found then it will re-broadcast the RREQ to its neighboring nodes by incrementing the hop count. In this process a node may receive multiple copies of the broadcast packets in transmissions from all the corresponding nodes. Now the node will check if the broadcast ID is new, if it is therefore, the node will process the request else it will ignore the re-broadcast.

During the Route Maintenance process, when a route breaks in AODV, which is determined by monitoring the periodical signals or by link-level acknowledgements, the end nodes are informed. When a source node notices the route break, it again sets up the route to the destination. If a route break is found at an intermediate node, the node tells the end nodes by sending unsolicited RREP with the loop count set to infinity. The source node re-launches the path finding mechanism with a new broadcast ID and the previous DSN. The nodes react to the any change in network topology and path failures. In case of the path failures the respective nodes are informed with the message, and then the affected nodes will withdraw the routes using the lost path. This makes the operation of AODV "Loop free".

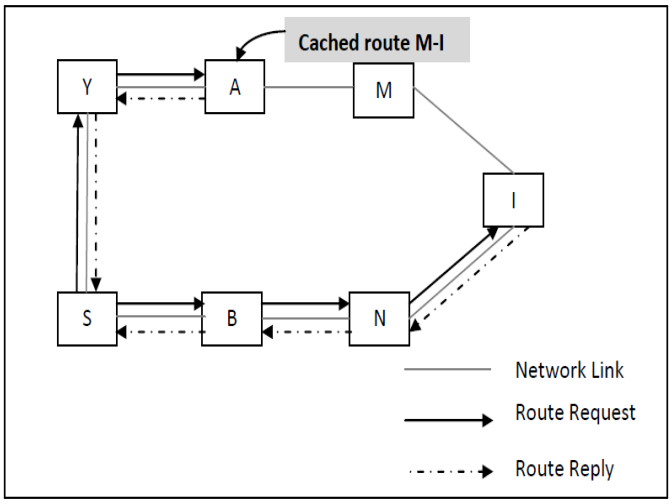

Figure 1 AODV Route Discovery Process

A mobility models in VANETs represent the way in which vehicular nodes might move in a real world traffic environment. A mobility model is designed to represent the movement patterns, their location at a particular instance of time, direction of movement, pause pattern, and speed changes over time of the mobile nodes in a given scenario. The freeway mobility model [6] represents the scenario of a freeway. We consider the freeway to contain 6 lanes; 3 lanes on either direction. Each lane has a defined speed and the defined velocity of that lane. When a vehicle has to change its lane it should either increase or decrease its speed.

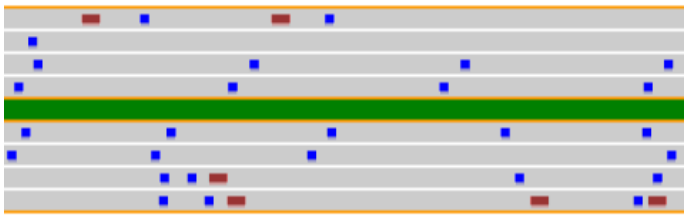

Figure 2. The freeway mobility model

Also it has to look for the space for moving left or right. Fig 2 shows the arrangement of nodes in freeway mobility model.

IV. Grayhole Attack in AODV

Routing misbehavior is the category of attacks in which the malicious node intentionally or unintentionally hinders the routing of data or control packets which may lead to collapse in a part or total network.

There are some shortcomings in AODV that makes it vulnerable to grayhole attack**.** AODV after finding the route to destination rely on the nodes falling in route for forwarding the message. AODV has any mechanism for finding and blocking a malicious node. It has no mechanism to deny a path that contains malicious node.

In AODV, whenever a sender has a path to destination, it starts sending packet to the next hop. Now each node will forward the packet to its next hop pertaining in the path to the destination. The malicious node

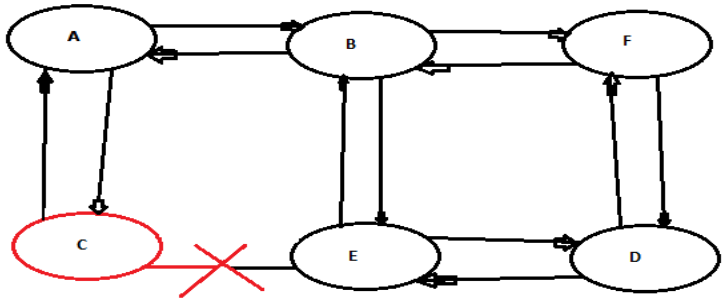

Figure 3 Grayhole attack in AODV

will take part in the routing process but will not forward a packet when required. It will simply drop all packets which come to it as shown in figure 3. Here node A wants to send packets to node D. The route that it has is A-C-E-D. When the packet comes to node C, which is the malicious node, it will start dropping packets and the communication will fail. The next section presents a possible solution to this misbehavior.

V. Mitigation of Grayhole Attack: A Proposed Framework

In this work, we have proposed a framework to mitigate the grayhole attack on AODV. For this purpose we need to redesign the functionality of AODV in such a way that it mitigates the grayhole attack. There are some pre-requisites that must be fulfilled in order to mitigate the effect of the grayhole attack. Every single node in the network must sense its neighboring nodes using HELLO or beacon messages with a fixed time interval T. This is necessary because there must be no ambiguity between link failure and Grayhole attack. Here T has to be defined earlier to the communication process. Apart from this the normal route finding and route maintenance process must carried out as the malicious node will take part in route finding process. The nodes that are added to the blacklist must not be considered for routing process.

The proposed mitigation framework based on number of times the packet is sent over a legitimate route but not acknowledged. A message transmission list has to be maintained which contain the packet number, time elapsed and Tries Counter (TC). The time elapsed is a counter that records the time elapsed when a specific packet was sent. TC will store the number of times a packet is retransmitted. The threshold of TC is defined as *A*. A blacklist table must also be maintained with each node in order to store the malicious nodes. A NACK message is also required which will contain the address of the malicious node. This NACK will be initiated by the intermediate node in the path and has to be sent back to the sender node. A blackcast message will contain the broadcast with malicious node address. The maximum time required for receiving an acknowledgement from destination is denoted by *t*, defined as:

$$t = 2 * n * D$$

Where *n* is number of hops remaining and D is the maximum delay between two hops. Here every node will be updated with the status of their neighbors using HELLO messages.

In this proposed framework whenever a sender has to send some message to destination, it initiates the normal route discovery process of AODV. When it finds the route to destination it makes an entry of message number in the message transmission list and initializes the TC to zero for each new message. Now it starts sending the packets to the destination. If acknowledgement is received, continue the transmission. If a NACK message is received it increments the TC by 1, it retransmits the packet and sets the elapsed time counter to 0. When the TC reaches *A* it puts the node address contained in the NACK to the blacklist and blackcast a message with the blacklisted nodes to its neighbors. Every time the sender node waits for time *t*, if TC reaches to be equal to *A* and no NACK is received, then it blacklists the next-hop and blackcasts a message to its immediate neighbors. Also it finds a new route to the destination excluding the nodes in the blacklist and retransmits those messages present in the message transmission list.

Every intermediate node will save every packet received into message transmission list. Whenever a NACK or ACK is received it will send it back to the sender. If no ACK or NACK is received and elapsed time reaches equal *t*, it will send a NACK message back to the sender node. If a blackcast is received it will forward it to all it neighbors. Result analysis says that the proposed framework enhances the throughput and packet delivery ratio when used in a grayhole attack scenario.

5.1 Algorithm for the sender node packet generation and transmission process

1. Start to send the data to the destination.
2. For each message wait for maximum threshold time (*t*) required for receiving an acknowledgement/ NACK from destination.
3. If acknowledgement is received then continue the transmission.
4. If NACK is received and TC < *A* then increment the TC by 1 and continue sending.
5. If NACK is received and TC = *A* then abort the transmission.
6. Abort the transmission of current message and blacklist the node.
7. Blackcast a message to all the neighbors.
8. Start route finding process for each route containing the malicious node and retransmit.
9. If no ACK or NACK is received after time *t*, the malicious node is the next hop node and goto 7.
10. STOP.

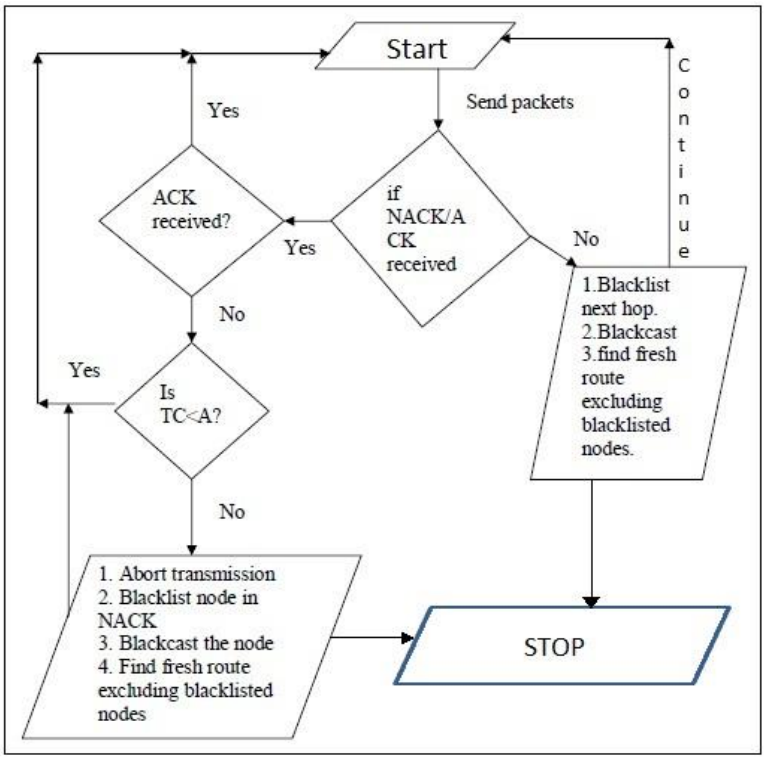

Figure 4. Flowchart for the sender node packet generation and transmission process

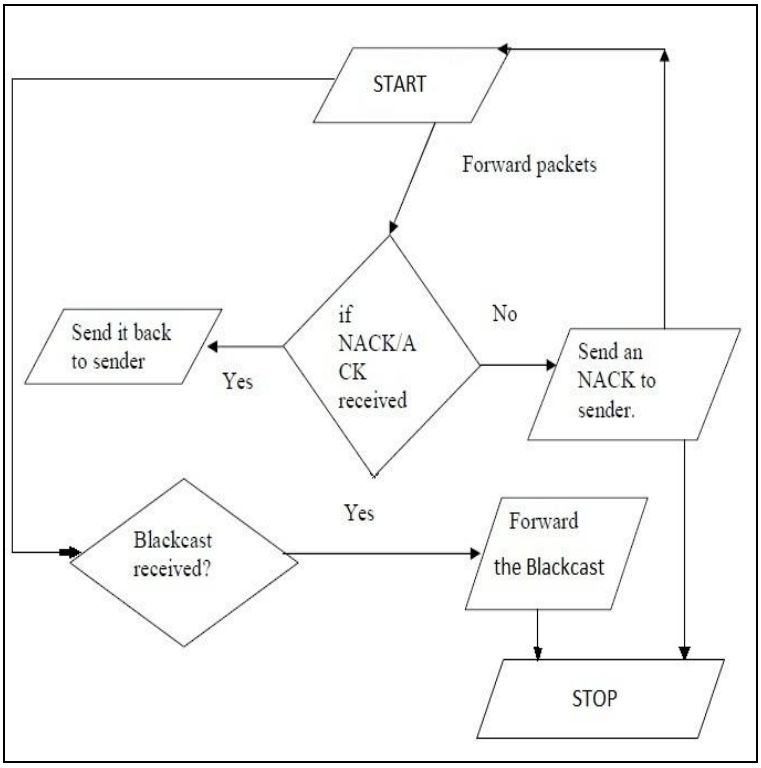

Figure 5 Flowchart for the processing of intermediate node

5.2 Algorithm for intermediate nodes

1. Forward the message towards destination.
2. Wait for maximum threshold time (t) required for receiving an acknowledgement from destination.
3. If ACK or NACK is received send it back to sender.
4. If no ACK or NACK is received after time t, send a NACK back to sender.
5. If a black cast is received, add node to blacklist and blackcast it further.
6. STOP.

VI. Simulation, Results and Analysis

The simulation is carried out using NS-2. For generation of freeway scenario C++ code and for generation of traffic CBRgen tool are used. Modified AODV protocol uses C++ and TCL to incorporate Grayhole attack and Mitigation Approach. The simulation parameters are as follows:

Table 1 simulation parameters

Parameter	Value
Number of nodes	10 to 100
Simulation area	1000*10
Simulation time	1000 seconds
Vehicle speed	100 Kmph
Mobility Model	Freeway
Traffic/ Connections	FTP over TCP
MAC	802.11
Transmission Range	150m
Protocol	AODV

The performance of proposed work can be analyzed and compare in terms performance metrics such as packet delivery ratio, normalized routing load, end-to-end delay, and average throughput. The next sections describes about these metrics and the resultant graphs of the simulation.

6.1 Packet delivery ratio

Packet Delivery ratio defines the efficiency of the network and hence signifies the efficiency of the routing protocol used. It is defined as

$$Packet\ delivery\ ratio = \frac{Total\ no\ of\ packets\ recieved}{Total\ no\ of\ packets\ sent}$$

Figure 6 shows the comparison between packet delivery ratio and number of nodes in the network. It shows that the packet delivery ratio decreases as the number of nodes increases. It is because link failures halt the transmission and hence resulting in packet drop. Our mitigation approach slightly enhances the packet delivery as compared to grayhole attack.

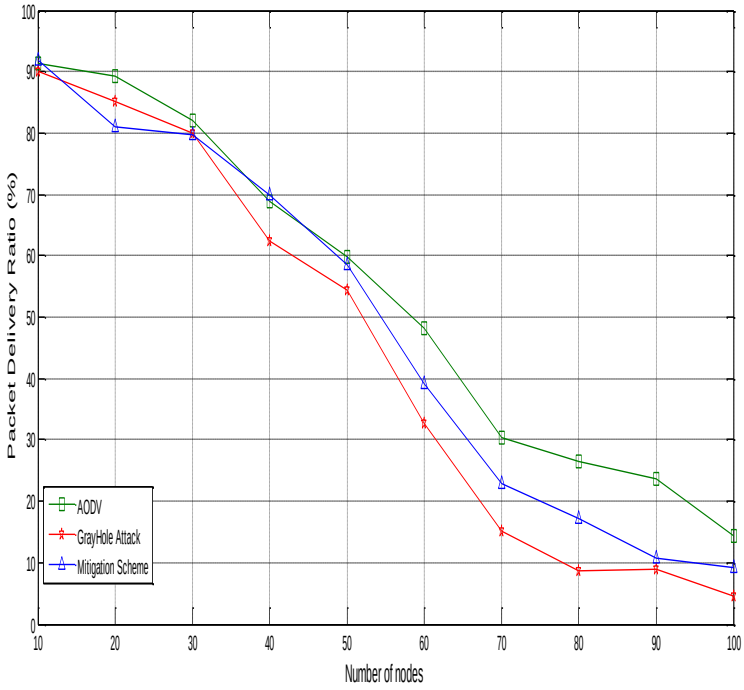

Figure 6 Packet delivery ratio Vs. number of nodes

6.2 Normalized routing load (NRL)

Normalized routing load signifies the stress that a specific protocol offers. It is defined by the mathematical formula as

$$Normalised\ Routing\ Load = \frac{Number\ of\ routing\ packets\ sent}{Number\ of\ data\ packets\ sent}$$

Figure 7 shows the effect of normalized routing load when the number of nodes increases for three different scenarios. In this simulation, NRL initially remains constant for all the scenarios. With the increase of the number of nodes in the network the routing load increases drastically. Our mitigation approach decreases the load on the network as compared to the grayhole attack in AODV and normal AODV.

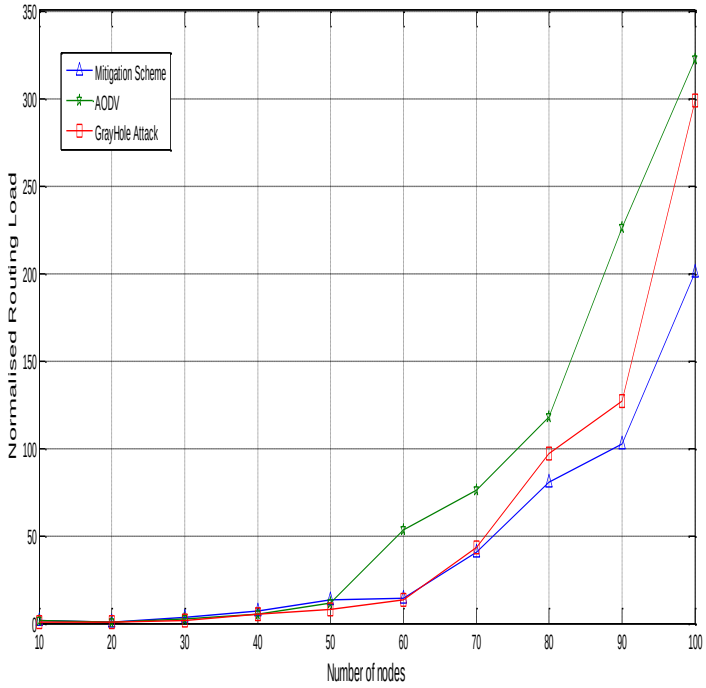

Figure 7 Normalized routing load vs. number of nodes

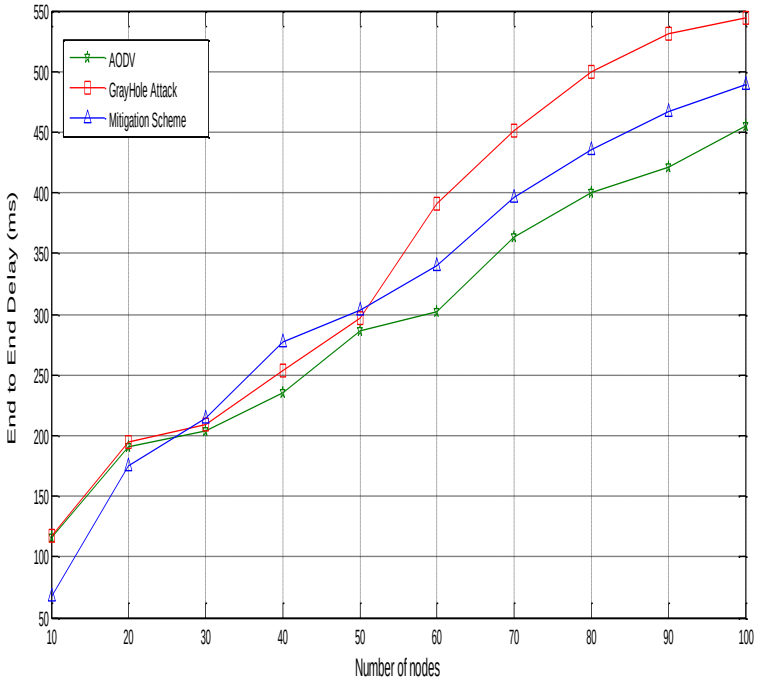

Figure 8 End-to-end delay vs. number of nodes

6.3 End–to-end delay

Average end-to-end delay signifies the total congestion factor in the network. It is defined as

$$Average\ End\ to\ End\ delay = \frac{\sum_{i=0}^{no.of\ packets} end\ time(i) - start\ time(i)}{Total\ no\ of\ packets}$$

Figure 8 depicts the average end to end delay for all three scenarios. It increases for all three with the increase in the size of the network. Our mitigation approach increases the efficiency of the network by decreasing the end to end delay.

6.4 Average Throughput

Average throughput tells us about the actual data rate of the network. It is defined by the mathematical formula.

$$Average\ Throughput = \frac{Total\ data\ sent(Kb)}{Total\ time\ (s)}$$

Figure 9 shows the comparison graph for average throughput of the network with AODV, grayhole attack and proposed mitigation approach. This graph clearly indicates that with the increase of nodes in the

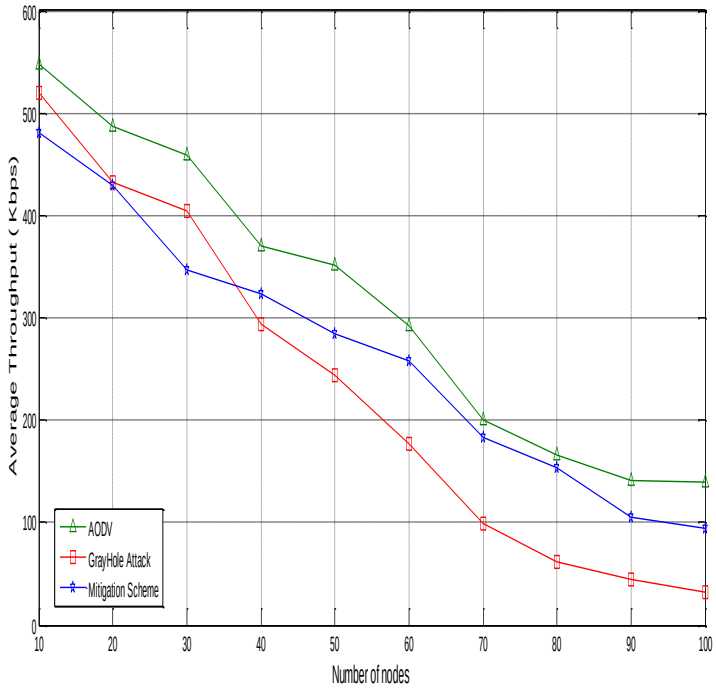

Figure 9 Average throughput vs. number of nodes

network throughput decreases. This is true for AODV, grayhole attack and our mitigation scheme. Initially the throughput for all three is closer to each other but as the number of nodes increases our approach mitigates the drop in throughput.

The aforementioned comparisons and analysis of all the four metrics show that our proposed counter based mitigation approach performed better and efficiently. It not only enhanced the throughput and packet delivery ratio but also performed better in terms of end to end delay and normalized routing load as compared to grayhole attack in AODV and normal AODV protocol.

VII. Conclusion

This paper presented a brief framework for mitigating grayhole attack in AODV. The paper showed that grayhole attack affect the performance of VANETs even at a high speed of 100 Kmph. This framework is tested and analyzed using NS-2 simulation tool. The simulation generated a scenario using freeway mobility model and AODV protocol. The proposed framework is implemented for varying number of nodes and number of misbehaving nodes for different scenarios. The comparison and analysis has been done on the basis of average throughput, packet delivery ratio, normalized routing load and average end to end delay. We found that our proposed solution helps in mitigating grayhole attack on VANETs.

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Orbital Floor Fracture: A Retrospective Analysis of the Timing of Presentation and Surgical Outcome. A Review of 25 Cases

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Abstract- The face is the index of man , eyes are index are index of soul .The face is intimately related to self image .Orbits are part of facial skeleton and skeletal component of orbital cavity is formed by the combination of seven different bones . Due to complex arrangement orbital fracture occurs in isolation or in concomitant with fracture of adjacent facial bones like in lefort II , le fort III and zygomatic complex fractures .Among the various clinical features associated with orbital floor fracture, the diplopia which is most distressing to the patient generally for which he/she seeks treatment. So far as orbital floor reconstruction is concerned, various materials starting from autologous to alloplastic materials have been used.

The aim of surgery is to fully correct diplopia or minimize diplopia and enophthalmos by repositioning or releasing displaced and entrapped orbital soft tissue. Most authors suggest that urgent surgery within days of injury is indicated to prevent soft tissue scarring and its long term sequelae. Several authors have associated poorer outcome, including slower recovery and a higher likelihood of persistent motility disturbance with delayed surgery[1,2]. **Van Streak** and **Storing** who first discussed the treatment of orbital floor fracture, when such injuries constitute part of treatment of the associated facial injuries. The prime goal in managing fracture of orbital floor is repositioning of displaced orbital tissue, restoration of previous orbital volume and shape, and provision of orbito-antral herniation

This retrospective study tries to evaluate amount of diplopia correction after orbital floor reconstruction from the time of injury.

I. MATERIAL AND METHODS

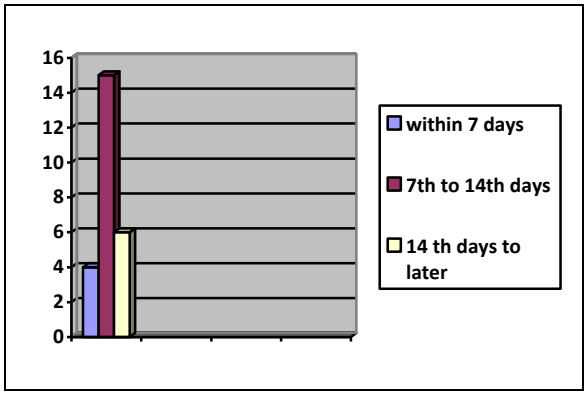
Total no of patients reported with injury to orbital floor from August 01 to May 12 in our department was 25.Among 25 patient 12 was associated with lefort 3 fractures ,5 associated with le fort 2 fractures and 8 were isolated floor fractures. In view of the complex nature of orbital fracture the study was concerned with the management of diplopia in the blow out fracture of orbital floor.

The patients were grouped in three groups depending upon the time elapsed between the injury and surgery:

1)group A: time between injury and surgery is within 7 days.

2)group B: time between injury and surgery is between 7 days and 14 days

3)group C: time between injury and surgery is between 14 days and later.



GRAPH 1: data showing the percent of patient operated in time period

We recorded the diplopia in the various gaze :

a) diplopia in extreme gaze
b) diplopia in primary gaze & reading position
c) could not be assessed due to poor vision.

Table 1: Diplopia chart

diplopia in extreme gaze	15 patients
diplopia in primary gaze & reading position	7 patients
could not be assessed due to poor vision	3 patients

As per surgical principle all the 25 patients underwent thorough pre-operative evaluation comprising of

(a) A detailed case history.
(b) Clinical examination including:

1) Pre – surgical ophthalmologic consultation including Hess chart, Diplopia chart (fig: 1), Visual acuity test, force duction test.

2) Radiological examination – PNS, Coronal CT Scan (fig: 2) (Evaluation of dimension of the defect from scan)

(c) Pre- anaesthetic evaluation.

All patients were taken up for surgery under general anaesthesia.Naso endotracheal intubation with nitrous oxide and oxygen was done. Infra orbital incision was used to approach the floor of the orbit. For all patients with significant complain of diplopia, graft was taken from the anterior wall of maxillary sinus of the contra lateral side of fracture of the orbital floor (except in one patient, where the blow out was so extensive that it required graft from both sides of anterior wall of maxillary sinus). The periorbita was incised, prolapsed orbital contents were retrieved (fig: 3) and orbital floor was reconstructed (fig: 4). The skin incision was closed with 5 – 0 prolene subcutaneous suture.

II. FOLLOW UP

The follow up period was taken from six to eleven months including post operative ophthalmologic consultation which included HESS chart and Force duction test .Post operative CT scan were obtained in all follow up patients in coronal and axial projections and sinus radiograph were taken.

Table 2: Outcome of the surgery

Number of patients	Preoperative diplopia	Post operative diplopia
Group A	4	None
Group B	15	None
Group C	6	4 (66%)

III. RESULTS

The results of this study are consistent with prior reports[3,4]. The outcome of the surgical repair is also comparable to other studies and there is no statistically significant difference among the reconstruction materials with regards to complication[5,6] .Among the 25 patients included in the study 19 patients got the fracture repaired within 14 days of injury.

Out of 25 blowout fracture 18 were associated with zygomaticomaxillary and orbital rim fracture. The size of the defect (1.5 to 2.5cm) in the orbital floor was measured by Scannogram . Autogenous bone (anterior wall of maxillary sinus) was used for the reconstruction. Out of the 25 patients with diplopia and enopthalmos, 21 had complete resolution of their symptoms after surgery. However in 4 patients from group C had mild to moderate degree of diplopia persisted after surgery. No post operative surgical complication like infection, haemorrhage, ectropion was seen. Post – operative coronal CT showed adequate integrity of orbital floor and no orbital fat/fibrotic tissue in the maxillary sinus.

IV. DISCUSSION

Early diagnosis with the use of proper investigation tools and accurate description of the extent of injury is useful in planning the appropriate intervention .A period of 7 days observation allow for clearing of soft tissue edema and haemorrhage, which may temporally perpetuate abnormal motility ,and thus present unnecessary surgery[7]. Any visually handicapping diplopia or cosmetically unacceptable enopthalmous still present at this duration will require surgery .As in this study we have noted that though the signs and symptoms at the time of presentation had significantly higher incidence there was considerable recovery in post operative period with almost normal function or minimal residual deformity. Thus a proper intervention with correct timings will lead to beautiful seeing eyes.

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FIGURE 1: Lower Left Extremity There Is Diplopia

II	II	II
II	II	II
I	II	II

L M R

FIGURE 2: CT SCAN Showing blow out defect of orbital floor

FIGURE 3: orbital contents retrieved from maxillary sinus

FIGURE 4: Reconstruction of orbital floor by anterior wall of maxillary sinus

Social problems of people living with HIV

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Abstract- In the general population, the HIV epidemic is still misunderstood among the Indian society. People living with HIV have faced Stigma, Discrimination, violent attacks, harassment, been rejected by families, spouses and communities, been refused medical treatment, and even in some reported cases denied the last rites before they die. Negative attitudes from health care staff have generated problem among many people living with HIV. As a result, many keep their status secret. The study try to focus on social problems of these people. This is very sensitive issue. Everyone has a right of living. One cannot seize it from others. Are those people really enjoying their rights or not? To understand what are the conditions of their life? How they are living in this society? Society can accept or not? What type of responses they get from this? All these doubts are cleared in this.

Index Terms- AIDS, Counseling, HIV, People living with HIV, Social problems

I. INTRODUCTION

A 2006 study found that 25% of people living with HIV in India had been refused medical treatment on the basis of their HIV-positive status. It also found strong evidence of stigma in the workplace, with 74% of employees not disclosing their status to their employees for fear of discrimination. Of the 26% who did disclose their status, 10% reported having faced prejudice as a result. As well as adding to the suffering of people living with HIV, this discrimination is hindering efforts to prevent new infections.*"***Man is a social animal.***"* -He can't live without society. He needs society, its love, care and also the co-operation.

AIDS is: Acquired – must do something to contract
Immune – ability to fight off infectious agents
Deficiency – lack of
Syndrome – cluster of symptoms that are Characteristic for a disease

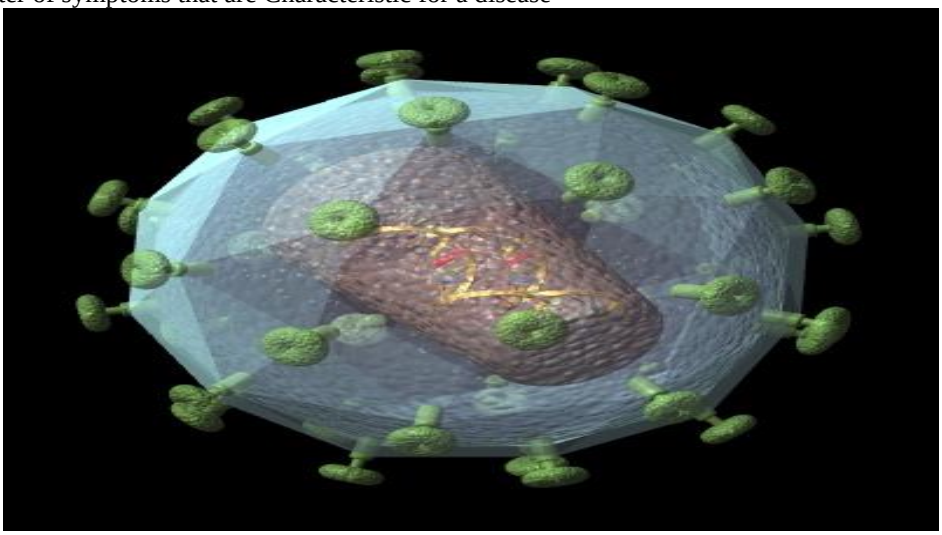

Figure 1. The picture of HIV Virus

HIV is: Human – isolated to the human species
Immuno-Deficiency – Lacking the ability to fight off infectious agents
Virus – a disease causing agent

Transmission mode:

- Unprotected sexual intercourse with infected person (either heterosexual or homosexual)
- Transfusion of infected blood or blood products
- Infected mother to her baby during pregnancy, birth process and through breast – feeding
- Use of infected needles and instruments without sterilization or sharing of needles and syringes by HIV drug addicts

AIDS virus is not transmitted through:

--> Embarrassing or kissing (social)
--> Touching hand shaking or hugging
--> Sharing bathroom or toilet
--> Coughing, saliva or sneezing
--> Eating together or sharing utensils
--> Swimming pools
--> Sharing clothes
--> Mosquito bite, Insect bite or houseflies
--> Patient caring

Prevention methods:

Prevention is the only cure for HIV and AIDS. It can be easily prevented by adopting simple measures such as:

Safe sex:

The only safe sex is 'no sex'; all other practices like masturbation, cuddling, hugging, rubbing, sticking to one partner or using condom if one cannot avoid multiple partners are safer sex practices.

Tips for condom usage:

- Never re-use condoms, always use a new one
- Check the pack expiry date
- Keep a supply handy, where they cannot be damaged by heat, light or damp
- Make sure the foil, fingernails or juwellery do not damage the rubber
- Make sure you squeeze any air out of the 'teat' at the top of the condom before putting it on
- Only use water based lubricants e.g. k-y jelly, not oil bases like Vaseline
- Dispose condoms carefully by wrapping them in a tissue and putting them in a bin

Safe blood:

Judicious use of blood and use only pretested HIV free blood or blood product.

Safe needles:

Insist your doctors and nurses to use sterile or disposable needles and instruments.

Safe motherhood:

Before taking any major step in life like marriage or having child ascertains that you are HIV free. Through ARV and NVP medicine we protect child of HIV positive mother during pregnancy, labor & breast milk.

Safe razor and blade:

Never share your shaving blades with anyone and also ask your barber to use properly cleansed razor and new blade during shaving or hair cut. (Although the risk of getting infection from a saloon is minimal)

Remember, Aids does not discriminate caste, creed, and race, and religion, educational or social status. Prevention of AIDS is our joint responsibility. Education and awareness is the only weapon in our hand. Let us accept the challenge to fight against AIDS. We must support and care for the people with HIV and AIDS with compassion and understanding.

HIV and AIDS in India:

Current estimates:

In 2006 UNAIDS estimated that there were 5.6 million people living with HIV in India, which indicated that there were more people with HIV in India than in any other country in the world. In 2007, following the first survey of HIV among the general population, UNAIDS and NACO agreed on a new estimate – between 2 million and 3.1 million people living with HIV. In 2008 the figure was estimated to be 2.31 million. In 2009 it was estimated that 2.4 million people were living with HIV in India, which equates to a prevalence of 0.3%. While this may seem low, because India's population is so large, it is third in the world in terms of greatest number of people living with HIV. With a population of around a billion, a mere 0.1% increase in HIV prevalence would increase the estimated number of people living with HIV by over half a million.

From Wikipedia, the free encyclopedia:

India has the world's third-largest population suffering from HIV and AIDS. However, the estimated number of Human Immunodeficiency Virus (HIV) infections in India has declined drastically in recent years—from 5.5 million in 2005 to below 2.5 million in 2007. These new figures are supported by the World Health Organization and UNAIDS. According to the United Nations 2011 Aids report, there has been a 50% decline in the number of new HIV infections in the last 10 years in India.

DOs:

- Sympathise and empathise with them

- Provide them family and social support
- Allow them to be a part of the family as he / she was prior to disclosure of the infection
- Allow them to get back to their work as soon as soon as he / she is physically fit, since HIV infection doesn't require special rest
- Keep them engaged in some activity, as an empty mind is a devil's workshop
- Make efforts to reduce their stress
- Encourage them to exercise and meditate as these help prolong the life span
- Provide them with a high protein, high vitamin diet and clean potable water (boiled)
- Convince them to stop all addictions such as tobacco cigarettes, alcohol or other psychotropic / recreational drugs
- Register them with a health care facility for regular checks & follow up
- Take immediate steps to treat even minor ailments. However, it is not necessary to disclose their HIV status to their family physician
- Dispose of blood stained tampons and bandages properly, either by flushing or by disinfecting them first with detergent
- Advice them to use safe sex (condoms) with their sex partner, even if partner is already HIV positive
- Purse them at any appropriate time, to make a will
- Provide foster care to their children
- Help fight the discrimination meted out to them by hospitals , doctors and employers
- Educate family members and friends about HIV & AIDS, if they already know the HIV status of the patient.

DON'TS:

- Don't accuse them for getting infected, it doesn't help
- Don't try to probe into when, where the person was infected
- Don't make them feel guilty
- Don't isolate them in their home / workplace
- Don't separate them from spouse or children, since they are the best support for them. It is important for them to spend quality family time together
- Don't use gloves in feeding the infected person or to wipe off his saliva, sweat, nasal secretions and tears
- Don't share razors, tooth brush and other sharp objects with infected person or for that matter with any body else
- It is not necessary to wash their clothes separately
- Don't humiliate the infected person, his / her spouse or children
- Don't scare them of suffering and death. In the terminal stage, prepare them for a smooth journey to death
- Don't get conned by the fake claims, false cures, witch hunters and faith healers. Wait for declaration of the noble prize for the real cure
- Don't spend the entire available money limit in the first bout of illness, it may be the first of such illnesses in the pipeline. Make a proper planning of your spending capability.
- Don't take many relatives to see the patient admitted in hospital
- Don't test for HIV repeatedly, once the presence of infection is established it remains there forever

II. RESEARCH METHODOLOGY:

AIM OF THIS STUDY:

"To understand the social problems of people living with HIV "

OBJECTIVES:

- Focusing the social problems.
- Focusing the HIV and AIDS.
- Focusing the influence of society on HIV and AIDS.
- Find out the condition of these people.
- Understand the relationship between people living with HIV and Society
- Creating awareness.
- Implication of social work.

STUDY AREA AND JUSTIFICATION:

This study will be conducted in ICTC Taluk Hospital Honnavar. Honnavar taluk is in coastal area which is situated very near to Murdeshwar and Gokarna which comes under Uttarakannada district. Considering the review and the observations made by the investigator the study is planned. . It is hoped that the study will help in understanding the social problems of people living with HIV in Honnavar.

RESEARCH DESIGN:

For the present study the researcher uses exploratory design from the respondents concern.

RANDOM SAMPLING DESIGN:

Purposive Random Sampling Technique is used to collect the data which is given from the respondent. The researcher selected 50 samples out of 198 HIV infected person who registered in the ICTC during 2010 to 2012. Researcher personally interviewed each under study. Tools of data collection are used by the ICTC documents and Interview schedule.

LIMITATIONS OF STUDY:

- Male and female of above 20 years old included.
- All religious and socio-economic classes included.
- It is focused on the social problems of people living with HIV in Honnavar.
- This study restricted to people living with HIV of Honnavar Taluk.
- Depends on information of people living with HIV in Honnavar.

III. DISCUSSION AND RESULT.

Researcher focusing the "social problems of people living with HIV " in Honnavar Taluk through the interview schedule made analyses and interpretation of data. In Honnavar Taluka 20-30 age group is very high risk group. Among these 76% have primary education, 20% have secondary education and only 4% are uneducated. Although have lot of social problems.. 90% people have miss concept about the modes of transmission through mosquito. 90% people know the use of condom but they feel hesitate. 56% are belongs to joint family and 44% are belongs to nuclear family. All know about ART. 16% able to get nutritious food. 16% have a good economic condition. 30% have the knowledge of health and hygiene.30% of people are feeling happy in home. 10% are working comfortably with family. 98% people are telling that HIV is affected on their family life. Only 26% are getting family support in this situation. 10% people are getting cooperation from the family members. 90% people are neglected from their family. Only 10% of people are feeling comfort in society. 50% are having satisfied relationship among their friends, 80% people are telling that their life is worthless. 80% people are thinking about suicide. Other 20% are not thinking like that they are still optimist. 80% people are not participating in public functions. They are hesitating to attend this. 74% people have guilty feeling. 70% people are able to lead a common life in society. 90% are frustrated from the society. 90% people are suffering from loneliness. That means only some families are taking care about them. 96% people are telling that HIV affects on their social status. 64% have social stigma. This shows that how the society is treating them. 72% have discrimination. This reflects the behavior of our people and society. 80% have the feeling of lack of love and affection. 92% were irritated by the public.All are feeling that counseling is playing an important role in their life. All have the feeling that the counseling gives them social support to face the situation and develop the activities. This shows how important the counseling is. 54% people are feeling that the government hospitals are giving satisfactory services regarding social issues. 30% feel that the NGOs are providing satisfactory services. 20% have got the help from NGOs. 88% have idea about Positive Network Group. 80% needed residential facilities.

IV. SUGESTIONS

The family is a unique institution which can look after its members very carefully. After getting HIV family should give love, care, treatment, support and mould their views in positive way towards life. HIV and AIDS is a stage where a person need special care and support. Society should give them opportunity to participate in all social fields and treat them as a human being. Friends should give respect and more attention towards them. They should share their feelings, engage them in other creative work and guide them. NGO should work actively, make awareness in all public and meet those people who are suffering from HIV and AIDS. Counseling helps to make better relationship with others. Govt. should provide sufficient recruitment, medicine, modern technology and good supervision method in Govt. Hospitals. All people living with HIV should actively participate in positive network group. Then they can gather, live together and becoming peer educator. By this they can share their problems, can fight their rights, can strengthen the group and bring changes in their attitudes. They should take all Govt. facilities and lead a hopeful life. Ex. Govt. provides Anthyoday ration card, free home facility, free treatment etc. They can maintain the healthy sexual relationship with the help of condom and remember that condom is not hundred percent safe.

III. CONCLUSION

By the above discussion we see that they have so many problems even though the NGOs getting more projects regarding this and govt. has introduced several plans like giving free shelter and treatment. We can see that the govt. and many NGOs are trying to give social support and thinking about their rights. But no one is thinking what problems are there in grass root level , their all programmes are working in mass level only. Every person should think about theme , their wants, needs and feelings. All developmental programmes should not be in papers. It should be in practice. This is possible when they will come out from their social problems and lead a peace full and hope full life. For this every person needs govt., NGOs, community and societies support.

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Challenges and Prospects of Emerging Management and Accounting of Green Supply Chain in the Next Millennium

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Abstract- Green Supply Chain is a system of organizations, people, technology, activities, information and resources involved in moving green supply product or service from supplier to customer, green Supply chain activities transform natural resources, raw materials and components into a finished green product that is delivered to the end customer. There are a variety of supply chain models, which address both the upstream and downstream sides. In the 1980s, the term Supply Chain Management (SCM) was developed to express the need to integrate the key business processes, from end user through original suppliers. Management and accounting of green Supply Chain is a recent and important concept. Their contributions are organized around five key issues in the green chain:- concepts of measuring performance; empirical research in measuring costs, benefits and risk; modeling; value of information; and governance and performance. Papers with a wide variety of approaches from different economic disciplines have been demonstrated to be useful in analyzing the supply chain. Green supply chains entered a new era in which customer orientation and social responsibility are the main driving forces. Globalization of supply chains complicates the chain governance. In order to develop a research agenda that meets the challenges facing industry and policymakers, invited experts from around the world convened to review the state of the art. There is a large number of research and dissuasions is necessary. Understanding the management and accounting of green Supply Chains systems requires more investments in retrieving empirical data for testing propositions and developing appropriate models.

Index Terms- agribusiness; food production chains; performance measurements; risk and uncertainty; chain governance; financial accounting; reporting guidelines; accounting standards; reciprocity Generally accepted accounting principles.

I. Emergence of Green Supply Chains

Now a day's public becomes more aware of environmental issues and global warming, consumers will be asking more questions about the products they are purchasing.It has been increasing in consciousness of the environment in the last few decades. More people are aware of the world's environmental problems such as global warming, toxic substance usage, and decreasing in non-replenish resources. The Government has released campaigns to promote this problem to people. Several organizations responded to this by applying green principles to their company, such as using environmental friendly raw material, reducing the usage of petroleum power, and using the recycle papers for packaging. **Green** Supply Chain is a system of organizations, people, technology, activities, information and resources involved in moving green product or service from supplier to customer green Supply chain activities transform natural resources, raw materials and components into a finished green product that is delivered to the end customer. During 1980's and 90's, there has been a rapid industrialization of agriculture in the developed economies around the world. The trend toward greater concentration in agricultural input and food distribution, the increasing role of information and logistic technologies, and the growing importance of food safety, quality, and other technical requirements have resulted in dramatic changes in green systems. Green supply chain systems have become highly organized and linked from producer through consumer with an increasingly dominant role being played by highly concentrated agro-industrial firms and retailers.

The most notable change is the rapidly changing in green supply chain distribution systems worldwide.

The key indicators of the change can be summarized as follows:

- Rising modern retail outlets such as supermarket, fast food and other food services.
- Increasing vertical partnerships and horizontal alliances.
- Greater market segmentation.
- Availability of range of goods at market.
- Brand marketing.
- Strong presence of Multinational Corporations (MNCs) in processing and retailing.
- International purchasers/agents.

Successful participation in global markets has increasingly required efficient organization of domestic green system. In parallel with these interrelated trends, a new type of organization and management in green system - supply chain management (SCM) has emerged in developed countries. With the rapid economic growth, the increasing urbanization, and accelerated integration into the world market, the similar trends have been observed in many of developing countries in Latin America and South East Asia. The quest for a more efficient supply chain organization has been considered by many as a driving force for the future growth of green industries in developing countries. In the future, it will no longer be company competing with company, but supply chain competing against supply chain.

II. Defining

Green Supply chain management: Green Supply chain management (SCM) is the management of a network of interconnected businesses involved in the ultimate provision of green -product and green -service packages required by end customers (Harland, 1996). Green Supply chain management encompasses the planning and management of all green activities involved in sourcing, procurement, conversion, and logistics management. It also includes the crucial components of coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, Green supply chain management integrates supply and demand management of green products within and across companies though it has not well understood yet, SCM usually refers to the management of the entire set of production, distribution, and marketing processes that deliver competitive products to consumers. The terms "supply chain", "value chain", "commodity chain", and "green system" are used liberally throughout the literature, but the meaning is often shaded differently depending on the focus and context. Some people use these terms interchangeably. Other use each of the terms to describe different processes. It is not uncommon that these terms are used for political and promotional reasons as well. It is fair to say that these terms are now overworked and routinely applied to a wide range of activities that are dissimilar.
For this presentation, the term green supply chain system refers to the entire vertical chain of activities: from production on the farm, through processing, distribution, and retailing to the consumer - in other words, the entire spectrum, from farm gate to plate, regardless how it is organized or how it functions. The supply chain typically deals with a product-specific sub-sector of the green system. Green supply chain management refers to the management of the entire set of production, distribution, and marketing processes that deliver competitive products to consumers. The term supply chain has an attached meaning of 'managing' in order to distinct itself from usual sub-sector assessments. In a traditional spot market, business-to-business transactions are decentralized. A producer supplies several wholesalers; a wholesaler's purchase from various producers; and likewise retailers have various sources of supply for a given product. Business entities often change their sources of supply and lose and win new customers over time. In a green supply chain environment, the number of actors involved in transactions is reduced and the business-to-business relationship is relative lasting and more centralized. At one end of the continuum, a supply chain may function close to a situation of vertical integration. In the most streamlined chain, one producer supplies product to one wholesaler, who supplies to one retailer, though the wholesaler may be bypassed.

In reality, most 'chains' in green are loose, fragmented, and unstable over time. A successful chain often has an effective 'channel manager', a role often taken by supermarket or processors in developed countries. A related concept is that of global commodity chains discussed by Gereffi (1994). By explicitly focusing on the co-ordination of globally dispersed, but linked, production systems, Gereffi has shown that many chains are characterized by a dominant party who determine the overall character of the chain, and as lead firm(s) become responsible for upgrading activities within individual links and coordinating interaction between the links. This is a role of governance, and here a distinction is made between two types of governance: those cases where the co-ordination is undertaken by buyers (buyer-driven commodity chains) and those in which producers play the key role.

III. Development of Green Supply Chains

Though the phenomenon of green supply chain while, relatively new to the green industry has been well established in other industries for some time. The automotive industry is perhaps one of the first sectors to developed sophisticated supply chain management skills. The high volume manufacturers developed supplier relations with such designations as OEM (Original Equipment Manufacturers) and PSS (Preferred Suppliers Status). The retail sector has been revolutionaries by firms such as Wal-Mart. The use of sophisticated inventory management systems and on-line ordering and stocking procedures with suppliers has propelled the company to become the fast growing and one of the most profitable retail organizations in the world. The rapid growth of the personal computer industry has led to the rise of corporate giant such as Dell Computer to conduct business in entirely new ways formerly unthinkable. Dell, for example, has no original manufacturing - it simply assembles components and creates a machine using supply chain management methods that ensure the prompt and timely arrival of hundreds of parts on a daily basis. A recent Ernst & Young Study estimate that 85% of the companies in electronics industry have at least one alliance in place. Booz-Allen & Hamilton estimates that more than 20,000 alliances have been formed worldwide since 1996. It appears that the firm is convinced that alliances are a central engine to achieve growth and profitability.

The formation of supply chain of food and agricultural products is also taking place world-wide. Beginning with the evolution of information technology (IT) in the 1980s, it has become possible to extend the supply chain management further to include the final consumer and the suppliers. Efficient Consumer response (ECR) in the 1990's was the food industry's first coordinated response to embrace the concept of supply chain management. Much of the initial development and experience has taken place in Europe. Perhaps the most illustrative example of strategic supply chain formation can be found in the Netherlands. With the formation of the Agri Chain Competence (ACC) Foundation in 1995 and an overall budget of 50 million USD, over 60 supply chain pilot projects have been initiated. In the United Kingdom, the formation of a supply chain is led by major retailers with some government support, while in Japan it is led by retailers and trading companies. In the United States, the formation of value chain is focused on niche markets with some movement at the large company level, though the market continues to be defined by vertical integration or low cost commodity strategies. In Australia, the formation of supply chain is driven by the Japanese market requirement with support from industry association. In Canada, Alberta has recently created AVAC, a public institution; to encourage the formation of value chains in green systems. Supply chain formation within green system is driven by the desire to improve competitiveness.

The following three key market drivers of supply chain formation in developed economies can be identified:

- Food safety and quality assurance: the development of detailed quality assurance systems from primary production to retail. This type of chain may be small scale or involve an entire sector strategy involving major producer organizations and large scale food processors and retailers.
- Product innovation and differentiation: typically involves the development of niche markets and is most appropriate for smaller organizations working to develop specialist markets.
- Lowering systemic cost: the drive to reduce logistics costs which can include a range of transaction, delivery, and warehousing and delivery costs. Typically these chains require a strong operations research focus to identify system bottlenecks and to seek out inefficiencies best suited for improvement.

Green Supply chains develop through different stages over time. Porter (1980) identifies, through industry life cycle perspective, four stages for the chain development: birth, expansion, efficiency, and self-renewal. Some of generic characteristics for each stage of chain development is discussed in the presentation. It is important to recognize that, in reality, the formation of a chain does not necessarily follow a clear path as defined. Two cases are used to illustrate the complexity of building supply chains in practice. Thailand, typical of many developing nations, has an emerging middle and higher income class with sufficient income to desire processed foods sold in supermarkets. Traditional food supply chains in developing nations are often inefficient with many middlemen between the grower and the retail outlet. Supermarkets want to provide safe environmental friendly high quality products at competitive prices, a difficult goal to achieve with existing supply chains. There is a case example presented on Tops Supermarkets in Thailand (Tops is owned by Royal Ahold of The Netherlands). Tops is working in cooperation with KLICT and ACC of The Netherlands, Syngenta, Rabobank International and the Thai Ministry of Agriculture to develop a production, assembly, and distribution network to provide safe food from domestic sources for their supermarkets. The discussion will focus on required activities, successes, problems, and the possible usefulness of the model elsewhere.

Key success factors for forming green supply chains are summarized as follows:

- Clear benefits for all partnership and alliance members.
- Business proposition underpinning the partnership that makes long-term commercial sense.
- Focus on specific partnerships, products, and markets.
- Build upon successful partnerships.
- Apply lessons learnt from the partnership to gain benefits in other business areas.
- Partners/alliance members should have a good strategic fit.
- The commercial relationship should be based on interdependence.
- Companies have similar corporate values and the same commercial ethos.
- Mutual trust and respect.
- Aim high on quality - make it difficult for others to follow.
- For junior partners: pick a senior partner with a long-term commercial future.
- Build relationships and communication links between all levels of the two businesses.
- Gain full endorsement of the venture by the most senior management and strong personal commitment of all staff.
- Members should hold a common view on the long-term objectives of the partnership.
- Partnership members should hold a common view of what the final consumer wants.
- Raise the veil of secrecy and focus on sharing information required to make the partnership a success.
- Investment in physical plant and, for horizontal partnerships, joint investment by members builds commitment to the venture.
- Build flexible organizations that meet the specific needs of each partnership.
- Fix problems as they arise - delays only serve to disrupt.
- To ensure success, partnerships require their fair share of commercial good.

There is green supply chain management software also available which includes tools or modules used to execute supply chain transactions, manage supplier relationships and control associated to green business processes. Green chains entered a new era in which customer orientation and social responsibility are the main driving forces. Globalization of supply chains complicates the chain governance. In order to develop a research agenda that meets the challenges facing industry and policymakers, invited experts from around the world convened to review the state of the art.

Activities in management of Green Supply Chains**:-**

Green Supply chain management is a cross-function approach including managing the movement of raw materials into an organization, certain aspects of the internal processing of materials into finished goods, and the movement of finished goods out of the organization and toward the end-consumer. As organizations strive to focus on core competencies and becoming more flexible, they reduce their ownership of raw materials sources and distribution channels. These functions are increasingly being outsourced to other entities that can perform the activities better or more cost effectively. The effect is to increase the number of organizations involved in satisfying customer demand, while reducing management control of daily logistics operations. Less control and more supply chain partners led to the creation of supply chain management concepts. The purpose of green supply chain management is to improve trust and collaboration among green supply chain partners, thus improving inventory visibility and the velocity of inventory movement. Several models have been proposed for understanding the activities required to manage material movements across organizational and functional boundaries. SCOR is a supply chain management model promoted by the Supply Chain Council. Another model is the SCM Model proposed by the Global Supply Chain Forum (GSCF). Supply chain activities can be grouped into strategic, tactical, and operational levels. The CSCMP has adopted The American Productivity & Quality Center (APQC) Process Classification

Framework's a high-level, industry-neutral enterprise process model that allows organizations to see their business processes from a cross-industry viewpoint. These are the following importunate component of Activities in management of Green Supply Chains:-

Strategic

- Strategic network optimization, including the number, location, and size of warehousing, distribution centers, and facilities etc.
- Strategic partnerships with suppliers, distributors, and customers, creating communication channels for critical information and operational improvements such as cross docking, direct shipping, and third-party logistics.
- Product life cycle management, so that new and existing products can be optimally integrated into the supply chain and capacity management activities.
- Information technology chain operations.
- Where-to-make and what-to-make-or-buy decisions.
- Aligning overall organizational strategy with supply strategy.
- It is for long term and needs resource committeemen.

Tactical

- Sourcing contracts and other purchasing decisions.
- Production decisions, including contracting, scheduling, and planning process definition.
- Inventory decisions, including quantity, location, and quality of inventory.
- Transportation strategy, including frequency, routes, and contracting.
- Benchmarking of all operations against competitors and implementation of best practices throughout the enterprise.
- Milestone payments.
- Focus on customer demand.

Operational

- Daily production and distribution planning, including all nodes in the supply chain.
- Production scheduling for each manufacturing facility in the supply chain (minute by minute).
- Demand planning and forecasting, coordinating the demand forecast of all customers and sharing the forecast with all suppliers.
- Sourcing planning, including current inventory and forecast demand, in collaboration with all suppliers.
- Inbound operations, including transportation from suppliers and receiving inventory.
- Production operations, including the consumption of materials and flow of finished goods.
- Outbound operations, including all fulfillment activities, warehousing and transportation to customers.
- Order promising, accounting for all constraints in the supply chain, including all suppliers, manufacturing facilities, distribution centers, and other customers.

Integration process in business for management of green Supply chain business process integration**:-**

Successful green SCM requires a change from managing individual functions to integrating activities into key supply chain processes. An example scenario: the purchasing department places orders as requirements become known. The marketing department, responding to customer demand, communicates with several distributors and retailers as it attempts to determine ways to satisfy this demand. Information shared between green supply chains partners can only be fully leveraged through process integration.

Green supply chain business process integration involves collaborative work between buyers and suppliers, joint product development, common systems and shared information. According to Lambert and Cooper (2000), operating an integrated supply chain requires a continuous information flow. However, in many companies, management has reached the conclusion that optimizing the product flows cannot be accomplished without implementing a process approach to the business. The key supply chain processes stated by Lambert (2004) are:

- Customer relationship management
- Customer service management
- Demand management
- Order fulfillment
- Manufacturing flow management
- Supplier relationship management
- Product development and commercialization
- Returns management

Much has been written about demand management. Best-in-Class companies have similar characteristics, which include the following: a) Internal and external collaboration b) Lead time reduction initiatives c) Tighter feedback from customer and market demand d) Customer level forecasting.

One could suggest other key critical supply business processes which combine these processes stated by Lambert such as:

- Customer service management
- Procurement
- Product development and commercialization
- Manufacturing flow management/support
- Physical distribution
- Outsourcing/partnerships
- Performance measurement

a) Customer service management process

Customer Relationship Management concerns the relationship between the organization and its customers. Customer service is the source of customer information. It also provides the customer with real-time information on scheduling and product availability through interfaces with the company's production and distribution operations. Successful organizations use the following steps to build customer relationships:

- determine mutually satisfying goals for organization and customers
- establish and maintain customer rapport
- produce positive feelings in the organization and the customers

b) Procurement process

Strategic plans are drawn up with suppliers to support the manufacturing flow management process and the development of

new products. In firms where operations extend globally, sourcing should be managed on a global basis. The desired outcome is a win-win relationship where both parties benefit, and a reduction in time required for the design cycle and product development. Also, the purchasing function develops rapid communication systems, such as electronic data interchange (EDI) and Internet linkage to convey possible requirements more rapidly. Activities related to obtaining products and materials from outside suppliers involve resource planning, supply sourcing, negotiation, order placement, inbound transportation, storage, handling and quality assurance, many of which include the responsibility to coordinate with suppliers on matters of scheduling, supply continuity, hedging, and research into new sources or programs.

c) Product development and commercialization: Here, customers and suppliers must be integrated into the product development process in order to reduce time to market. As product life cycles shorten, the appropriate products must be developed and successfully launched with ever shorter time-schedules to remain competitive. According to Lambert and Cooper (2000), managers of the product development and commercialization process must:

- Coordinate with customer relationship management to identify customer-articulated needs;
- Select materials and suppliers in conjunction with procurement, and
- Develop production technology in manufacturing flow to manufacture and integrate into the best supply chain flow for the product/market combination.

d) Manufacturing flow management process:

The manufacturing process produces and supplies products to the distribution channels based on past forecasts. Manufacturing processes must be flexible to respond to market changes and must accommodate mass customization. Orders are processes operating on a just-in-time (JIT) basis in minimum lot sizes. Also, changes in the manufacturing flow process lead to shorter cycle times, meaning improved responsiveness and efficiency in meeting customer demand. Activities related to planning, scheduling and supporting manufacturing operations, such as work-in-process storage, handling, transportation, and time phasing of components, inventory at manufacturing sites and maximum flexibility in the coordination of geographic and final assemblies postponement of physical distribution operations.

e) Physical distribution

This concerns movement of a finished product/service to customers. In physical distribution, the customer is the final destination of a marketing channel, and the availability of the product/service is a vital part of each channel participant's marketing effort. It is also through the physical distribution process that the time and space of customer service become an integral part of marketing, thus it links a marketing channel with its customers (e.g., links manufacturers, wholesalers, retailers).

f) Outsourcing/partnerships

This is not just outsourcing the procurement of materials and components, but also outsourcing of services that traditionally have been provided in-house. The logic of this trend is that the company will increasingly focus on those activities in the value chain where it has a distinctive advantage, and outsource everything else. This movement has been particularly evident in logistics where the provision of transport, warehousing and inventory control is increasingly subcontracted to specialists or logistics partners. Also, managing and controlling this network of partners and suppliers requires a blend of both central and local involvement. Hence, strategic decisions need to be taken centrally, with the monitoring and control of supplier performance and day-to-day liaison with logistics partners being best managed at a local level.

g) Performance measurement

Experts found a strong relationship from the largest arcs of supplier and customer integration to market share and profitability. Taking advantage of supplier capabilities and emphasizing a long-term supply chain perspective in customer relationships can both be correlated with firm performance. As logistics competency becomes a more critical factor in creating and maintaining competitive advantage, logistics measurement becomes increasingly important because the difference between profitable and unprofitable operations becomes narrower. A.T. Kearney Consultants (1985) noted that firms engaging in comprehensive performance measurement realized improvements in overall productivity. According to experts, internal measures are generally collected and analyzed by the firm including

- Cost
- Customer Service
- Productivity measures
- Asset measurement, and
- Quality.

External performance measurement is examined through customer perception measures and "best practice" benchmarking, and includes 1) customer perception measurement, and 2) best practice benchmarking.

Components of Supply Chain Management:-

There are following Components of Supply Chain Management:-

- Standardization
- Postponement
- Customization

Sustainability in management of green Supply chain:-

Green supply chain sustainability is a business issue affecting an organization’s supply chain or logistics network and is frequently quantified by comparison with SECH ratings. SECH ratings are defined as social, ethical, cultural and health footprints. Consumers have become more aware of the environmental impact of their purchases and companies’ SECH ratings and, along with non-governmental organizations ([NGO]s), are setting the agenda for transitions to organically-grown foods, anti-sweatshop labor codes and locally-produced goods that support independent and small businesses. Because supply chains frequently account for over 75% of a company’s carbon footprint many organizations are exploring how they can reduce this and thus improve their SECH rating.

Components of Green supply chain management integration:

The green supply chain management plays a very critical role in the present scenario. **Green** supply chain management integration components are the third element of the four-square circulation framework. The level of integration and management of a business process link is a function of the number and level, ranging from low to high, of components added to the link (Ellram and Cooper, 1990; Houlihan, 1985). Consequently, adding more management components or increasing the level of each component can increase the level of integration of the business process link. The literature on business process re-engineering, buyer-supplier relationships and SCM suggests various possible components that must receive managerial attention when managing supply relationships. Lambert and Cooper (2000) identified the following components:

- Planning and control,
- Work structure,
- Organization structure,
- Product flow facility structure,
- Information flow facility structure,
- Management methods,
- Power and leadership structure,
- Risk and reward structure,
- Culture and attitude,

IV. Strategies of Green Supply Chain Management

Risk-based Strategies

The simplest strategy of **Green Supply Chain Management** with regard to inter-organizational investment resource development is one of risk minimization. Firms adopting this strategy are proposed to do so in response ostensibly to stakeholder requirements. Such a strategy is ideal for the organization that retains minimal internal environmental management resources or has only recently begun to consider the introduction of a supply chain greening program. It is based on minimal inter-organizational engagement. Such efforts might involve the inclusion of basic clauses in purchasing contracts for suppliers to meet all relevant regulatory requirements. Most frequently used with this approach is the cascading of an established international standard such as ISO 14001 (King, Lenox, & Terlaak, 2005). The use of an existing performance standard, an approach used initially by the Ford Motor Company with its suppliers and now more frequently by other organizations for their supply chains, offers: (a) established environmental performance benefi ts (Melnyk, Sroufe, & Calantone, 2003), (b) third party or arms-length management of performance, and (c) a system recognized globally by other organizations. This third aspect improves the effi cacy of uptake by suppliers because the system is recognized by the market and other industry members, reducing the ambiguity of desired performance levels and minimizing the need for customer involvement. From the perspective of competitive advantage, however, the benefi ts are limited because of the ease of implementation, a lack of uniqueness, and a growing use by other supply chains. A similar approach to basic certification schemes is the use of broad statements within purchasing guidance or principles to include 'supplier activities' among the organization's environmental responsibilities. Such systems based on risk minimization only and managed in a climate of low relational investment only guarantee supply chain compliance with local or national regulations. The end result being that risk can be minimized and reputation enhancement is possible, but no additional innovation or complementary economic benefi ts are likely.

Efficiency-based Strategies

A more complex and developing strategy in recent years has been the 'eco-efficiency' or 'lean-and-green' approach to GSCM. This type of strategy derives environmental performance benefits for the supply chain beyond mere regulatory compliance through the requirement for suppliers to meet operations-based efficiency targets. Much of the environmental performance benefit arises from specific manufacturing practices that have been found to provide secondary environmental performance benefits. The point of departure for the efficiency based strategy from the risk-based strategy is the availability of dual economic and environmental performance benefits to the supply chain and the requirement for higher levels of engagement between customers and suppliers. The efficiency-based strategy ties environmental performance to operational processes in the supply chain, and this strategy allows the extension of performance requirements into the supply chain that maximize economic performance and provide secondary environmental performance benefits through waste and resource use reductions. It requires more comprehensive and supply chain specific performance specifications than the simpler risk-based strategy. It also requires a higher level of involvement between supply chain partners arising from the use of more complex interfirm performance requirements. Using this strategy to facilitate greater efficiency in the supply chain does not require the development of co-specialized resources specific to environmental performance. The necessity for collaboration on efficiency, however, provides a facilitating role for context-specific, complex problems such as waste reduction and recycling (Geffen & Rothenberg, 2000;Klassen & Vachon, 2003). product design, material substitution, or innovation. Product recalls because of a poor choice of low-cost but hazardous materials represent the inherent risk in focusing only on effi ciency in the supply chain. The effi ciency-based strategy is considered technically weak but more socially complex than the risk-basedstrategy.

Innovation-based Strategies

The innovation-based green supply chain

Innovation-based Strategies

The innovation-based green supply chain management strategy is distinct from the management strategy is distinct from the efficiency-based approach because of its use of a supply chain environmental performance strategy that is more environmentally specific. Organizations are increasingly aware of the potential for narrow purchasing policies to in-source components or services from suppliers that may be legally non-compliant with environmental regulations or who themselves procure goods in an environmentally irresponsible way (Bowen et al, 2001). Some organizations have begun to guarantee more comprehensive product life-cycle considerations for consumers of their products. Once a supply chain begins to consider

specialized processes, technologies, or complex performance standards for suppliers such as chemical avoidance, the level of knowledge exchange and relational investment begins to change. Moving from an effi ciency-based GSCM strategy to a greater level of innovation or integration of environmental performance in supply chain and product design requires specialized environmental resources (Lenox & King, 2004). Keeping up-to-date with environmental legislation changes and training suppliers in environmentally relevant process changes requires more dedicated environmental resources, specialized personnel, and design.

Closed-loop Strategies

Closed-loop strategies are a more recent type of GSCM strategy and represent the most complex and collaborative form of this type of activity. Often referred to in its simplest form as 'reverse logistics,'closing the loop involves the capture and recovery of materials for either re-anufacture (high-value) or recycling (low value) (Kocabasoglou et al, 2007). These materials can arise during production, as returned goods, post-use, and at end-oflife. The closed-loop strategy ties or integrates environmental performance to the whole supply chain. Very few examples of coordinated recycling or closed-loop activity in the supply chain currently exist however. Prominent examples include Kodak's return and re-manufacture of its disposable cameras, Hewlett Packard's retrieval of used printer cartridges, and BMW's end-of-life vehicle requirements for suppliers (Guide et al, 2002). The motivation for a closed-loop strategy remains low for basic reasons of poor and distributed control over the reverse supply chain, lack of available infrastructure, and the inability of supply chains to believe that such activity is economically viable. Designing and successfully using a closed-loop strategy presents one of the most complex endeavours for a single organization to undertake within its supply chain (Richey et al, 2005). Goods need to be managed for quality considerations and aggregation of collection and sorting activities allows for the creation of economies of scale. Such a high level of integration, coordination across partners, and socially complex knowledge requires years of development effort. Socially complex, collaborative relationships provide the basic foundation for a closed-loop supply chain strategy.

Accounting of Green Supply chain: -

ACCOUNTING of green Supply chain is a recent and most important concept. **Accountancy** is the art of communicating financial information about a business entity to users such as shareholders and managers. The communication is generally in the form of financial statements that show in money terms the economic resources under the control of management. It is the branch of mathematical science that is useful in discovering the causes of success and failure in business. The principles of accountancy are applied to business entities in three divisions of practical art, named accounting, bookkeeping, and auditing. Accounting is defined by the AICPA as "The art of recording, classifying, and summarizing in a significant manner and in terms of money, transactions and events which are, in part at least, of financial character, and interpreting the results thereof." Early accounts served mainly to assist the memory of the businessperson and the audience for the account was the proprietor or record keeper alone. Accounting that provides information to people outside the business entity is called financial accounting and provides information to present and potential shareholders, creditors such as banks or vendors, financial analysts, economists, and government agencies. The relationship between shareholders and management is one between principals and agents. The agents (management) should, in a world with asymmetrically distributed information, respond to the need for transparency of different stakeholder groups (principals). Accounting, whether it is management accounting or financial accounting, creates the needed transparency and accountability.

Accounting principles of green supply chain:-

The accounting principles that have been developed in the past refer mostly to the information processing of the single (isolated) firm, and are proposed by rulemaking bodies, like the EU (4th Directive), IAS (IRFS guidelines), SEC (NYSE prescriptions), GRI (Global Reporting Initiative, stressing sustainability reporting), Official sources for these principles began with the American Institute of Certified Public Accounts (AICPA), whose Accounting Principles Board issued 31 formal opinions. AICPA has been replaced by the Financial Accounting Standards Board (FASB). There are following **Accounting** principles of green Supply chain:-

ACCOUNTING ENTITY CONCEPT: -

Accounting entity concept is an important concept in green supply chain management under this concept an economic unit, which may be a person, business, government, organization, or part thereof, is being accounted for.

GOING CONCERN CONCEPT: -

Until reasonable facts indicate otherwise, it is assumed that the accounting entity will exist long enough to use assets and fulfill commitments. Liquidation value may be ignored. The green supply chain management accounting follow this concept.

TIME PERIOD CONCEPT:-

To be useful, accounting information must be current and presented in equal understandable time units called accounting periods. The green supply chain management accounting is based on time periodic concept.

COST PRINCIPLE:-

Income Statement and Balance Sheet accounts must be recorded at cost, as evidenced by their objective fair market value at time of acquisition. Called historical costs, these figures, to the dismay of some, are generally not adjusted to current market value.

REALIZATION PRINCIPLE: -

With accrual accounting, revenue is recorded when earned, and costs are recorded when incurred. For a retailing business, point of sale easily establishes when earned, for manufacturing and construction businesses, the process is more complicated.

THE MATCHING PRINCIPLE: -

When determining income, expenses must be matched with the revenue they generate. According to the principle, expenses are recognized when obligations are (1) incurred (usually when goods are transferred or services rendered, e.g. sold), and (2) offset against recognized revenues, which were generated from those expenses (related on the cause-and-effect basis), no matter when cash is paid out.

OBJECTIVITY PRINCIPLE: -

To be reliable, accounting information must be objective. Objectivity requires unbiased opinions of verifiable events concerning business transactions.

MATERIALITY: -

Accounting principles need not be followed when the effect of this action is immaterial and would not effect the reader's interpretation of the accounting information. The green supply chain management accounting conciders the materiality concept.

FULL DISCLOSURE:-

All relevant material facts must be incorporated into financial statements. Some information, such as a contingent liability, is easily communicated with a footnote, while other information, such as the effect of inflation, requires more complex procedures.

CONSISTENCY: -

Accounting methods used to determine income and value balance sheet items must be consistently applied.

CONSERVATISM: -

Estimates requiring subjective analysis should not overstate revenue and asset Values or understate expenses and liabilities.

STABLE DOLLAR ASSUMPTION:-

Historical costing assumes a stable dollar. Because the dollar is not stable, larger corporations, at FASB's request, voluntarily prepare information on the effects of inflation on their financial statements.

Accounting standards for green supply chains: - There are following three proposed accounting standard for accounting of green supply chain.

- Reciprocity in information access: those that deliver information to the system should be able to retrieve an equivalent amount. In contrast with centralized and atomic supply chains (in which information is centralized or dispersed, respectively), transparency is best served in cooperative supply chains; they render open access to information concerning supply-chain operations, strategy and results.
- Equivalent cash flows: provision of assets (supply-chain investments) should be matched with an equivalent amount of assets (cash flows) in return.
- Matching risks and returns: the bigger the opportunities for individual firms, the bigger the contribution should be in risk sharing and risk management.

Problems involved accounting of green Supply chain:-

In this areas there are following in accounting of green Supply chain:-

- Technical: achieving efficient transmission and reception of data;
- Semantic: increasing precision of message transfer;
- Effectiveness: level of behavioral influence.

Supply-chain governance:-

There are three types of supply-chain governance can be discerned: the centralized supply chain, the cooperative supply chain and the decentralized (atomic) supply chain. In a centralized supply chain, all information about the strategic and operational issues is concentrated at one of the firms within the channel. Moreover, the central governing firm not only controls the operational processes and strategy, but also the information flows to the contributing firms. The profit from supply-chain activities is captured by this central governing firm, because of its dominant position and power. An example of this governance system is the EUREP-GAP quality system that supermarkets have imposed on the horticultural and agricultural producers.

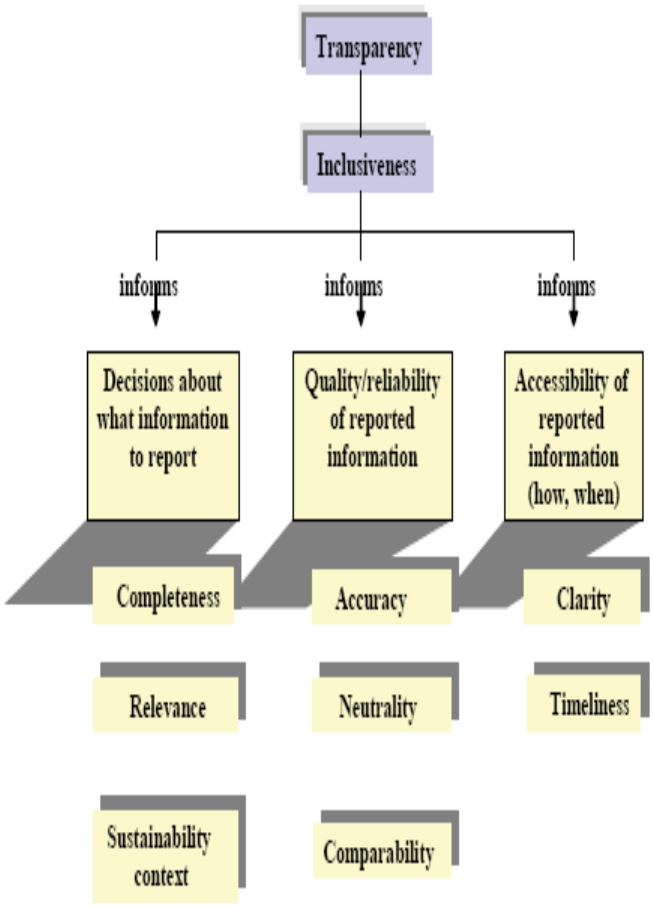

Figure 1. Reporting principles (source: Global Reporting Initiative 2002, p. 23)

In a cooperative supply chain, the partners have an equal (or better 'equivalent') say and have the right to be informed on overall chain performance. Surpluses are distributed to the partners in concordance with their contribution to chain efforts. The cooperative supply-chain governance system is the ideal image of a well functioning, sustainable supply chain, because centralized governance (hierarchy) could just as well take place within the individual firm. On the other end of the continuum, the atomic supply chain uses market price as the only coordination mechanism. Under these rules, accounting is dispersed over different firms and a collective information system is non-existent. Only in the cooperative supply chain, a collectively designed and controlled information system is viable. Especially in cooperative supply chains that are not governed by decisive (legal) property rights, an integrated or supplementary reporting structure will be necessary, since

intellectual, social and physical assets are for a large part not controlled by a single firm, but are common property. Although such a supply-chain governance structure is a channel structure rather than a cooperative in legal sense, its governance resembles the legal cooperative governance in many aspects. Analogous problems are present: performance measurement, redistribution of benefits and joint governance (member influence). Effective vertical coordination and policy disclosure make the development of special standards for supply-chain accounting necessary. There are following legal technical devices were evaluated:

- Integrated environmental permit for the supply chain as a whole;
- Integrated environmental report for the supply chain as a whole;
- Electronic environmental reporting;

V. CONCLUSIONS AND FINDINGS

Green Supply **chain management (SCM)** is the management of a network of interconnected businesses involved in the ultimate provision of green -product and green -service packages required by end customers. During 1980's and 90's, there has been a rapid industrialization of agriculture in the developed economies around the world. Accounting is the language of commerce. Accounting of green -food Supply chain is a recent and most important concept. **Accountancy** is the art of communicating financial information about a business entity to users such as shareholders and managers. For accounting in supply chains to be effective and efficient, not only technical conditions, like electronic reporting devices, are a prerequisite, but also the availability of (normative) accounting standards. Like all accounting standards, supply-chain accounting standards should mainly come from practice, as well as from theoretical reasoning. We found that the devices we proposed are supported by a considerable number of companies. Not only do they improve transparency and cooperative decision making, but they will, if adopted, also reduce the administrative burden of the companies cooperating in supply chains. Concepts, cases and empirical findings of these approaches in green -food supply chains have been demonstrated. Second, understanding the complex systems of green -food chains requires more investments in retrieving empirical data for testing propositions and developing appropriate models. The experiences from past research can be and should be further explored. The identified research gaps a discussion points are shared among an international forum of researchers. International cooperation among researchers will enhance progress in this research field. The workshop and conferences are highly valued in this respect.

Directions for Future Study

There are many issues that require further Study, which needs to be of 'best practice' case studies, and larger field studies that map the fi eld and its progress. We also need to extend existing theories and principles of competitive advantage, operations management resource-based view of the firm and others. Some suggested research areas and issues follow.As raw material costs increase and environmental protection legislation becomes increasingly stringent, a focus on one fi rm's green operational excellence is becoming the norm in organizations.

To attain even greater cost savings from waste reduction, meet comprehensive social and environmental responsibility targets and fi nd new products with smaller ecological footprints, firms are now extending their goals for environmental performance into their suppliers' operations. This type of activity is an effective mechanism for fi rms to improve their record on corporate social responsibility, lower reputational risks, reduce wastes, and improve supply chain response-time to new environmental regulations.

VI. TEXT CITATIONS

A. Gereffi has shown that many chains are characterized by a dominant party who determine the overall character of the chain, and as lead firm(s) become responsible for upgrading activities within individual links and coordinating interaction between the links.

B. In Canada, Alberta has recently created AVAC, a public institution; to encourage the formation of value chains in agri-food systems. Supply chain formation within agri-food system is driven by the desire to improve competitiveness.

C. Porter (1980) identifies, through industry life cycle perspective, four stages for the chain development: birth, expansion, efficiency, and self-renewal. Some of generic characteristics for each stage of chain development is discussed in the presentation.

D. According to Lambert and Cooper (2000), operating an integrated supply chain requires a continuous information flow.

E. A.T. Kearney Consultants (1985) noted that firms engaging in comprehensive performance measurement realized improvements in overall productivity.

F. Bowersox and Closs states that the emphasis on cooperation represents the synergism leading to the highest level of joint achievement (Bowersox and Closs, 1996).

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SSTC: Secure and Seclusion-Upholding Timeserving Computing for Physical Health Information

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Abstract- Now a day's Wireless Sensor is booming research area and used in most of the sensitive application. Mobile Healthcare is one of the most important, sensitive and necessary research point in WSN. Mobile Healthcare (m-Healthcare) helps the Healthcare Centre to provide a better Healthcare Solution to the Medical User. Although m-Healthcare is flourishing, the Security is most challenging problem in Mobile Healthcare. In this paper we propose a Secure and Seclusion-Upholding Timeserving Computing (SSTC) for Physical Health Information in mobile Healthcare. In case of medical emergency how the physical health information is transferred securely using SSTC has been discussed in this paper. SSTC will also provide a timeserving method while it's needed at the time of medical emergency. SSTC will provide minimum disclosure of patient's highly sensitive Physical Health Information.

Index Terms: Mobile Healthcare (m-Healthcare), Physical Health Information (PHI), Body Sensor, Private Key.

I. INTRODUCTION

Wireless Sensors are one of the main component of mobile healthcare system. Sensors used in m-Healthcare are known as the wearable body sensors. These wearable body sensors are implanted in the patient's body. Body sensor senses the various condition of patient's body like blood pressure, heart beat, blood sugar, body temperature and others. These data are known as the physical health information. The highly sensitive physical health information is then transmitted to authorised medical healthcare centre. According to the received PHI medical experts present in the medical centre will provide a remote healthcare solution.

Fig. 1 PHI Transmission Scenario in m-Healthcare

But in case of medical emergency m-Healthcare faces various problem like privacy of transferred data, power effectiveness of the transmitting device. While the emergency occurs body sensors senses the various condition of patient very rapidly and generate a huge data that is needed to transmit via 3G network to the authorised healthcare centre. To send these huge data a transmitting device (mobile) should have enough power. But mobile is used for various purpose like calling, web browsing, navigating etc. and battery power may be drained. In that case patient's mobile will use the passing by person's mobile phone who has enough power in his mobile phone battery to send the highly sensitive physical health information to the authorised healthcare centre. If a passing by person has no subscription of the medical healthcare solution provided by the healthcare centre then the person can't be selected for the further process of transmitting the physical health information. Another factor that will be consider for selecting other sources is

how much trust worthy is the passing by person depending upon the similarity in their physical health information. The selection of other devices is shown in the fig. 2.

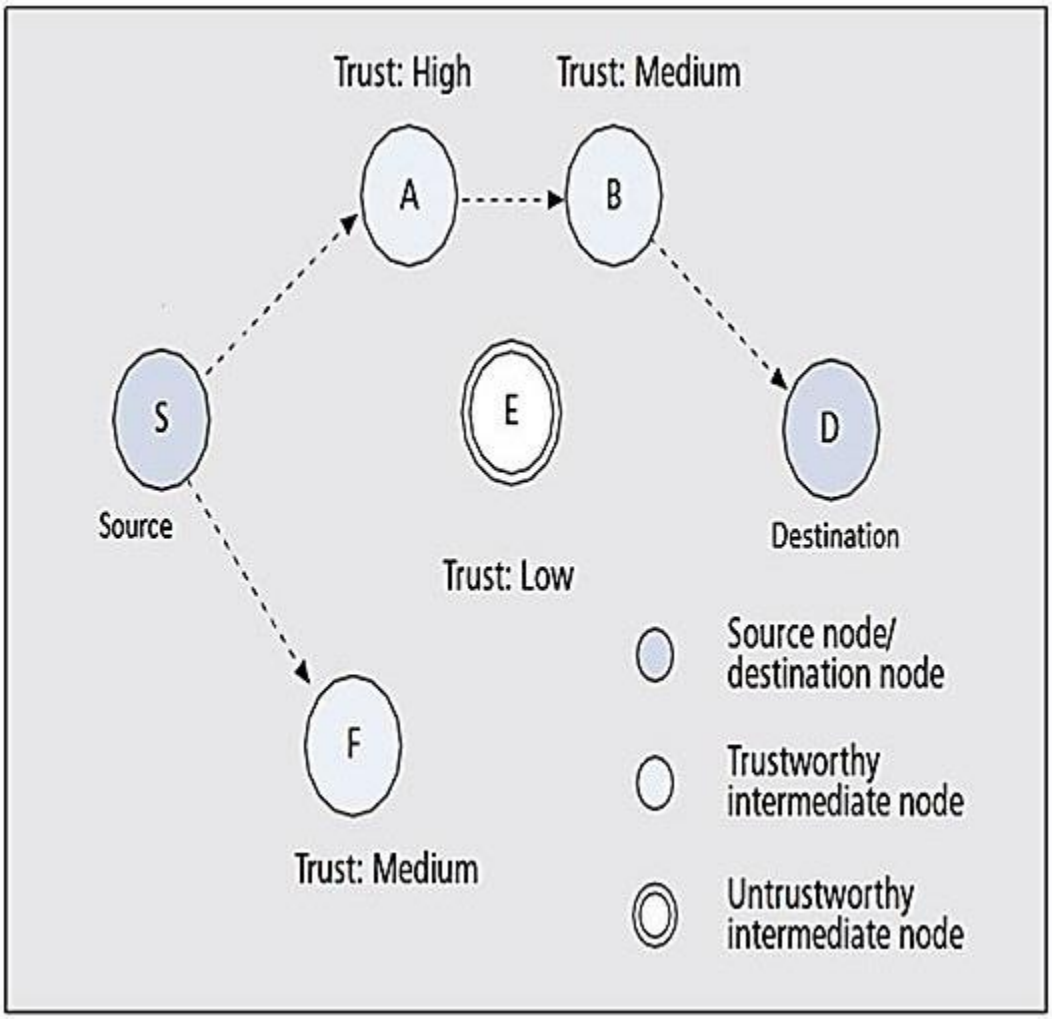


Fig. 2 Selection of Other Power Source

I. PROPOSED SYSTEM

To overcome the security issues and the low power of transmission device we proposed the Secure and Seclusion-Upholding Timeserving Computing. It will work in two steps:

i. Data Encryption
ii. Tackle Power Issue.

i. Data Encryption:

Using the symmetric key physical health information will be encrypted. At the time of subscription for a m-Healthcare solution a private key will be distributed to the medical user. Medical user will share the private key only with the authorised m-Healthcare centre. Data collected by the body sensor will be encrypted by the medical user using the shared private key and the encrypted PHI will be send to the helping node. Helping node will not be able to read the sensitive physical health information as they are encrypted with the medical user's private key. Helping node will forward the

encrypted data to the m-Healthcare Centre. These data can easily be decrypted here as they have the user's private key. Symmetric key provides the security to the patient's health information.

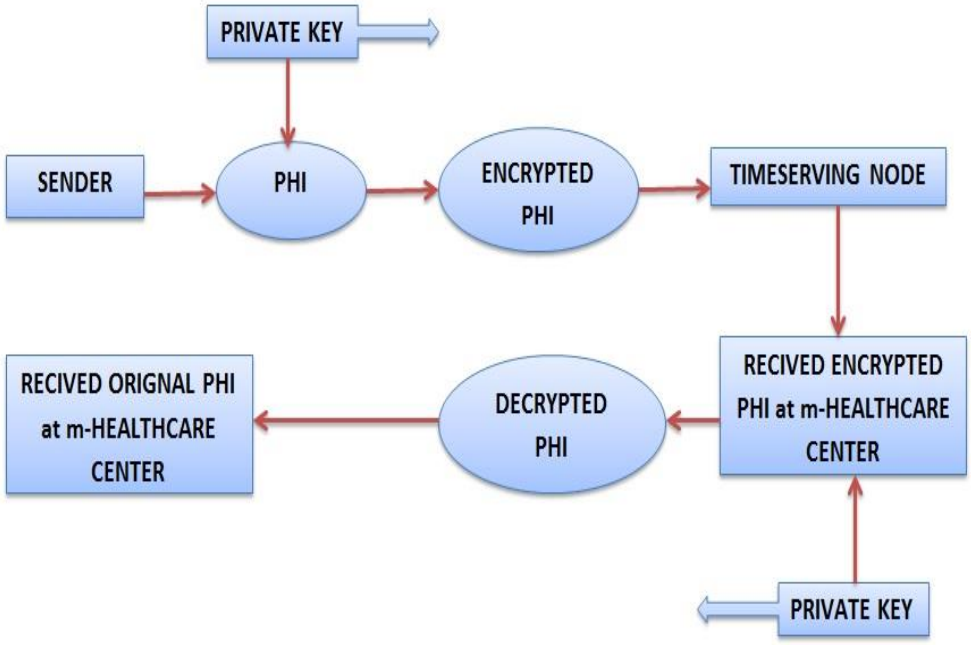


Fig. 3 PHI Encryption

ii. Tackle Power Issue:

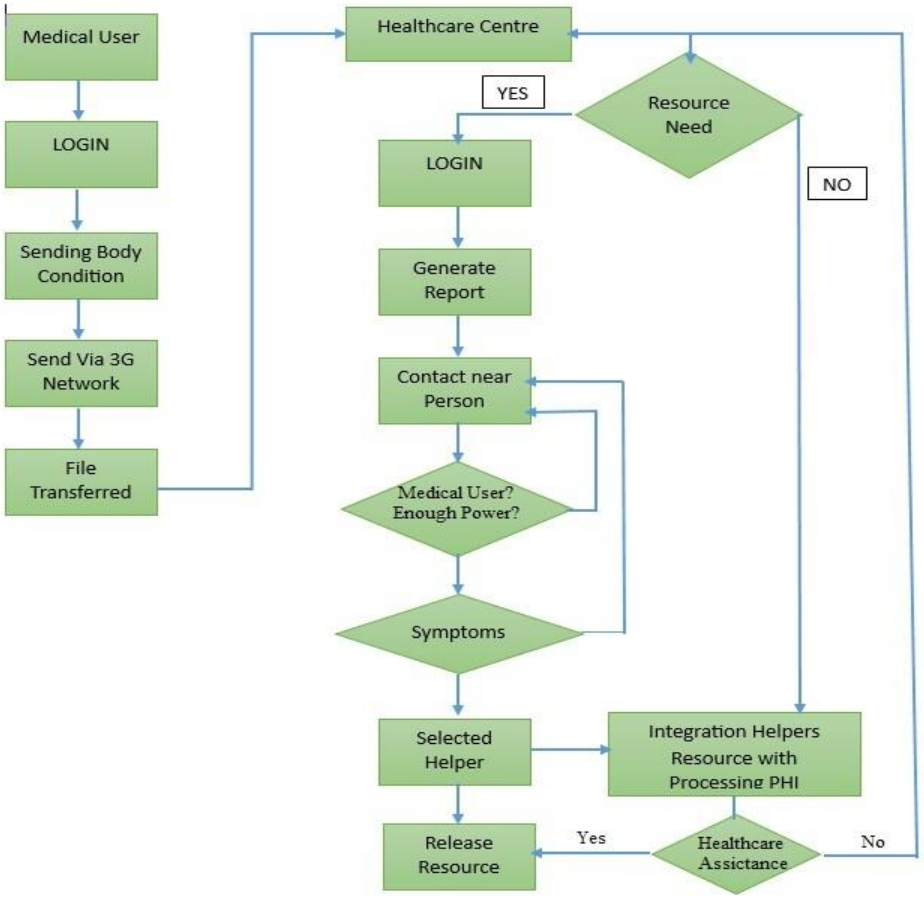
Lower power of transmitting device is solved using the passing by Timeserving Devices. While the medical user don't have enough power to transmit the data, it looks for the other timeserving devices which are medical user. Selection of trust worthy helping node is shown in fig. 2. These trust worthy devices help in forwarding the encrypted PHI to the m-Healthcare Centre.

II. BLOCK DIAGRAM & PROCEDURE

Procedure of the Computing:

1. Body sensor will gather the body condition.
2. Generate the PHI.
3. If power is sufficient, send the PHI to the Healthcare Centre.
4. Else Contact the passing by person.
5. Check whether the passing by person is a medical user or not.
6. If the person is not medical user discard it.
7. If the person is a medical user check whether the transmitting device has enough power.
8. Check for the similar symptoms.
9. If a threshold is achieved then the node is selected for the PHI transmission.
10. Send the PHI using the timeserving Node.
11. Receive medical assistance from the authorized medical Healthcare Centre.

Block Diagram:



III. RESULTS

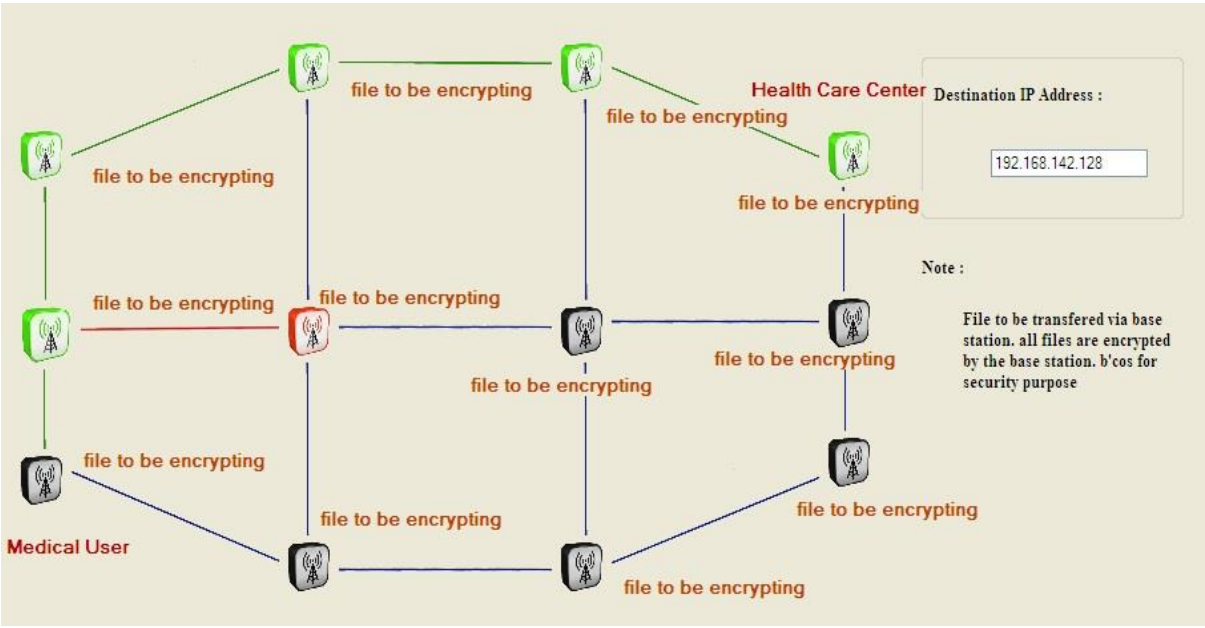


Fig. 4 Encrypted PHI Transmitted Via Trusted Node

In case of emergency Medical User will encrypt the PHI, so that helping nodes could not able to read the data. These encrypted data will be transmitted via helping nodes. Timeserving helping nodes are selected on the basis of SSTC. Here in the result Red node represents the timeserving node which is not qualified for helping. Green nodes represent the qualified timeserving helping nodes. These nodes will help the medical user to transmit the highly sensitive encrypted physical health information to the authorised Healthcare Centre. After decrypting the data with the help of the key, that is shared at the time of subscription with the medical user, healthcare centre will provide mobile assistance to the medical user.

IV. Conclusion and Future Work

In this paper we proposed a computing to secure the medical user's highly sensitive physical health information. The transmission power and the security of sensitive physical health information is the main issues in transmitting physical health information. For an effective mobile Healthcare service physical Health Information are needed to be transmitted at the time of emergency case while the medical users transmitting power is not enough in order to send the rapidly generated highly sensitive physical health information. Proposed SSTC is simple way to handle these kind of emergency cases effectively. In future asymmetric key encryption can be used for better security and low computational cost.

Acknowledgment

I would like to express my special thanks of gratitude to Mr. Sanjeev Kumar Tomar, Mr. Kunal Gupta, as well as our HOD who gave me the golden opportunity to work on the topic Secure and Seclusion-Upholding Timeserving Computing for Physical Health Information, which also helped me in doing a lot of Research and I came to know about so many new things. I am really thankful to them. Secondly I would also like to thank my parents and friends who helped me a lot in finishing this research within the limited time.

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Mitigating Large Propagation Delay by Mitigating Wormhole Attack in Mobile Ad Hoc Network

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***Abstract*-** Wormhole attacks, in which colluding attackers with out-of-band communication links record packets (or bits) at one location and replay at another, cause far away nodes to consider themselves as neighbours to one another.

Under this attack, two faraway malicious nodes can collude together using either wired link or directional antenna, to give an impression that they are only one hop away. We presents NEVO, in which nodes passively monitor (overhear) the forwarding of broadcast type packets by their neighbours and use the send and overhear times of trans- missions of these packets, to mitigate these wormhole attacks. NEVO does not require synchronized clocks, special hardware support, or any special capability. NEVO can detect almost all instances of wormhole attacks and is virtually independent of the routing protocol used. NEVO has a disadvantage that it does not consider the impact of clock drift. On the other hand, NEVO uses network layer verification, which takes more time to complete, and thus require clock drift correction. In this paper, we use an approach which consider the impact of clock drift and do not require any correction in network layer.

***Index Terms*-** MANET**,** wormhole, NEVO

I. INTRODUCTION

Mobile Ad Hoc Networks is the most popular networks widely used in various applications. It consists of mobile nodes where each node communicates with each other. The control of nodes is not administrated by any access point. Due to this, the network is easily impersonated by several attacks like active and passive attacks. These attacks degrade the performance of networks i.e. means network connectivity, network availability and communication coverage.

In a wormhole attack, two or more colluding attackers create a private communication channel (wormhole) between them and replay packets heard at one end of the link at the other end. This can cause two far away nodes to consider themselves as neighbours to each other or have a distorted view of the number of hops between them. This is a particularly hard attack using which even a handful of malicious nodes can conduct traffic analysis of packets or disrupt connections by dropping packets when needed. Wormhole attack can be launched in hidden or in participation mode. The wormhole attacks are powerful since the attackers neither needs to neither compromise any of the network nodes nor have any knowledge of the security mechanisms or routing protocols in use.

The security mechanisms used for wired network such as authentication and encryption are futile under hidden mode wormhole attack, as the nodes only forward the packets and do not modify their headers. Wormhole attacks are considered to be difficult to prevent since the malicious nodes are invisible and may use special high-speed links to cover large distances [1]. Wormhole attackers can also simply record the traffic for later analysis.

It is easy to see that wormhole attack that span long distances (multiple hops) can be prevented if each node that its neighbour is truly within its radio range.

According to this observation, there is a network layer based countermeasure in which nodes passively monitor or overhear [5] the forward- ing of certain types of broadcast packets by their neighbours and use the timing information of these broadcast packets to ensure that routes are established through true neighbours only. We call it NEVO (Neighbour Verification by Overhearing). NEVO re- quires broadcasts among neighbors, which are commonly used in ad hoc wireless networks, and local timestamps of broadcast packets sent or received by the medium access control (MAC) layer, which do not require any changes to the MAC protocol but may require a firmware upgrade to enable MAC layer to automatically send this information to the network layer. NEVO does not rely on special hardware support such as directional antennas or ultrasound transmitters/receivers, special capabilities such as clock synchronization or GPS coordinates, geometric inconsistencies, or statistical methods. Therefore, NEVO is a practical solution to mitigate wormhole attacks. NEVO works with all ad hoc network routing protocols.

Implementation of NEVO together with a previously proposed on demand secure routing protocol SOR [9], which prevents route Falsification and tunnelling attacks by compromised insider nodes, in the Glomosim simulator.

II. WORMHOLE ATTACK IN MANET

In this attack, an attacker receives packets at one location in the network and tunnels packets to another location in the network, where the packets are resent into the network. This tunnel between two colluding attackers is referred to as a wormhole. It could be established through a single long-range wireless link or even through a wired link between the two colluding attackers.

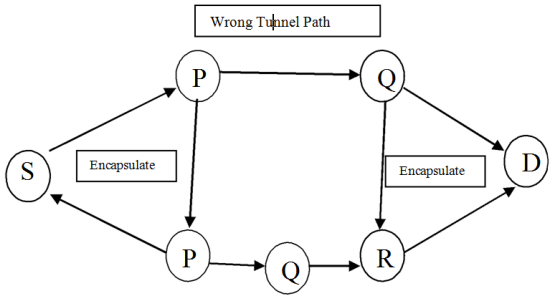

FIGURE1: WORMHOLE ATTACK

Due to the broadcast nature of the radio channel, the attacker can create a wormhole even for packets not addressed to itself.

Example In figure1. **P** and **Q** are two malicious nodes that encapsulate data packets and falsified the route lengths. Suppose node **S** wishes to form a route to **D** and initiates route discovery. When **P** receives a Route Request from **S, *Q*** encapsulates the Route Request and tunnels it to **Q** through an existing data route, in this case {**P** --> **P** --> **Q** --> **R** --> Q}. When Q receives the encapsulated Route Request for **D** then it will show that it had only travelled {**S** --> **P** --> **Q** --> **D**}. Neither P nor **Q** updates the packet header. After route discovery, the destination finds two routes from **S** of unequal length i.e. one is of 4 and another is of 3. If **Q** tunnels the Route Reply back to **P**, **S** would falsely consider the path to **D** via P is better than the path to **D** via R. Thus, tunnelling can prevent honest intermediate nodes from correctly incrementing the metric used to measure path lengths.

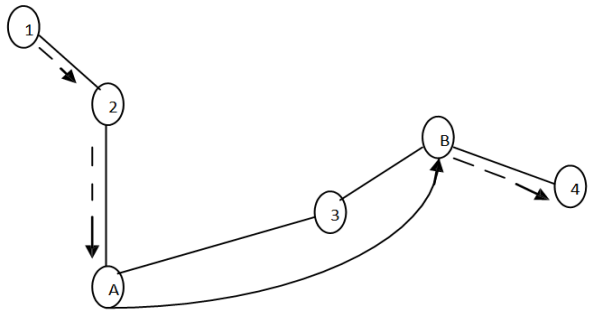

Figure.1.1. A wormhole attack performed by colluding malicious nodes A and B

Though no harm is done if the wormhole is used properly for efficient relaying of packets, it puts the attacker in a powerful position compared to other nodes in the network, which the attacker could use in a manner that could compromise the security of the network. The wormhole attack is particularly dangerous against many ad hoc network routing protocols in which the nodes that hear a packet transmission directly from some node consider themselves to be in range of that node. Performance of wormhole attack can be shown in figure 2.In this attack, an attacker receives packets at one point in the network, "tunnels" them to another point in the network, and then replays them into the network from that point.

Due to the nature of wireless transmission, the attacker can create a wormhole even for packets not addressed to it, since it can overhear them in wireless transmission and tunnel them to the colluding attacker at the opposite end of the wormhole. Two malicious nodes share a private communication link between them. Worm hole can eavesdrop the traffic, maliciously drop the packets, and perform man-in- the-middle attacks against the network protocols.

III. NEVO

We illustrate the approach of NEVO using Fig. 1.3 in which node *i* broadcasts a packet, and one of its neighbors, node *j*, rebroadcasts (forwards) it. We assume half-duplex wireless channels. Let *t* denote the time it takes a packet to traverse one hop and δ denote the time taken by *j* to process the packet and acquire the channel before transmitting it. Then, node *i* overhears *j*'s forwarding in $t + \delta$ seconds after it completed its broadcast if node *j* is a true neighbor. On the other hand, it takes at least $3t + \delta$ seconds to overhear *j*'s forwarding via a wormhole.

a. Timing Analysis of Wormhole Attacks

For a more rigorous timing analysis, we use Figs. 2 (a) and (b) and the following notation.

• $ts1$ ($ts1$): the local time of node *i* (node *j*) at the time the first bit of the message is broadcasted by node *i* (heard by node *j*).

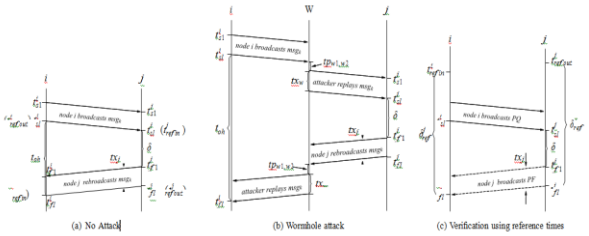

Fig. 2. Timing analysis of packet transmissions.

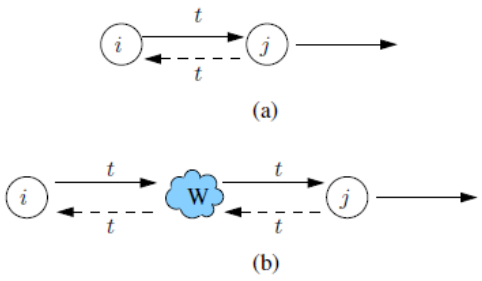

Fig.1.3. Detection of out-of-band wormholes using passive monitoring. Node *i* sends a packet to node *j* and then passively monitors node *j*'s forwarding.

(a) normal case; (b) attack case with a wormhole, *W*, between node *i* and
node *j*. *W* is formed by one or multiple colluding attackers.

• t^i_{sl} (t^j_{sl}): the local time of node *i* (node *j*) at the time the last bit of the message is broadcasted by node *i* (heard by node *j*).

• t^i_{fl1} (t^j_{fl1}): the local time of node *i* (node *j*) at the time the first bit of the message is overheard by node *i* (forwarded by node *j*).

• t^i_{fl} (t^j_{fl}): the local time of node *i* (node *j*) at the time the last bit of the message is overheard by node *i* (forwarded by node *j*).

• tx_j: the transmission time for the forwarded message by node *j*. It includes preamble and MAC headers. Note that $t^j_x = t^j_{fl} - t^j_{fl1} = t^i_{fl} - t^i_{fl1}$.

• δ: the message delay at node *j*, $\delta = t^j_{fl} - t^j_{sl}$

.• tx_w: the additional transmission delay incurred to replay the message by a wormhole attacker. This can be as low as one bit time to as much as *txj* .

• $tp_{i,j}$: the message propagation delay between nodes *i* and node *j*.

• t_{oh}: the overhear time, i.e., the time delay for node *i* to overhear node *j*'s forwarding after it broadcasted the message. I.e., $t_{oh} = t^i_{fl} - t^i_{sl}$.

• *R*: maximum radio transmission range in meters.

• *Sp*: radio signal propagation speed; $Sp < c$, where *c* is the speed of light in free space.

If nodes *i* and *j* are true neighbors, see Fig. 2 (a), the propagation delay between them can be estimated as follows.

$$t_{oh} = t^i_{fl} - t^i_{sl} = tx_j + \delta + 2tp_{i,j} \quad (1)$$

$$t_{oh} - tx_j - \delta = 2tp_{i,j} \quad (2)$$

Note that node *i* knows $tx_j = t^i_{fl} - t^i_{fl1}$. In practice, δ, the processing delay at node *j*, varies a lot. However, if node *i* knows δ (suppose, node *j* gave this information in a separate message), then node *i* can verify if the following condition holds.

$$t_{oh} - tx_j - \delta = 2tp_{i,j} \leq 2R/Sp. \quad (3)$$

In the normal case without attack, (3) is satisfied.

In the case of a wormhole link between nodes *i* and *j*, see Fig. 2 (b), the time to overhear, denoted as *t'oh*, is given by

$$t'_{oh} = t^i_{fl} - t^i_{sl} = tx_j + \delta + 2(tx_w + tp_{i,w1} + tp_{w1,w2} + tp_{w2,j}) \quad (4)$$

where *w*1 and *w*2 are the two endpoints of the wormhole.

IV. Message Transmission Sequence in NEVO

The neighbor verification consists of three message transmissions between two encountered nodes, as shown in Fig. 3 — (1) node *i* broadcasts a control packet, called probe query (PQ) targeted to node *j*; (2) after node *j* receives the PQ from node *i*, it rebroadcasts (forwards) this query packet as its probe forward (PF) packet; then (3) node *j* sends node *i* a unicast packet, called probe reply (PR), which contains the processing delay, δ. After receiving PR from node *j*, node *i* can decide whether to accept node *j* as a true neighbor according to (3). To prevent wormhole attackers from fabricating probe packets, nonces are added to PQ and PF packets and a message authentication code to the PR packet. The message formats for PQ, PF, and PR are given as follows:

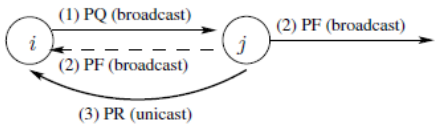

Figure3:Message Transmission Sequence used By NEVO

$$PQi = \{PQ, i, j, ni\} \quad (5)$$

$$PFj = \{PF, i, j, ni, nj\} \quad (6)$$

$$PRj = \{PR, i, j, ni, nj, \delta, Mij\} \quad (7)$$

where *ni* and *nj* are nonces generated by nodes *i* and *j* respectively,

Mij is the message authentication code computed over{PR,*i*, *j*, *ni*, *nj* , δ} using a shared cryptographic key betweennode *i* and *j*. Note that digital signatures may be used instead of message authentication codes.

Optimization: The broadcast message PF relayed might not be overheard by node *i* due to collision. Even if node *i* receives the PR from node *j* but did not overhear *j*'s forwarding, it cannot decide whether there is a wormhole link between them. Then the neighbor verification fails, and node *i* needs to retry the neighbor verification sequence. To reduce the number of retries, we introduce the concept of reference times. The reference times are local timestamps corresponding to a previous successful event such as the last time nodes *i* and *j* verified that they were true neighbors. Consider Fig. 2 (a) in which node *i* initiates the neighbor verification. When node *I* verifies that node *j* is its neighbor, node *i* records *tisl* and *tifl* as the reference times *tirefout* and *tirefin*, respectively. Also node *i* sends a special unicast packet to notify node *j* of theirtrue connectivity so that node *j* can record its local timestamps *tjsl* and *tjfl* during that verification event as its reference times *tjrefin* and *tjrefout*, respectively. These reference times are usedfor future neighbor verifications as follows.

We add one more fields to PR, $\delta jref = tjfl - tjrefout$, which is the delay between the time to send the last bit of the PF and the reference time, as shown in Fig. 2 (c). If node *i* receives *a* PR from node *j* and did not overhear the related PF, it can estimate $tifl = tirefin + \delta jref$ and then verify node *j* accordingto (3). This works only if nodes *i* and *j* verified each other by overhearing both ways and established the reference times.Node *j* sets $\delta jref = 0$, which indicates that reference time is invalid for neighbor verification, if reference times with node *I* are not established. The reference times *tirefout* and *tjrefin* are used for the case where node *j* initiates the verification of node *i*. Potentially, the references times may be updated whenever node *i* verifies node *j* without using $\delta jref$; however, such updates should be done infrequently to reduce the overhead.

V. Disadvantage of the NEVO

The message delay large δ in PR packet is measured at node *j* and used by node *i for* neighbor verification. If δ is, then relative clock drifts of the network cards can cause false positives.

Usually, a clock is characterized by its "skew," i.e., relative speed with respect to a reference clock, as well as an "off- set", i.e., the time difference from the reference clock at a particular time (time 0 of the reference clock is often used). In the neighbor verification of NEVO, clock at node *i* can be considered as the reference clock (denoted as *t*) and the clock (denoted as *tj* (*t*)) at node *j* satisfies

$$tj(t) = aj\,t + bj \quad , \qquad (8)$$

where *aj* denotes *skew* and *bj* denotes *offset*. Assume node *i* sends two broadcast messages to node *j* successfully and each node records the times of sending or receiving the first bit of the message.

NEVO is based on the True Link protocol [9]. True Link does not have the clock skew problem, however, since it reserves the channel and completes its verification related transmissions within a few microseconds. The disadvantage is it requires modifications to the 802.11 protocol. On the other hand, NEVO uses network layer verification, which takes more time to complete, and thus requires clock drift correction.

VI. PROPOSED WORK

As we know that NEVO does not consider the impact of clock drift and it requires modification to the 802.11
Protocol and also uses network layer verification, which Take more time to complete and thus require clock drift correction. we propose an approach in which we are considering the impact of clock drift and which do not require the change in 802.11 protocol and also no change in network layer verification which is very time consuming.

REQUESTING NODE

1. Enters request in its own queue (ordered by time stamps)
2. Send a request to every node.
3. Wait for replies from all other nodes.
4. if own request is at the head of the queue and all replies have been received send the data
5. After sending the data send a release message to every node

OTHER NODES

1. After receiving a request, enter the request in the request queue (ordered by time stamps) and reply with a time stamp.
2. After receiving release message, remove the corresponding request from the request queue.
3. If own request is at the head of the queue and all replies have been received.

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Big Data Landscape

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***Abstract*- "**Big Data" has become a major source of innovation across enterprises of all sizes .Data is being produced at an ever increasing rate. This growth in data production is driven by increased use of media, fast developing organizations, proliferation of web and systems connected to it. Having a lot of data is one thing, being able to store it, analyze it and visualize it in real time environment is a whole different ball game. New technologies are accumulating more data than ever; therefore many organizations are looking forward to optimal ways to make better use of their data. In a broader sense, organizations analyzing big data need to view data management, analysis, and decision-making in terms of "industrialized" flows and processes rather than discrete stocks of data or events. To handle these aspects of large quantities of data various open platforms had been developed.

***Index Terms*-** Big Data, Landscape,Open Platforms, Technologies,Tools

I. Introduction

In 2012 Gartner defined Big Data as follows "**Big Data are high volume, high velocity, and/or high variety information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimization**". Using a big data platform allows one to address the full spectrum of big data challenges. These platforms make use of traditional technologies that are most suited for structured and repeatable task and incorporate them with complementary new technologies that address speed and flexibility and are ideal for unstructured analysis as well as data exploration and discovery.

Open platforms are software systems which have fully documented external application programming interface which allow the use of software in other ways than the original programmer intended without affecting the source code. Open platforms are based on open standards and does not mean they are open source. Big data open platforms are based on similar concepts and various platforms are discussed that provide visualization and discovery of large data sets, monitors big data systems and speeds time to value with analytical and industry specific modules.

Exquisite Example
"THE GOD PARTICLE"

An exquisite example of the enormous amount of data generator
is The Large Hadron Collider which represent about of 150 million sensors delivers 150 million petabytes annual rate or nearly 500 exabytes per day .To put the numbers in perspective this is equivalent to 5×10^{20} bytes per day. Almost 200 times higher than all the sources combined together in the world. To handle this huge chunk of data will be hard with the existing data management technologies. Hence the technology transitions have become imminent.

II. Technology Transition

With the introduction of Big Data platforms there has been a change in analytic techniques of organizations. The focus of the organizations has moved from orthodox methods like trend analysis and forecasting using historic data to its complementary and far better data visualization techniques. More interests had been shown towards scenario simulation and development over standardized reporting techniques. Analytics is emerging as a key to enhance business processes.

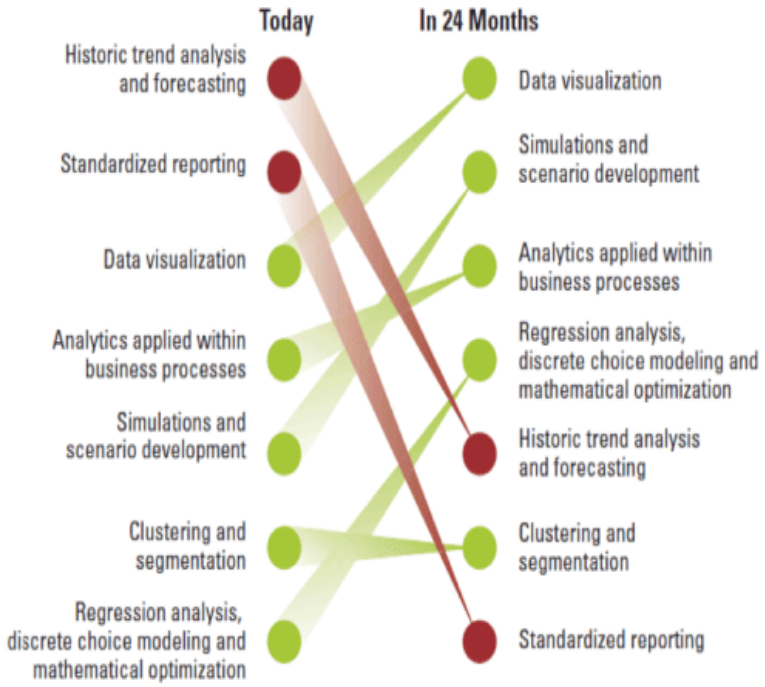

Figure1: Technology Transition

(Big data, Analytics and the Path from Insights to Value, MIT Sloan management review, Winter2011)

III. Classification of Big Data Tools

The Big Data tools landscape is growing rapidly and they can be classified majorly into following area:

1. Data Analysis
2. Databases/Data warehousing
3. Operational
4. Multi value Database
5. Business Intelligence
6. Data Mining
7. Key Value
8. Document Store
9. Graphs
10. Grid Solutions
11. Object Databases
12. Multi Model
13. XML databases
14. Big Data Search.

There are many products available for each classification, which have their own special features to meet the requirements.

Figure2: Big Data Landscape

IV. Big Data Landscape

In order to plan a big data architecture it is important to grasp the knowledge of the current big data landscape and incorporate it into existing infrastructure. In traditional data management structures, the structured information or data was fed into the enterprise integration tool which transferred the collected structured data into data warehouses or operational units. Then different analytical capabilities were used to reveal the data, but the new form of data management structures that inherit big data landscape are designed to meet the velocity, volume, value and variety of requirements. To handle these large data sets, new architectures have been formed that incorporate multi node parallel processing techniques.

Big data landscape has a further classification based on processing requirements and different strategies are proposed for

batch processing and real-time processing. Different technologies through which we can harness big data are :

1. Relational Database Management Systems
2. Massively Parallel Processing
3. MapReduce
4. NoSQL
5. Cassandra
6. Common Event Processing

Relational Database Management Systems

Databases are now using massively parallel processing techniques. These techniques are used to break data into small slots and to achieve faster processing operate them on multiple machines. Databases are acquiring columnar architecture to allow the storage of unstructured data.

Massively Parallel Processing

The data is distributed among a number of nodes for faster processing .The process is done parallel on each machine and the output is collected to deduce the required result. This technology requires knowledge of SQL and expensive hardware to work on.

MapReduce

Map reduce also use the concept of multi nodes and parallel processing .It consists of two function-

- Map - It separates information over multiple nodes which are then processed in parallel.
- Reduce - This function combines the result sets into a final response.
- Massively parallel processing uses SQL queries whereas MapReduce uses java and does not need expensive dedicated platforms.

NoSQL

NoSQL database-management systems are unlike relational database-management systems, in that they do not use SQL as their query language. The idea behind these systems is that that they are better for handling data that doesn't fit easily into tables. They dispense with the overhead of indexing, schema and ACID transactional properties to create large, replicated data stores for running analytics on inexpensive hardware, which is useful for dealing with unstructured data.

Hive

Databases like Hadoop's file store make ad hoc query and analysis difficult, as the programming map/reduce functions that are required can be difficult. Realizing this when working with Hadoop, Facebook created Hive, which converts SQL queries to map/reduce jobs to be executed using Hadoop.

Vendors

There is scarcely a vendor that doesn't have a big-data plan in train, with many companies combining their proprietary database products with the open-source Hadoop technology as their strategy to tackle velocity, variety and volume. Many of the early big-data technologies came out of open source, posing a threat to traditional IT vendors that have packaged their software and kept their intellectual property close to their chests. However, the open-source nature of the trend has also provided an opportunity for traditional IT vendors, because enterprise and government often find open-source tools off-putting.

Therefore, traditional vendors have welcomed Hadoop with open arms, packaging it in to their own proprietary systems so they can sell the result to enterprise as more comfortable and familiar packaged solutions.

Cloudera

Cloudera was founded in 2008 by employees who worked on Hadoop at Yahoo and Facebook. It contributes to the Hadoop open-source project, offering its own distribution of the software for free. It also sells a subscription-based, Hadoop-based distribution for the enterprise, which includes production support and tools to make it easier to run Hadoop.

Since its creation, various vendors have chosen Hadoop distribution for their own big-data products. In 2010, Teradata was one of the first to jump on the Cloudera bandwagon, with the two companies agreeing to connect the Hadoop distribution to Teradata's data warehouse so that customers could move information between the two. Around the same time, EMC made a similar arrangement for its Greenplum data warehouse. SGI and Dell signed agreements with Cloudera from the hardware side in 2011, while Oracle and IBM joined the party in 2012.

Hortonworks

Cloudera rival Hortonworks was birthed by key architects from the Yahoo Hadoop software engineering team. In June 2012, the company launched a high-availability version of Apache Hadoop, the Hortonworks Data Platform on which it collaborated with VMware, as the goal was to target companies deploying Hadoop on VMware's vSphere.

Teradata has also partnered with Hortonworks to create products that "help customers solve business problems in new and better ways".

Teradata

Teradata made its move out of the "old-world" data-warehouse space by buying Aster Data Systems and Aprimo in 2011. Teradata wanted Aster's ability to manage "a variety of diverse data that is not structured", such as web applications, sensor networks, social networks, genomics, video and photographs.

Teradata has now gone to market with the Aster Data nCluster, a database using MPP and MapReduce. Visualization and analysis is enabled through the Aster Data visual-development environment and suite of analytic modules. The Hadoop connecter, enabled by its agreement with Cloudera, allows for a transfer of information between nCluster and Hadoop.

Oracle

Oracle made its big-data appliance available earlier this year — a full rack of 18 Oracle Sun servers with 864GB of main memory; 216 CPU cores; 648TB of raw disk storage; 40Gbps InfiniBand connectivity between nodes and engineered systems; and 10Gbps Ethernet connectivity.

The system includes Cloudera's Apache Hadoop distribution and manager software, as well as an Oracle NoSQL database and

a distribution of R (an open-source statistical computing and graphics environment).

It integrates with Oracle's 11g database, with the idea being that customers can use Hadoop MapReduce to create optimised datasets to load and analyze in the database.

The appliance costs US$450,000, which puts it at the high end of big-data deployments, and not at the test and development end, according to analysts.

IBM

IBM combined Hadoop and its own patents to create IBM InfoSphere BigInsights and IBM InfoSphere Streams as the core technologies for its big-data push.

The BigInsights product, which enables the analysis of large-scale structured and unstructured data, "enhances" Hadoop to "withstand the demands of your enterprise", according to IBM. It adds administrative, workflow, provisioning and security features into the open-source distribution. Meanwhile, streams analysis has a more complex event-processing focus, allowing the continuous analysis of streaming data so that companies can respond to events.

IBM has partnered with Cloudera to integrate its Hadoop distribution and Cloudera manger with IBM BigInsights. Like Oracle's big-data product, IBM's BigInsights links to: IBM DB2, its Netezza data-warehouse appliance (its high-performance, massively parallel advanced analytic platform that can crunch petascale data volumes); its InfoSphere Warehouse; and its Smart Analytics System.

V. Platform Technology that Handles Big Data

VoltDB

VoltDB is a system consisting of a suitable format to a high-performance OLTP environment. The system is not memory-based data processing or SQL, but it performs sequential processing for data split based on stored procedure and reduces lock overhead with communication, helping to configure the high-speed OLTP system through horizontal split for table data.

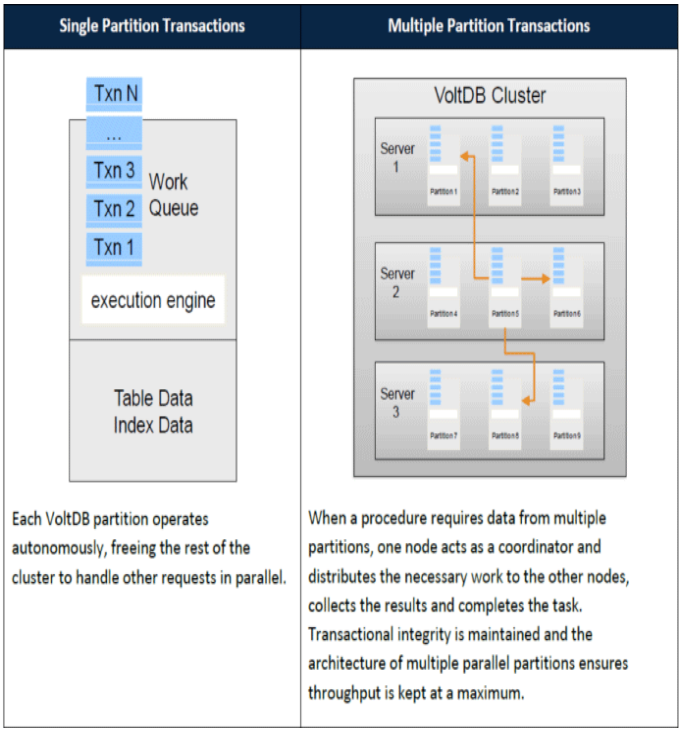

Figure 3: VoltDB architecture.

Figure 3 displays that a certain task that requires to operate in just one partition is executed sequentially in the corresponding partition, and that a certain task that needs to be handled in several partitions are processed by a coordinator. If there are many operations that need to be processed in several partitions, large rows and sizes may not be good.

SAP HANA

SAP HANA is a memory-based storage made from SAP. Its characteristic is to organize a system optimized to analysis tasks, such as OLAP. If all data is inside system memory, maximizing CPU utilization is crucial and the key point is to reduce bottlenecks between memory and CPU cache. In order to minimize Cache miss, consecutive data for processing within the given time is more advantageous, meaning that configuration of column-oriented tables could be favorable when analyzing many OLAP.

There are many advantages of the column-oriented table configuration and typical examples are a high data compression ratio and processing speed. In case of the same data domain, several data domains are better for data compression than when they are combined together. Moreover, the configuration enables reducing CPU operations through a lightweight compression, such as RLE (Run length encoding) or dictionary encoding or executing desired operations without a recovery process for compressed data. The following figure shows a brief comparison with Row-oriented and Column-oriented methods.

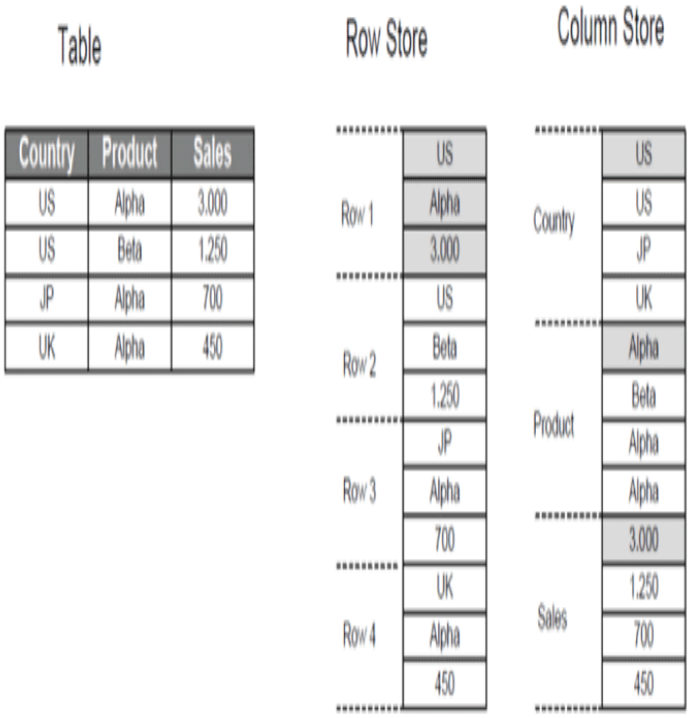

Figure 4: A Comparison with Row-oriented and Column-oriented methods.

Vertica

Vertica is database specialized for OLAP, which stores data on disk via the column method. The Shared-nothing-oriented MPP structure comprises a storage optimized for writing so as to load data fast, a reading storage in a compressed type, and tuple mover that manages bilateral data flow. Figure 5 below helps to understand the Vertica structure.

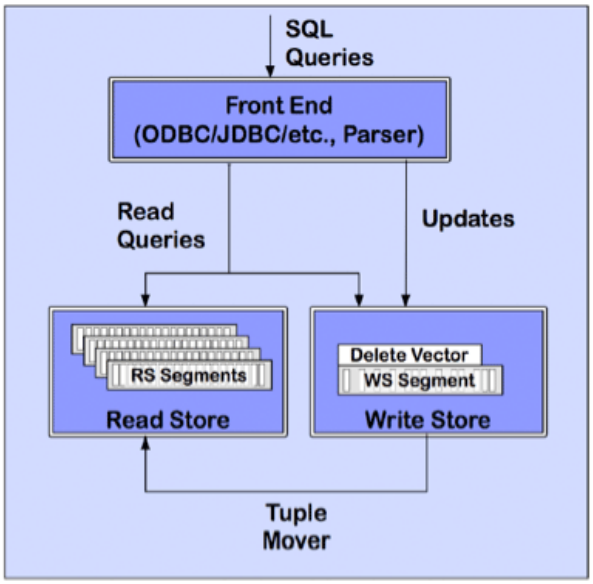

Figure 5: Vertica structure.

Greenplum

Greenplum database is a shared-nothing MPP structure, generated based on PostgreSQL. Data to be stored can select Row-oriented or Column-oriented methods accordingly to operations apply to the corresponding data. Data is stored in a server in segment and have availability because of segment unit replication of the log shipping method. A query engine, which was developed based on PostgreSQL, is configured to execute SQL basic operation (hash-join, hash-aggregation) or a map-reduce program so as to effectively process parallel query or map-reduced type programs. Each process node is connected to software-oriented data switch component.

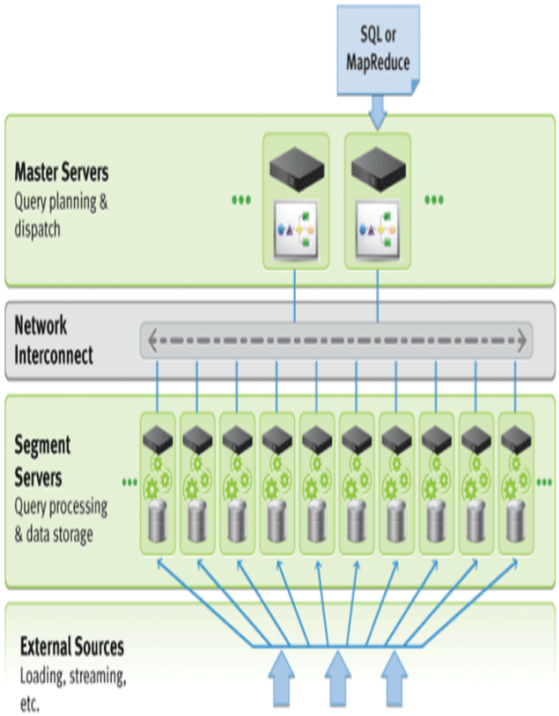

Figure 6: Greenplum architecture.

IBM Netezza Data Warehouse

IBM Netezza data warehouse has a two-tier type architecture consisted of SMP and MPP, called AMPP (Asymmetric Massively Parallel Processing).

A host with a SMP structure operates query execution plan and aggregation results, while S-blade nodes with a MPP structure handles query execution.

Each S-blade is connected by a special data processor called FPGA (Field Programmable Gate Array) and disk.

Each S-blade and host is connected to network that use IP addresses.

Unlike other systems, FPGA has filtering for data compression, record or column; in transaction processing, it enables filtering or transformation functions, such as visibility check during retrieving data from disk memory for real-time processing. When processing large-date, it adheres to the principles (processing close to the data source), which is to

reduce as much unnecessary data as possible from transmission by performing data operation where data is located.

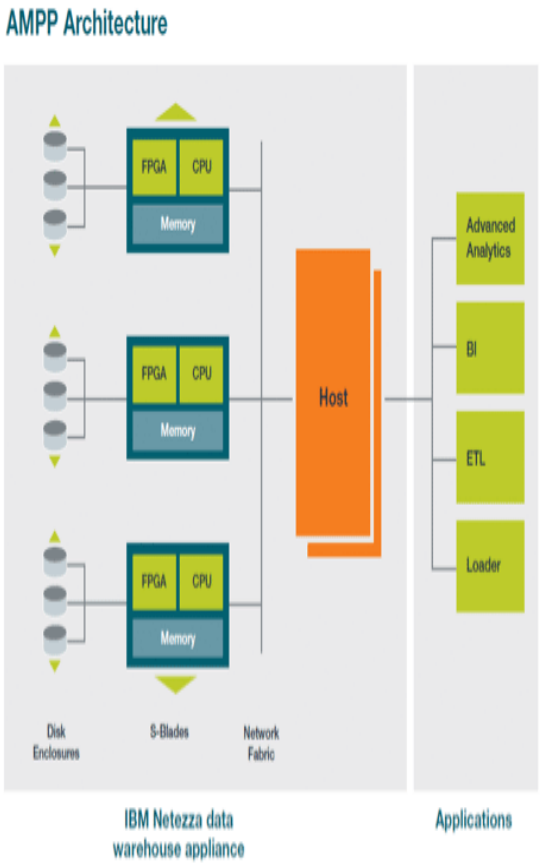

Figure 7: IBM Netezza data architecture.

In addition, companies and organizations that develop parallel DBMS are taken over by IT conglomerates and are in the progress of development in the appliance type. The names of conglomerates and date of acquisition of aforementioned parallel DBMS are shown in the following table:

The names of companies acquired	Database	Year
SAP	Sybase	2010
HP	Vertica	2011
IBM	Netezza	2010
Oracle	Essbase (Hyperian Solutions)	2007
Teradata	Aster Data	2011
EMC	Greenplum	2010

Table 1: Names of companies which acquired parallel RDBMS.

NoSQL

In RDBMS, scaling out while supporting ACID (Atomicity, Consistency, Isolation, and Durability) is almost impossible. For storage, data had to be divided into several devices; to be satisfied with ACID that has divided data, you have to use complicated locking and replication methods, which will lead to performance degradation.

NoSQL, a general term for a new storage system has emerged in order to simplify data models for easy definition of shard, which is the basic of distribution, and to make requirements less strict (Eventual Consistency) in a distribution replication environment or constraint isolation.

Since NoSQL is covered many times in our DevPlatform Blogs and there are many places to obtain information, we will not go over the NoSQL products.

Processing Aspects

The key point of parallel processing is Divide and Conquer. That is, data is divided in an independent type and process it in parallel. Just imagine the matrix multiplication that can divide and process each operation. The meaning of big data process is dividing a problem into several small operations, and combine them into a single result. If there is operation dependence, it is certainly impossible to make the best use of the parallel operation. It is necessary to save and process data considering these factors.

Map-Reduce

The most widely known technology that helps to handle large-data would be a distribution data process framework of the Map-Reduce method, such as Apache Hadoop.

Data processing via the Map-reduce method has the following characteristics:

It operates via regular computer that uses built-in hard disk, not a special storage. Each computer has extremely weak correlation where expansion can be hundreds and thousands of computers.

Since many computers are participating in processing, system errors and hardware errors are assumed as general circumstances, rather than exceptional.

With a simplified and abstracted basic operation of Map and Reduce, you can solve many complicated problems. Programmers who are not familiar with parallel programs can easily perform parallel processing for data.

It supports high throughput by using many computers.

The following figure displays the implementation flow of the map-reduce method. Data stored in the HDFS storage is divided to available worker and expressed (Map) a value type, and results are stored in a local disk. The data is complied by reducing worker and generate a result file.

Depending on the characteristics of a data storage, make the best use of locality by reducing the gap between a node which is processing data and source data location by placing worker in the location (based on network switch) where data is stored. Each worker can be implemented in various languages through streaming interface (standard in/out).

Apache Hive

Apache Hive helps to analyze large data by using the query language called HiveQL for data source, such as HDFS or HBase. Architecture is divided into Map-Reduce-oriented execution, meta data information for a data storage, and an execution part that receives a query from user or applications for execution.

To support expansion by user, it allows user specified function at the scalar value, aggregation, and table level.

Analysis Aspects

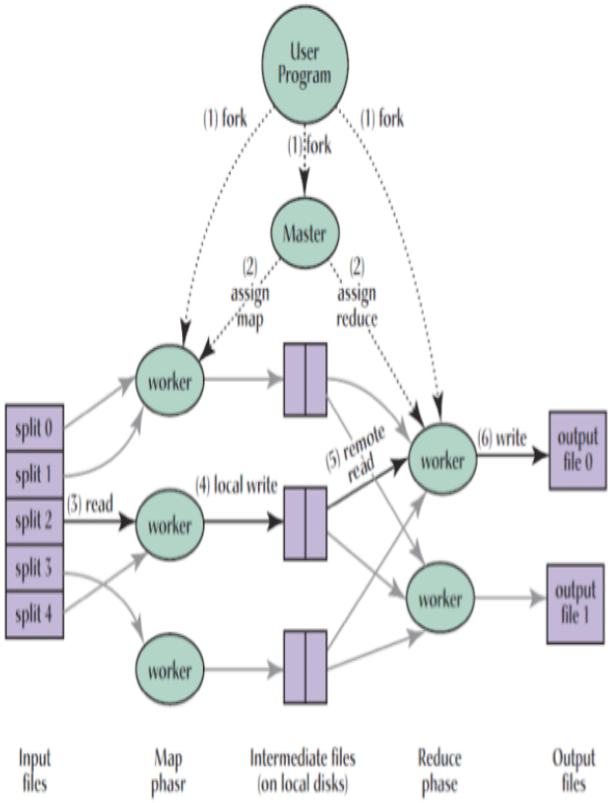

Figure 8: Map-Reduce execution.

We reviewed systems that store big data and procedural/declarative technologies that display processing and how to process large data. Finally, let us look into technology that analyzes big data.

The process of finding meaning in data is called KDD (Knowledge Discovery in Databases). KDD is to store data, process/analyze the whole or part of interested data in order to extract progress or meaning value, or discover facts that were so far unknown and make them into knowledge ultimately. For this, various technologies are comprehensively applied, such as artificial intelligence, machine learning, statistics, and database.

GNU R

GNU R is a software environment comprising program languages specialized for statistics analysis and graphics (visualization) and packages. It ensures a smooth process of vector and matrix data so as to be optimized for statistical calculations in terms of language. You can easily acquire desired statistics process library because of the R package site known as CRAN (Comprehensive R Archive Network). It can be touted as an open source in the field of statistics.

In the past, R used to put data to be processed into the memory of a computer for analyzing using a single CPU. There has been much progress due to ever increasing data to be processed

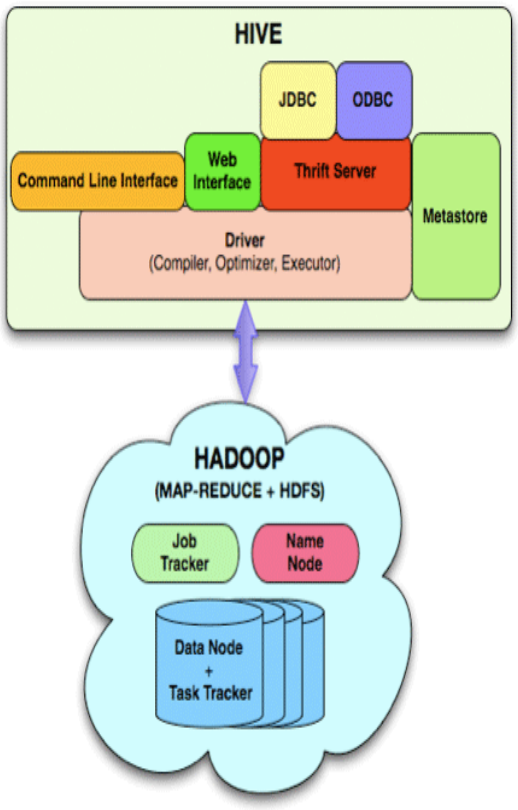

Figure 11: HIVE architecture.

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Application of Incline Matrix in Medical Diagnosis

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Abstract- In this paper I extend Sanchez's approach for medical diagnosis using incline matrix and exhibit the technique with a hypothetical case study.

Index Terms- incline matrix, medical knowledge

I. INTRODUCTION

Most of our real life problems in medical sciences, engineering, management, environment and social sciences often involve data which are not necessarily crisp, precise and deterministic in character due to various uncertainties associated with these problems. Such uncertainties are usually being handled with the help of the topics like probability, fuzzy sets, intuitionistic fuzzy sets, interval mathematics, and rough sets, etc.,

The field of medicine is one of the most fruitful and interesting areas of applications for fuzzy set theory. In the discrimination analysis, the symptoms are ranked according to the grade of discrimination of each disease by a particular symptom and is represented in the form of a matrix called a frequency distribution matrix $F=(f_{ij})$ where f_{ij} is the ratio of the patients with disease 'd_i'. This matrix model may not yield more accurate diagnosis in such cases where several diseases affect a single patient or when a single disease manifests quite differently in different patients and at different disease stages. Moreover, with the increased volume of information available to physicians from new medical technologies, the process of classifying different sets of symptoms under a single name of disease and determining the appropriate therapeutic actions becomes increasingly difficult. Recently, there are varieties of models of medical diagnosis under the general framework of fuzzy sets theory involving fuzzy matrices to deal with different complicating aspects of medical diagnosis.

De et. Al [3] have studied Sanchez's [6] method of medical diagnosis using intuitionistic fuzzy set. Saikia [7] have extended the method in [6] using IFS. In [2], Chetia and Das have studied Sanchez's approach of medical diagnosis through IVFSS obtaining an improvement of the same presented in De [3]. Meenakshi [4] have provided the techniques to study Sanchez's approach of medical diagnosis of IVFM.

In this article, I extend Sanchez's method for medical diagnosis using the notion of incline matrix theory. The notion of inclines and their applications are described comprehensively in Cao, Kim and Rough[1]. The method of incline medical diagnosis involves incline order relations as defined in [5].

II. PRELIMINARIES

Definition 2.1

A non empty set £ with two binary operations' +' and' ·' is called an incline if it satisfy the following conditions:

1. (£,+) is a semilattice
2. (£,·) is a semigroup
3. x(y+z)=xy+xz for all x,y,z ϵ £
4. x+xy=x and y+xy=y for all x,y ϵ £.

Definition 2.2

For x,y ϵ £, the order relation "≤" is defined as $x \leq y \leftrightarrow x + y = y$. From the incline axiom (4) , the order relation "≤" has the following properties:

$x + y \geq x$ and $x + y \geq y$ for x,y ϵ £

$xy \leq x$ and $xy \leq y$ for x,y ϵ £

which are called as incline properties.

III. APPLICATION OF INCLINE MATRIX IN MEDICAL DIAGNOSIS

In a given pathology, suppose S is a set of symptoms, D a set of diagnosis and P a set of patients. Analogous to Sanchez's notion of medical Knowledge as an incline order relation R from the set of symptoms S to the set of diagnosis D.

The methodology involves mainly the following 3 jobs..

1. Determination of symptoms
2. Formulation of medical knowledge based in incline order relations.
3. Determination of diagnosis on the basis of composition of incline order relations.

Suppose S is a set of symptoms of certain diseases, D is a set of diseases and P is a set of patients, construct an incline matrix P over D. A relation matrix say ,R_1 is constructed from the incline matrix (£,D) and called symptom-disease matrix. Similarly , write an another relation matrix S over D, say R_2,called non symptom diseases matrix. Analogous to Sanchez's notion of medical knowledge, I refer to each of the matrices R_1 and R_2 as medical knowledge of an incline matrix. Again I construct another incline matrix (£,S) over D, where £ is a mapping given by £:S→£(D). This incline matrix gives another relation matrix Q called patient-symptom matrix. The two new relation matrices $T_1=R_1Q$ and $T_2=R_2Q$ called symptom patient matrix and non symptom patient matrix respectively.

3.1.Algorithm

Step 1:

Input the incline matrix value over the set of patients P over diseases D and write the input value over the set of symptoms S over D denoted by the knowledge matrix R_1 and R_2 respectively.

Step 2:

Input the incline matrix over the set P of patients over D and write its relation Q.

Step 3:

Compute the relation matrices under the composition (+,·), where the + is Maximum and · is minimum.

i. $T_1= R_1Q$
ii. $T_2= R_2Q$
iii. $T_3= (J-R_1)\ Q$

Where J is the matrix with all its entries 1, which is the greatest element of £.

iv. $T_4=(J-R_2)\ Q$

Step 4: Compute the diagnostic scores ST_1 and ST_2

$ST_1= \max \{T_1(p_i,d_j),T_3(p_i,d_j)\}$ for i=1,2,3 j=1,2

$ST_2=\max \{T_2(p_i,d_j),T_4(p_i,d_j)\}$ for i=1,2,3 j=1,2

Step 5: Find $S_k = \max [ST_1 (p_i,d_j) – ST_2 (p_i,d_j)]$ then we conclude the patient p_i is suffering from the disease d_k.

Step 6: If S_k has more than one value then go to step 1 and repeat the process by reassessing the symptoms for the patient.

Case Study

Let us consider 3 patients Balu ,Somu and Ramu are denoted by the set P={Balu, Somu, Ramu} and the set of symptoms S={Head ache,stress, acidity}. Let the set of diseases be D={Vision problem, Ulcer}.

Step 1

$$R_1 = \begin{array}{c} \\ p_1 \\ p_2 \\ p_3 \end{array} \begin{array}{c} \begin{array}{cc} d_1 & d_2 \end{array} \\ \begin{pmatrix} 1 & 0.2 \\ 0.4 & 1 \\ 0.9 & 0.25 \end{pmatrix} \end{array} \qquad R_{2=} \begin{array}{c} \\ s_1 \\ s_2 \\ s_3 \end{array} \begin{array}{c} \begin{array}{cc} d_1 & d_2 \end{array} \\ \begin{pmatrix} 0.8 & 0 \\ 0.5 & 1 \\ 0.75 & 0.5 \end{pmatrix} \end{array}$$

Step 2

$$Q = \begin{array}{c} \\ p_1 \\ p_2 \\ p_3 \end{array} \begin{array}{c} \begin{array}{ccc} d_1 & d_2 & d_3 \end{array} \\ \begin{pmatrix} 0.4 & 0.9 & 0.8 \\ 0.7 & 0 & 0.6 \\ 0.8 & 0.7 & 1 \end{pmatrix} \end{array}$$

Step 3

$$T_1 = \begin{array}{c} \\ p_1 \\ p_2 \\ p_3 \end{array} \begin{array}{c} \begin{array}{cc} d_1 & d_2 \end{array} \\ \begin{pmatrix} 0.72 & 0.9 \\ 0.7 & 0.15 \\ 0.9 & 0.7 \end{pmatrix} \end{array} \qquad T_{2=} \begin{array}{c} \\ p_1 \\ p_2 \\ p_3 \end{array} \begin{array}{c} \begin{array}{cc} d_1 & d_2 \end{array} \\ \begin{pmatrix} 0.6 & 0.9 \\ 0.56 & 0.3 \\ 0.75 & 0.7 \end{pmatrix} \end{array}$$

$$T_3 = \begin{array}{c} \\ p_1 \\ p_2 \\ p_3 \end{array} \begin{array}{c} \begin{array}{cc} d_1 & d_2 \end{array} \\ \begin{pmatrix} 0.54 & 0.6 \\ 0.06 & 0.56 \\ 0.42 & 0.75 \end{pmatrix} \end{array} \qquad T_{2=} \begin{array}{c} \\ p_1 \\ p_2 \\ p_3 \end{array} \begin{array}{c} \begin{array}{cc} d_1 & d_2 \end{array} \\ \begin{pmatrix} 0.6 & 0.5 \\ 0.4 & 1 \\ 0.12 & 0.3 \end{pmatrix} \end{array}$$

Step 4

$$ST_1 = \begin{array}{c} \\ p_1 \\ p_2 \\ p_3 \end{array} \begin{array}{c} \begin{array}{cc} d_1 & d_2 \end{array} \\ \begin{pmatrix} 0.72 & 0.9 \\ 0.7 & 0.15 \\ 0.9 & 0.7 \end{pmatrix} \end{array} \qquad ST_{2=} \begin{array}{c} \\ p_1 \\ p_2 \\ p_3 \end{array} \begin{array}{c} \begin{array}{cc} d_1 & d_2 \end{array} \\ \begin{pmatrix} 0.6 & 0.9 \\ 0.4 & 1 \\ 0.42 & 0.75 \end{pmatrix} \end{array}$$

ST_1-ST_2	d_1	d_2
p_1	0.12	**0.3**
P_2	0.3	**0.75**
p_3	**0.48**	-0.05

From the above table, it is obvious that, if the doctor agrees, then Balu (p_1) and Somu (p_2) suffer from Ulcer and Ramu (p_3) suffer from Vision Problem.

ACKNOWLEDGEMENT

This work was partially supported by Women's Of Scientists–A (WOS-A), Department of Science & Technology (DST), New Delhi.

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AQ-Functional Equation in Paranormed Spaces

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***Abstract*- In this paper, we introduce and investigate the general solution of a new AQ-functional equation**

$$2a^2\left[f\left(\frac{x+y}{a}\right)+f\left(\frac{x-y}{a}\right)\right]=(1+a)\left[f(x+y)+f(x-y)\right]$$
$$+(1-a)\left[f(-x+y)+f(-x-y)\right]$$

where $a \neq 0,\pm 1$ and discuss its Hyers-Ulam stability in paranormed spaces.

2000 Mathematical Subject
Classification: Primary 39B52, 39B82, 39B72, 46A99.

***Index Terms*-** Hyers- Ulam-Stability, Paranormed spaces, Additive-Quadratic functional Equation.

I. INTRODUCTION

Functional equations of various forms were dealt in the last three decades regressively by many authors [2, 5, 8, 9]. Ulam [13] raised a question concerning the stability of group homomorphism as follows :

Let G_1 be a group and let G_2 be a metric group with the metric d(.,.). Given ε >0, does there exist a δ >0 such that if a function $h: G_1 \to G_2$ satisfies the inequality $d\left(h(xy), h(x)h(y)\right) < \delta$ for all $x, y \in G_1$, then there exist a homomorphism $H: G_1 \to G_2$ with $d\left(h(x), H(x)\right) < \varepsilon$ for all $x \in G_1$?

When G_1 and G_2 are Banach spaces, D.H. Hyers [7]solved the above question for the case of approximately additive functions. Later Th.M.Rassias [10] given a generalized version of the theorem of Hyers for approximately linear mappings. Then many mathematicians like Z.Gajda [3] , R.Ger [2], P.Gavruta [4], S. Czerwik [1] and J.M.Rassias [8] contributed a lot for the development of stability theory for various forms of functional equations . the functional equation $f(x+y)+f(x-y)=2f(x)+2f(y)$ is called quadratic functional equation because every solution of the quadratic functional equation is said to be a quadratic mapping. In the same way

$$f(2x+y)+f(2x-y)=2f(x+y)+2f(x-y)+12f(x) \qquad (1.1)$$

and

$$f(2x+y)+f(2x-y)=4f(x+y)+4f(x-y)+24f(x)-6f(y) \qquad (1.2)$$

are called cubic and quartic functional equations because $f(x)=x^3$ and $f(x)=x^4$ respectively satisfies the equations (1.1) and (1.2) . Recently J. M. Rassias and H.M.Kim [9] investigated Generalized Hyers-Ulam stability for general additive functional equations in quasi- β-normed spaces , M.E. Gordji and M.B. Savad kouhi [6] studied the stability properties of a mixed type additive, quadratic and cubic functional equation

$$f(x+3y)+f(x-3y)=9f(x+y)+9f(x-y)-16f(x) \qquad (1.3)$$

in random normed spaces. Very recently , C.Park and J.R.Lee [11] proved some results on the Hyers-Ulam stability of an additive-quadratic-cubic-quatraic functional equation

$$f(x+2y)+f(x-2y)=4f(x+y)+4f(x-y)-6f(x)+f(2y) \\ +f(-2y)-4f(y)-4f(-y) \qquad (1.4)$$

in paranormed spaces.

In this paper, authors are interested in finding the solutions and some results on Hyers-Ulam stability of a new Additive-Quadratic functional equation

$$2a^2\left[f\left(\frac{x+y}{a}\right)+f\left(\frac{x-y}{a}\right)\right]=(1+a)\left[f(x+y)+f(x-y)\right]+(1-a)\left[f(-x+y)+f(-x-y)\right]$$

where $a \neq 0, \pm 1$, in paranormed spaces. We consider some basic concepts concerning Frechet spaces and paranormed spaces.

Definition 1.1 [13]

Let X be a vector space. A Paranorm $P: X \to [0,\infty)$ is a function on X such that

(i) $P(0)=0$

(ii) $P(-x)=P(x)$

(iii) $P(x+y)\leq P(x)+P(y)$ (Triangle inequality)

(iv) If $\{t_n\}$ is a sequence of scalars with $t_n \to t$ and $\{t_n\} \subset X$ with

$P(x_n - x)\to 0$, then $P(t_n x_n - tx)\to 0$ (continuity of multiplication).

The pair (X,P) is called a Paranormed space if P is a paranorm on X. The paranorm is called total if, in addition, we have

(v) $P(x)=0 \Rightarrow x=0$

A Frechet space is a total and complete paranormed space.

In this paper, we first discuss the solution of a new additive and quadratic functional equation :

$$2a^2\left[f\left(\frac{x+y}{a}\right)+f\left(\frac{x-y}{a}\right)\right]=(1+a)\left[f(x+y)+f(x-y)\right] \\ +(1-a)\left[f(-x+y)+f(-x-y)\right] \qquad (1.5)$$

with $a \neq 0, \pm 1$, then we investigated the Hyers-Ulam Stability of (1.5) in paranormed spaces

II. Solution of the Equation (1.5)

In this Section, let E_1 and E_2 denote real vectors spaces, we will prove the following two Lemmas, which will be useful to prove our main theorems.

Lemma 2.1

If $f: E_1 \to E_2$ is an even function, satisfies equation (1.5) for all $x, y \in E_1$. Then f is quadratic .

Proof

Replacing (x,y) by $(0,0)$ in (1.5), we obtain

$$f(0)=0, \qquad \forall x \in E_1. \tag{2.1}$$

The function f is even and therefore $f(-x)=f(x)$ for all $x \in E_1$.

Equation (1.5) becomes ,

$$a^2\left[f\left(\frac{x+y}{a}\right)+f\left(\frac{x-y}{a}\right)\right]=f(x+y)+f(x-y), \quad \forall x,y \in E_1 \tag{2.2}$$

Replacing (x,y) by (z,z) in (2.2), we arrive that

$$a^2 f\left(\frac{2z}{a}\right)=f(2z), \qquad \forall z \in E_1 \tag{2.3}$$

Replacing z by $\frac{y}{2}$ in (2.3), we arrive that

$$a^2 f\left(\frac{y}{a}\right)=f(y), \qquad \forall y \in E_1 \tag{2.4}$$

Again, replacing y by ax in (2.4), we obtain

$$f(ax)=a^2 f(x), \qquad \forall x \in E_1 \tag{2.5}$$

Therefore $f: E_1 \to E_2$ is quadratic .

Lemma 2.2

If $f: E_1 \to E_2$ be an odd function, satisfies equation (1.5) for all $x,y \in E_1$. Then f is additive.

Proof

The function f is odd and therefore $f(-x)=-f(x)$ for all $x,y \in E_1$, Equation (1.5) becomes,

$$a\left[f\left(\frac{x+y}{a}\right)+f\left(\frac{x-y}{a}\right)\right]=f(x+y)+f(x-y), \qquad \forall x,y \in E_1 \tag{2.6}$$

Replacing (x,y) by (z,z) in (2.6), using equation (2.1) we arrive that

$$a f\left(\frac{2z}{a}\right)=f(2z), \qquad \forall z \in E_1 \tag{2.7}$$

Replacing z by $\frac{y}{2}$ in (2.7), we arrive that

$$a f\left(\frac{y}{a}\right)=f(y), \qquad \forall y \in E_1 \tag{2.8}$$

Again, replacing y by ax in (2.8), we obtain

$$f(ax) = a\, f(x), \qquad \forall x \in E_1 \qquad (2.9)$$

Therefore $f : E_1 \to E_2$ is additive .

Theorem 2.3

A function $f : E_1 \to E_2$ satisfies equation (1.5) for all $x, y \in E_1$, if and only if there exists a symmetric bi-additive function $B : E_1 \times E_1 \to E_2$ and an additive function $A : E_1 \to E_2$ such that

$$f(x) = B(x,x) + A(x), \qquad \forall x \in E_1$$

Proof . Suppose there exists a symmetric bi-additive function $B : E_1 \times E_1 \to E_2$ and an additive function $A : E_1 \to E_2$ such that

$$f(x) = B(x,x) + A(x), \qquad \forall x \in E_1 \qquad (2.10)$$

then using (2.10), we obtain

$$f\left(\frac{x+y}{a}\right) = B\left(\frac{x+y}{a}, \frac{x-y}{a}\right) + A\left(\frac{x+y}{a}, \frac{x-y}{a}\right) \qquad (2.11)$$

$$f\left(\frac{x-y}{a}\right) = B\left(\frac{x-y}{a}, \frac{x-y}{a}\right) + A\left(\frac{x-y}{a}, \frac{x-y}{a}\right) \qquad (2.12)$$

for all $x, y \in E_1$ .From (2.11) and (2.12), we obtain

$$a^2\left[f\left(\frac{x+y}{a}\right) + f\left(\frac{x-y}{a}\right)\right] = a^2\left[B\left(\frac{x+y}{a}, \frac{x+y}{a}\right) + A\left(\frac{x+y}{a}, \frac{x+y}{a}\right)\right]$$
$$+ a^2\left[B\left(\frac{x-y}{a}, \frac{x-y}{a}\right) + A\left(\frac{x-y}{a}, \frac{x-y}{a}\right)\right] \qquad (2.13) \quad .$$

for all $x, y \in E_1$. Using properties of symmetric bi-additive function in (2.13), we arrive

$$2a^2\left[f\left(\frac{x+y}{a}\right) + f\left(\frac{x-y}{a}\right)\right] = (1+a)\left[f(x+y) + f(x-y)\right]$$
$$+ (1-a)\left[f(-x+y) + f(-x-y)\right], \qquad \forall x, y \in E_1 .$$

Hence the function satisfies (1.5).

Conversely, we decompose f into even part and the odd part by letting $f_e(x) = \frac{f(x) + f(-x)}{2}$ and $f_0(x) = \frac{f(x) - f(-x)}{2}$

$x \in E_1$. Replacing x by -x ,y by -y in (1.5) and adding, subtracting the resultant

equation with (1.5), we find that $f_e(x)$, $f_o(x)$ $x, y \in E_1$ satisfies (1.5). Hence by Lemma 2.1 and Lemma 2.2, we obtain that the functions $f_e(x)$ and $f_o(x)$ are quadratic and additive respectively. It shows that there exists a symmetric bi-additive function $B: E_1 \times E_1 \to E_2$ such that $f_e(x) = B(x,x)$ and an additive function $A: E_1 \to E_2$ such that $A(x) = f_o(x)$ and $f(x) = B(x,x) + A(x), \quad \forall x \in E_1$.

III. HYERS – ULAM STABILITY OF THE FUNCTIONAL EQUATION (1.5) AN ODD MAPPING CASE

For a given mapping f , we define

$$Df(x,y) = 2a^2\left[f\left(\frac{x+y}{a}\right) + f\left(\frac{x-y}{a}\right)\right] - (1+a)\left[f(x+y) + f(x-y)\right]$$
$$-(1-a)\left[f(-x+y) + f(-x-y)\right]$$

In this Section and section (4), we assume that (E_1, P) is a Frechet space and $(E_2, \|.\|)$ is a Banach space.

Theorem 3.1

Let r and θ be positive real numbers with $r > 1$, and let $f: E_2 \to E_1$ be an odd mapping such that

$$P\left[Df(x,y)\right] \le \theta\left(\|x\|^r + \|y\|^r\right) \qquad (3.1)$$

for all $x, y \in E_2$. Then there exists a unique additive mapping $A: E_2 \to E_1$ such that

$$P\left[f(x) - A(x)\right] \le \frac{\theta}{2^r}\left[\frac{a^{r-1}}{a^r - a}\right]\|x\|^r \qquad \forall x \in E_2 \qquad (3.2)$$

Proof . Using oddness of f in (3.1), we obtain

$$\left[2a^2\left(f\left(\frac{x+y}{a}\right) + f\left(\frac{x-y}{a}\right)\right) - 2a\left(f(x+y) + f(x-y)\right)\right] \le \theta\left(\|x\|^r + \|y\|^r\right) \qquad (3.3)$$

for all $x, y \in E_2$. Replace (x,y) by (z,z) in (3.3), we obtain

$$P\left[2a^2 f\left(\frac{2z}{a}\right) - 2af(2z)\right] \le \theta 2\|z\|^r \quad \forall z \in E_2 \qquad (3.4)$$

Replace z by $\frac{x}{2}$ in (3.4) , we obtain

$$P\left[f(x) - af\left(\frac{x}{a}\right)\right] \le \frac{\theta}{a2^r}\|x\|^r \qquad \forall x \in E_2 \qquad (3.5)$$

Hence

$$P\left[a^u f\left(\frac{x}{a^u}\right) - a^v f\left(\frac{x}{a^v}\right)\right] \le \sum_{j=u}^{v-1}\frac{\theta a^{j-1}}{a^{rj}2^r}\|x\|^r, \quad \forall x \in E_2 \qquad (3.6)$$

For all non negative integers u and v with $v > u$ and all $x \in E_2$. It follows from (3.6) that the sequence $\left\{a^k f\left(\frac{x}{a^k}\right)\right\}$ is a Cauchy sequence for all $x \in E_2$, since E_1 is complete, the sequence $\left\{a^k f\left(\frac{x}{a^k}\right)\right\}$ converges for all $x \in E_2$. Now we define the mapping $A: E_2 \to E_1$ by

$$A(x) = \lim_{k\to\infty} a^k f\left(\frac{x}{a^k}\right), \qquad \forall x \in E_2 .$$

by (3.1) , we get

$$P\left[D A(x,y)\right] = \lim_{k\to\infty} P\left[a^k Df\left(\frac{x}{a^k}, \frac{y}{a^k}\right)\right]$$

$$\leq \lim_{k\to\infty} \frac{\theta}{a^{k(r+1)}} \left(\|x\|^r + \|y\|^r\right) = 0, \qquad \forall x, y \in E_2 .$$

So $DA(x,y) = 0$. Since $f: E_2 \to E_1$ is odd , $A: E_2 \to E_1$ is odd . So the mapping $A: E_2 \to E_1$ is additive. Moreover, letting $u = 0$ and passing the limit $v \to \infty$ in (3.6), we arrive (3.2).So there exists an additive mapping $A: E_2 \to E_1$ satisfing (3.2).Now, let $A': E_2 \to E_1$ be another additive mapping satisfing (3.2). Then we have

$$P\left[A(x) - A'(x)\right] = P\left[a^s A\left(\frac{x}{a^s}\right) - a^s A'\left(\frac{x}{a^s}\right)\right]$$

$$\leq P\left[a^s\left(A\left(\frac{x}{a^s}\right) - g\left(\frac{x}{a^s}\right)\right)\right] + P\left[a^s\left(A'\left(\frac{x}{a^s}\right) - g\left(\frac{x}{a^s}\right)\right)\right]$$

$$\leq \left(\frac{a^{r-1}}{2^{r-1}\left(a^r - a\right)}\right)\left(\frac{\theta}{a^{s(r-1)}}\right)\|x\|^r \to 0 \quad as \quad s \to \infty$$

for all $x \in E_2$. So we can conclude that $A(x) = A'(x), \quad \forall x \in E_2$. This proves the uniqueness of A . Thus the mapping $A: E_2 \to E_1$ is a unique additive mapping satisfying (3.2).

Corollary 3.2

Let r and θ be positive real numbers with $r \geq 1$, and let $f: E_2 \to E_1$ be an odd mapping such that

$$P\left[D f(x,y)\right] \leq \left\{\begin{matrix} \theta\left(\|x\|^r \|y\|^r\right), \\ \theta\left(\|x\|^{2r} + \|y\|^{2r} + \|x\|^r \|y\|^r\right), \end{matrix}\right\}$$

for all $x, y \in E_2$. Then there exists a unique additive mappings $A: E_2 \to E_1$ satisfying

$$P\left[f(x) - A(x)\right] \leq \left\{\begin{matrix} \lambda_1 \|x\|^{2r}, \\ 3\lambda_1 \|x\|^{2r}, \end{matrix}\right\}$$

where $\lambda_1 = \dfrac{\theta a^{2r-1}}{2^{2r+1}\left(a^{2r}-a\right)}$, for all $x \in E_2$.

Theorem 3.3

Let r be positive real numbers with $r<1$, and let $f: E_1 \to E_2$ be an odd mapping such that

$$\left\| Df(x,y) \right\| \le P(x)^r + P(y)^r \quad \forall x, y \in E_1. \qquad (3.7)$$

Then there exists a unique additive mapping $A: E_1 \to E_2$ such that

$$\left\| f(x) - A(x) \right\| \le \frac{1}{a-a^r}\left(\frac{a}{2}\right)^r P(x)^r, \quad \forall x \in E_1 \quad . \qquad (3.8)$$

Proof . Using oddness of f in (3.7), we obtain

$$\left\| 2a^2\left(f\left(\frac{x+y}{a}\right) + f\left(\frac{x-y}{a}\right)\right) - 2a\left(f(x+y) + f(x-y)\right)\right\|$$

$$\le P(x)^r + P(y)^r, \quad \forall x, y \in E_1 \qquad (3.9)$$

Replace (x,y) by (z,z) in (3.9), we obtain

$$\left\| 2a^2 f\left(\frac{2z}{a}\right) - 2a\, f(2z)\right\| \le 2P(z)^r, \quad \forall z \in E_1 \qquad (3.10)$$

Replace z by $\dfrac{y}{2}$ in (3.10) , we obtain

$$\left\| a\, f\left(\frac{y}{a}\right) - f(y)\right\| \le \frac{1}{a2^r} P(y)^r \quad , \quad \forall y \in E_1 \qquad (3.11)$$

Again, replacing y by ax in (3.11), we obtain

$$\left\| f(x) - \frac{1}{a} f(ax) \right\| \le \frac{a^r 1}{a^2 2^r} P(x)^r \qquad \forall x \in E_1 \qquad (3.12)$$

Hence

$$\left\| \frac{1}{a^u} f\left(a^u x\right) - \frac{1}{a^v} f\left(a^v x\right)\right\| \le \sum_{j=u}^{v-1} \frac{a^{r(j+1)}}{a^{j+2}2^r}\|x\|^r, \quad \forall x \in E_1 \qquad (3.13)$$

For all non negative integers u and v with $v>u$ and all $x \in E_1$. It follows from (3.12) that the sequence $\left\{\dfrac{1}{a^k} f\left(a^k x\right)\right\}$ is a Cauchy sequence for all $x \in E_1$, since E_2 is complete, the sequence $\left\{\dfrac{1}{a^k} f\left(a^k x\right)\right\}$ converges for all $x \in E_1$. Now we define the mapping $A: E_1 \to E_2$ by

$$A(x) = \lim_{k\to\infty} \frac{1}{a^k} f\left(a^k x\right), \qquad \forall x \in E_1.$$

by (3.7) , we get

$$\|DA(x,y)\| = \lim_{k\to\infty}\left\|\frac{1}{a^k}Df\left(a^k x, a^k y\right)\right\|$$

$$\leq \lim_{k\to\infty}\frac{1}{a^{k(1-r)}}\left(P(x)^r + P(y)^r\right) = 0, \qquad \forall x, y \in E_1.$$

So $DA(x,y)=0$. Since $f: E_1 \to E_2$ is odd , $A: E_1 \to E_2$ is odd . So the mapping $A: E_1 \to E_2$ is additive. Moreover, letting $u = 0$ and passing the limit $v \to \infty$ in (3.12), we arrive (3.8).So there exists an additive mapping $A: E_1 \to E_2$ satisfing (3.8). Now, let $A': E_1 \to E_2$ be another additive mapping satisfing (3.8). Then we have

$$\|A(x) - A'(x)\| = \left\|\frac{1}{a^s}A(a^s x) - \frac{1}{a^s}A'(a^s x)\right\|$$

$$\leq \left\|\frac{1}{a^s}\left(A(a^s x) - g(a^s x)\right)\right\| + \left\|\frac{1}{a^s}\left(A'(a^s x) - g(a^s x)\right)\right\|$$

$$\leq \left(\frac{a^r}{2^{r-1}\left(a^{s(1-r)-r}\left(a-a^r\right)\right)}\right)P(x)^r \to 0 \quad as \quad s\to\infty$$

for all $x \in E_1$. So we can conclude that $A(x) = A'(x), \quad \forall x \in E_1$. This proves the uniqueness of A . Thus the mapping $A: E_1 \to E_2$ is a unique additive mapping satisfying (3.8).

Corollary 3.4

Let r be positive real numbers with $r < \frac{1}{2}$, and let $f: E_1 \to E_2$ be an odd mapping such that

$$\|Df(x,y)\| \leq \left\{\begin{matrix} P(x)^r P(y)^r, \\ P(x)^{2r} + P(y)^{2r} + P(x)^r P(y)^r, \end{matrix}\right\}$$

for all $x, y \in E_1$. Then there exists a unique additive mappings $A: E_1 \to E_2$ satisfying

$$\|f(x) - A(x)\| \leq \left\{\begin{matrix} \lambda_2 P(x)^{2r}, \\ 3\lambda_2 P(x)^{2r}, \end{matrix}\right\}$$

where $\lambda_2 = \frac{1}{2^{2r+1}\left(a - a^{2r}\right)}$, for all $x \in E_1$.

IV. HYERS – ULAM STABILITY OF THE FUNCTIONAL EQUATION (1.5) AN EVEN MAPPING CASE

In this Section, we prove Hyers-Ulam Stability of the functional equation $Df(x,y) = 0$ in paranormed spaces : an even mapping

Theorem 4.1

Let r and θ be positive real numbers with $r>2$, and let $f:E_2\to E_1$ be an even mapping satisfying (3.1). Then there exists a unique Quadratic mapping $Q:E_2\to E_1$ such that

$$P\left[f(x)-Q(x)\right]\le\frac{\theta}{2^r}\left[\frac{a^r}{a^r-a^2}\right]\|x\|^r \quad , \quad \forall x\in E_2$$

Proof . Using evenness of f in (3.1), we obtain

$$P\left[2a^2\left(f\left(\frac{x+y}{a}\right)+f\left(\frac{x-y}{a}\right)\right)-2\left(f(x+y)+f(x-y)\right)\right]\le\theta\left(\|x\|^r+\|y\|^r\right) \qquad (4.1)$$

for all $x,y\in E_2$. Replace (x,y) by (z,z) in (4.1), we obtain

$$P\left[2a^2 f\left(\frac{2z}{a}\right)-2f(2z)\right]\le\theta 2\|z\|^r, \quad \forall z\in E_2 \qquad (4.2)$$

Replace z by $\frac{x}{2}$ in (4.2) , we obtain

$$P\left[f(x)-a^2 f\left(\frac{x}{a}\right)\right]\le\frac{\theta}{2^r}\|x\|^r \quad , \qquad \forall x\in E_2$$

The rest of the proof is similar to the proof of theorem 3.1

Corollary 4.2

Let r and θ be positive real numbers with $r>1$, and let $f:E_2\to E_1$ be an even mapping such that

$$P\left[D f(x,y)\right]\le\left\{\begin{matrix}\theta\left(\|x\|^r\|y\|^r\right),\\ \theta\left(\|x\|^{2r}+\|y\|^{2r}+\|x\|^r\|y\|^r\right),\end{matrix}\right\}$$

for all $x,y\in E_2$. Then there exists a unique quadratic mappings $Q:E_2\to E_1$ satisfying

$$P\left[f(x)-A(x)\right]\le\left\{\begin{matrix}\lambda_3\|x\|^{2r},\\ 3\lambda_3\|x\|^{2r},\end{matrix}\right\}$$

where $\lambda_3=\frac{\theta a^{2r}}{2^{2r+1}\left(a^{2r}-a^2\right)}$, for all $x\in E_2$.

Theorem 4.3

Let r be positive real numbers with $r<2$, and let $f:E_1\to E_2$ be an even mapping satisfying (3.7) Then there exists a unique quadratic mapping $Q:E_1\to E_2$ such that

$$\left\|f(x)-Q(x)\right\|\le\frac{1}{a^2-a^r}\left(\frac{a}{2}\right)^r P(x)^r, \qquad \forall x\in E_1 \quad .$$

Proof . Using evenness of f in (3.7), we obtain

$$\left\| 2a^2\left(f\left(\frac{x+y}{a}\right)+ f\left(\frac{x-y}{a}\right)\right)-2\left(f\left(x+y\right)+ f\left(x-y\right)\right)\right\|$$

$$\leq P\left(x\right)^r + P\left(y\right)^r, \quad \forall x, y \in E_1 \qquad (4.3)$$

Replace (x, y) by (z, z) in (4.3), we obtain

$$\left\| 2a^2 f\left(\frac{2z}{a}\right)-2 f\left(2z\right)\right\| \leq 2P\left(z\right)^r \quad \forall z \in E_1 \qquad (4.4)$$

Replace z by $\frac{y}{2}$ in (4.4), we obtain

$$\left\| a^2 f\left(\frac{y}{a}\right)- f\left(y\right)\right\| \leq \frac{1}{2^r} P\left(y\right)^r \qquad \forall y \in E_1 \qquad (4.5)$$

Again, replacing y by ax in (4.5), we obtain

$$\left\| f\left(x\right)-\frac{1}{a^2} f\left(ax\right)\right\| \leq \frac{1}{a^{2-r}\,2^r} P\left(x\right)^r \qquad \forall x \in E_1$$

The rest of the proof is similar to the proof of theorem 3.2

Corollary 4.4

Let r be positive real numbers with $r<1$, and let $f: E_1 \to E_2$ be an even mapping such that

$$\left\|D f\left(x, y\right)\right\| \leq \left\{ \begin{matrix} P\left(x\right)^r P\left(y\right)^r, \\ P\left(x\right)^{2r} + P\left(y\right)^{2r} + P\left(x\right)^r P\left(y\right)^r, \end{matrix} \right\}$$

for all $x, y \in E_1$. Then there exists a unique quadratic mappings $Q: E_1 \to E_2$ satisfying

$$\left\| f\left(x\right)-Q\left(x\right)\right\| \leq \left\{ \begin{matrix} \lambda_4 P\left(x\right)^{2r}, \\ 3\lambda_4 P\left(x\right)^{2r}, \end{matrix} \right\}$$

where $\lambda_4 = \frac{a^{2r}}{2^{2r+1}\left(a^2 - a^{2r}\right)}$, for all $x \in E_1$.

Theorem 4.5

Let r be positive real numbers with $r>2$, and let $f: E_2 \to E_1$ be a mapping satisfying (3.1). Then there exists a unique additive mapping $A: E_2 \to E_1$ and quadratic mapping $Q: E_2 \to E_1$ such that

$$P\left[f\left(x\right)-A\left(x\right)-Q\left(x\right)\right] \leq \theta\left(\frac{a}{2}\right)^r \left[\frac{1}{a\left(a^r-1\right)}+\frac{1}{a^r-a^2}\right]\left\|x\right\|^r \qquad \forall x \in E_2 .$$

Theorem 4.6

Let r be positive real numbers with $r<1$, and let $f: E_1 \to E_2$ be a mapping satisfying (3.7) Then there exists a unique additive mapping $A: E_1 \to E_2$ and quadratic mapping $Q: E_1 \to E_2$ such that

$$\left\| f(x) - A(x) - Q(x) \right\| \le \frac{2}{a - a^r} \left(\frac{a}{2} \right)^r P(x)^r , \qquad \forall x \in E_1 \quad .$$

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Enhanced Packet Dissembling Schemes for Selective Jamming Attacks Prevention in Wireless Networks

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Abstract- Wireless networks provide wide range of services which is never so easy by any other medium, its mode of working tends it to have many security breaches. In modern era of communication trillions of profitable vital information is available on internet and they are accessible through this open medium. Such vital information can be achieved through intentional interference or jamming. In this paper we are trying to provide some efficient techniques which conceal such messages of high importance through dissembling. Dissembling refers to conceal under false appearance, there are various methods of concealing important messages but we tried to use very efficient ones, as messages are dissembled, the jammer won't be able to access it because transaction will be completed before jammer reaches the original important message.

Index Terms- Jamming attacks, Dissembling, Selective jamming, Dissembling commitment scheme, Puzzle dissembling scheme.

I. INTRODUCTION

Wireless network is now very wide area of research because despite of several advantages it has many flaws. Intentional interference attacks are made to jam channel by triggering many page requests or any other means is called Jamming attacks. When it is done to target specific vital information is called selective jamming attack, various schemes are available to get rid of such attacks but somehow these measures become inefficient in uncertain situations. Recently 'Bazooka' the largest cyber attack till now hit the cyber world which resulted into crashing internet worldwide, it was like nuclear blast in cyber world. Bazooka is also an intentional inference attack. In present system Rate adaptation scheme is used to save messages and supports end to end delivery of message. Rate adaptation scheme is implemented by achieving high link utilization by adjusting mode of transmission according to expected maximum throughput. I have given detailed description of this scheme in my last paper. But I can say this scheme is not efficient to secure messages of high importance and also doesn't assures the uninterrupted service. So we have demonstrated few other schemes. Such as Dissembling commitment scheme and Puzzle dissembling scheme along with All Or Nothing Transformations.

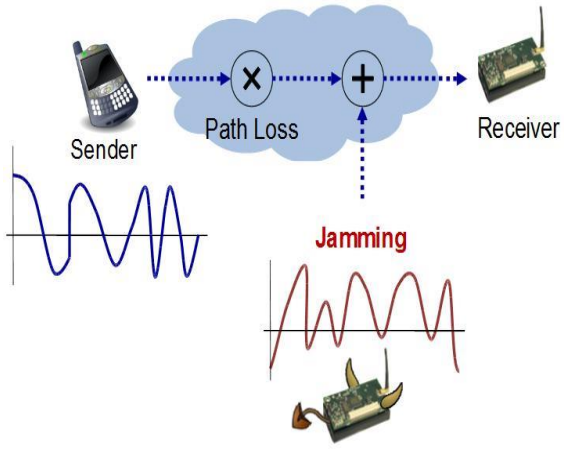

Figure 1: Jamming in wireless network

II. PROPOSED SYSTEM

Jamming can accomplished by the knowledge of Protocol specification and network secrets and in problem of selective jamming, attackers try to hit the system for short period of time and get the important messages.

To prevent or remove such attack we will focus on following schemes:

1) Combining the cryptographic primitives with physical layer attributes.
2) Analyse security
3) Evaluate computational & communicational overhead.

Security of important messages and jamming Prevention is accommodated by change in architecture of the existing system it means the previous architecture is considered to be less efficient for such purpose. Given below is proposed architecture, which starts with the source and after performing dissembling operations on the data to be secured it pass that data to the source and finally after application of decoding operations data is retrieved and saved from selective jamming.

Complete explanation in detail is given after figure.

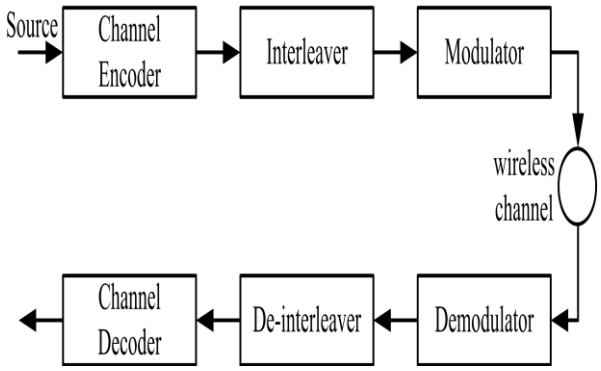

Figure 2: Proposed System Architecture

Original message is transformed first with the help of all or nothing transformation (AONT), which helps in reducing brute force attack, that is done by checking all the possible combination till the correct key is found and traversing the search space. Then it goes through channel encoder where binary conversion occurs and then few dissembling operations are performed into binary bits. Encoded Binary stream is passed through Interleaver which results in clubbing all odd and even input. Then analog signal taken from interleaver is passed through modulator for varying properties i.e. converting low frequency signals into R.F. signal.

(Low) (RF) (Can be transmitted)

Now the message is being transmitted to the wireless channel and jammer try to attack through route request/ route reply message or TCP acknowledgement. To get access of important message he must imply 'classy then jam' strategy. It means he must classify the transmitted packets using protocol knowledge and then he will decode the packet. But due to high security at physical layer he will not be able to decode before the packet reaches destination. Hence jam could not be accomplished and packet is demodulated then de-interleaved and decoded at destination to get its original form.

III. MODULE DESCRIPTION

A. *Network module*

The network consists of many nodes connected through wireless links. Nodes can communicate directly if they are in communication range, or indirect communication can also occur through multi hops. Nodes can communicate through both unicast and broadcast mode. Communication can be unencrypted or encrypted. For encrypted broadcast communications, symmetric keys are shared among all intended receivers. These keys are decided using asymmetric cryptography. We address the problem of avoiding the jamming from classifying message in real time, thus challenging and overcoming the jammers ability to perform jamming.

B. *Packet Classification*

Consider the communication system depicted in Architecture Fig. 2 At the physical layer, a packet is encoded through channel encoder, interleaved through interleaver, and modulated for varying properties through modulator before it floats over the wireless channel. At the receiver end, the signal is de-modulated, de-interleaved, and decoded, to recover the original message.

For our system only known people can classify packet through this type of encryption. Hence, attacker won't be able to access the important messages.

C. *Dissembling commitment scheme (DCS)*

Dissembling commitment scheme (DCS) is based on symmetric cryptography. Our main aim is to satisfy the strong concealing property and keeping the computation and communication overhead to a minimum.

The computation overhead of DCS is just a pair of symmetric encryption and decryption at sender and receiver ends. Because the header information is permuted as a trailer and encrypted, all receivers in the vicinity of a sender must receive the entire packet and decrypt it, before the packet type and destination can be determined However, in wireless protocols such as 802.11, the complete packet is received at the MAC layer before it is decided if the packet must be discarded or be further processed. If some parts of the MAC header are deemed not to be useful information to the jammer, they can remain unencrypted in the header of the packet, thus avoiding the decryption operation at the receiver.

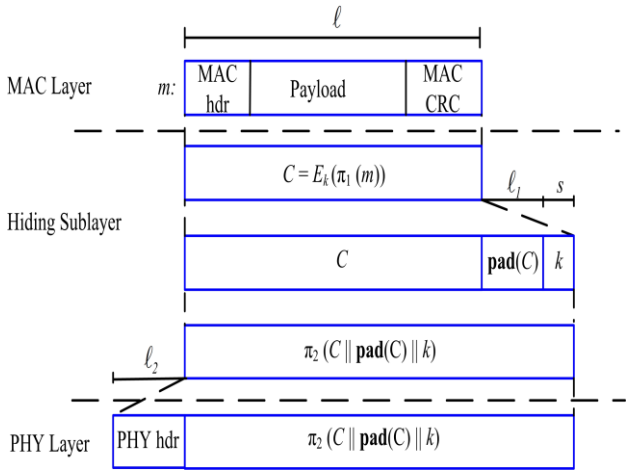

Figure 3: Dissembling Commitment Scheme

D. *Puzzle dissembling scheme (PDS)*

We present a packet hiding scheme based on cryptographic puzzles. The main idea behind such puzzles is to force the recipient of a puzzle execute a pre-defined set of computations before he is able to extract a secret of interest. The time required for obtaining the solution of a puzzle depends on its hardness and the computational ability of the solver. The advantage of the puzzle based scheme is that its security does not rely on the PHY layer parameters. However, it has higher computation and communication overhead

We consider several puzzle schemes as the basis for PDS. For each scheme, we analyze the implementation details which impact security and performance. Cryptographic puzzles are primitives originally suggested by Merkle as a method for establishing a secret over an insecure channel. They find a wide range of applications from preventing DoS attacks to providing broadcast authentication and key escrow schemes.

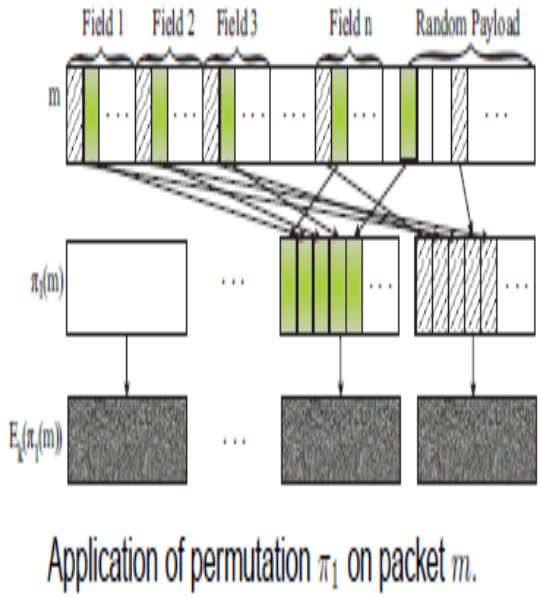

Figure 4: Puzzle Dissembling Scheme

E. AON TRANSFORMATION

Here AON stands for AON it means All or nothing, it means the receiver have to decode whole packet for retrieving the original message because if it receives half packet and it try to receive half message then that will be impossible for Jammer and jamming operation is also failed due to this scheme because jammer can never classify the data packet, which is most important for implement jamming.

IV. WIRELESS NETWORK DISCRIPTION

A. Sender node in wireless network:

Given Figure 5 shows the sender node which is blinking in green colour and all the other nodes are possible receivers.

Also sender is the starting component of wireless network from where the transmission begins.

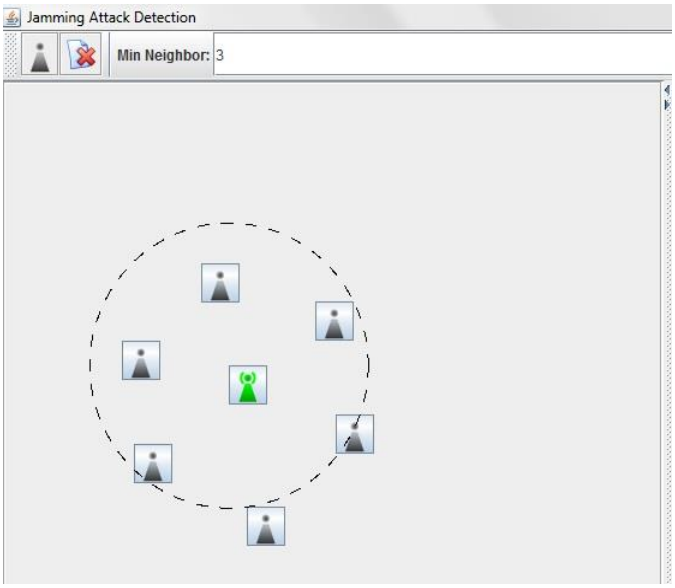

Figure 5: Receiver in WN

B. Receiver node in wireless network:

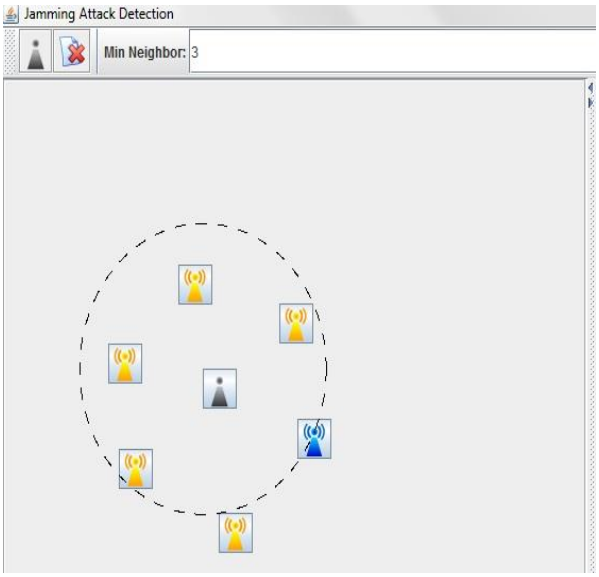

Figure 6: Receiver in WN

Node blinking in blue colour is receiver node and yellow ones are other nodes waiting for messages.

C. Jamming in wireless network:

This red symbol shows jamming in the sender nodes. As soon as this Red sign gets visible whole system interactions should stop and further processing occurs only when safe communication occurs.

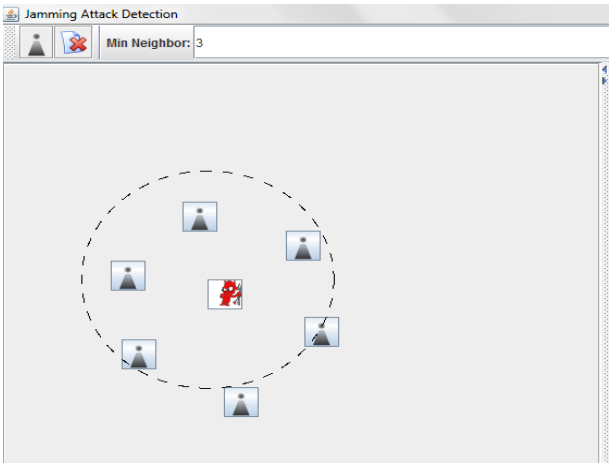

Figure 7: Jamming in WN

V. RESULT

A. *Channel encoding:*

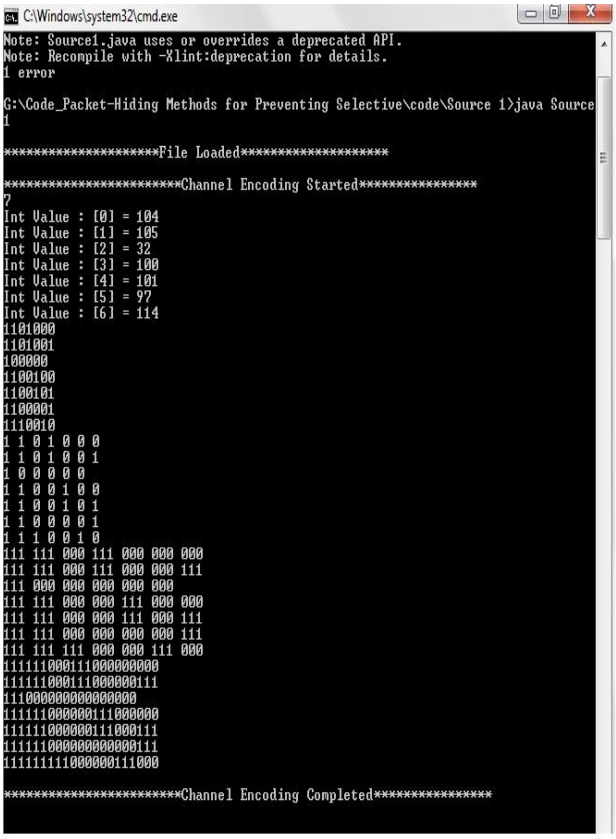

Figure: 8: Channel Encoding

Figure 8 shows how original message is being loaded and channel encoding is performed.

B. *Interleaving:*

After completion of channel encoding, file is interleaved which means all the even and odd bits are clubbed. Vice-versa process is used on receiver side to retrieve original message, which assure the secure and uninterrupted communication.

Figure 9: Interleaving

C. *Final Result*

Efficiency is given by efficiency of AONT because it is applied at the last layer of dissembling.

Efficiency: 99.59596
JBL: 21.0
Coding Rate: 0.666667
Interleaving Depth: 14.0
Formulations & calculations:
Since, File length: 7
Therefore, Jamming block length: 7*3 =21 (because each block is divided into 3 bits)
Also, Coding rate: Interleaving Depth / JBL
14/21= 0.666667

These all modules describe the wireless system and its components and uninterrupted communication with the selected important message security by dissembling through encoding and interleaving.

Figure 10: Final Result

VI. CONCLUSION

We addressed the problem of jamming in wireless networks and illustrated the effectiveness of jamming attacks, such as attacks against the TCP protocol. We showed that an adversary can exploit its knowledge of the protocol implementation to increase the impact of his attack at a significantly lower energy cost. We illustrated the feasibility of jamming attacks by performing real time packet classification. Showed PDS and DCS schemes through which the selective jamming can be prevented.

ACKNOWLEDGMENT

I would also like to express my sincere gratitude to all the faculties of ASET, Amity University for their extensive help and support during the writing this paper and continuously advising and guiding on the targets to be achieved for each week and evaluating the stages of experiments and suggestion improvements. But without their help, it would have been an extremely tedious task to come out with this research implementations and publications in such a limited span of time. I dedicate this paper to my family for their unconditional love and support in every way possible during the process of research and experimentations.

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Evaluation of Antiulcer Activity of Ethanolic Extract of *Madhuca longifolia flowers* in Experimental Rats

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Abstract- Gastric ulcer is one of the most prevalent gastrointestinal disorders, which affects approximately 5-10% of people during their life. In recent years, abundant work has been carried out on herbal medicine to clarify their potential efficacy in gastric ulcer prevention or management. Here, the present study was carried out to investigate antiulcer activity of ethanolic extract of *Madhuca longifolia* flowers in pylorus ligated ulceration in the albino rats .The ethanolic extract of ***Madhuca longifolia* flowers** at doses of 100,200,300 mg/kg b.w produced significant ($p<0.01$) inhibition of the gastric fluid volume, free acidity, total acidity. In conclusion the antiulcer properties of the extract may be attributed to the presence of phytochemicals like flavonoids (quercetin), alkaloids and tannins present in the plant extract with various biological activities.

Index Terms- ***Madhuca longifolia***, Ethanol, Free acidity, Total acidity.

I. INTRODUCTION

Peptic ulcers are a deep gastrointestinal erosion disorder that involves the entire mucosal thickness, penetrating the muscular mucosa. For decades it was believed that the excessive secretion of gastric acid caused gastrointestinal ulcerations, but many patients presenting such ulcerations had normal acid secretion rates. Then, researchers reported that peptic ulcers were been caused by an imbalance between the aggressive factors and a number of known defense mechanisms. Exogenous aggressive factors such as smoke, anti-inflammatory drugs, alcohol, stress, fatty foods and *Helicobacter pylori* infections triggered tissue necrosis through mucosal ischemia, free radical generation and cessation of nutrient delivery, hydrochloric acid together with pepsin, pancreatic enzymes and bile decreased the defense mechanisms of gastrointestinal mucosa such as the intercellular junctions, local blood flow, mucus/bicarbonate secretion and cellular growth.

Peptic ulcer therapy has undergone many strides over the past few years and a number of drugs are available for treatment. These drugs are broadly classified into two groups, those that decrease or counter acid pepsin secretion and those that afford cytoprotection by virtue of their effects on mucosal defence factors.These drugs act by different mechanisms, most of the commonly used drugs are H_2 blockers (ranitidine, famotidine etc.,), M_1 blockers (pirenzepine, telenzepine etc.,).proton pump inhibitors (omeprazole, lansaprazole etc.,) decrease secretion of acid while drugs like sucralfate and carbanoxolone promote mucosal defence. Recently the role of these drugs on the defensive factors gaining importance.

It is now assumed that these drugs ultimately balance the aggressive factors (acid, pepsin, *H.Pylori*, bile salt) and defensive factors (mucin secretion, cellular mucus, bicarbonate secretion). Although these drugs have brought about remarkable changes in ulcer therapy, the efficacy of these drugs is still debatable. Reports on clinical evaluation of these drugs show that there are incidences of relapses and adverse effects (arrythmiasis, impotence, gynaecomastia) and danger of drug interactions during ulcer therapy .hence search for an ideal anti ulcer drug continuous and has also been extended to herbal drug in search for new and novel molecules, which afford better protection and decrease the incidence of relapse.

Madhuca longifolia (Koen.) Macbr. (Syn. *Bassia longifolia* J. Koenig ex. L. *M. longifolia* (Koen.) Macbr. var. *longifolia*) , is a large, shady, deciduous tree, both wild and cultivated, dotting much of the Central Indian landscape. The tree is valued for its flowers, fruits, seeds and timber. The expectorant flowers are used to treat chest problems such as bronchitis. They are also taken to increase the production of breast milk. The distilled juice of the flowers is considered a tonic, both nutritional and cooling. The tree wins in fame due to the liquor distilled from the flowers, which is used to make vinegar. The leaves are applied as a poultice to relieve eczema. In Indian folk medicine, the leaf ash is mixed with ghee (clarified butter) to make a dressing for wounds and burns. Mahua preparations are used for removing intestinal worms, in respiratory infections, and in cases of debility and emaciation. The astringent bark extract is used for dental-related problems, rheumatism and diabetes.

The butter cup fruit-seeds, generally ellipsoidally shaped, measures from 1.5 to 2.0 cm and 1.3 to 1.6 cm across the length and breadth, respectively. *Madhuca longifolia* fruit is valued for its seed which yield high quantity of fat (Ca.50%), commercially known as Mahua butter or mowrah butter, and has many edible and medicinal applications.The semi-solid mahua fat is used in cooking, adulderation of ghee, and manufacturing chocolates. The seed fat has emuluscent property; it is used for skin diseases, rheumatism, headache, laxative, piles and sometimes used as galactogugue. Besides its edible and medicinal uses, *Madhuca longifolia* fats can also be utilized in the manufacture of laundary soaps and lubricants.Moreover, the seed cake is reported to have insecticidal and pesticidal property and also used for fishing. The timber is useful in various ways, but neglected. The medicinal properties attributed to this plant are stimulant, demulant, emollient, heating and astringent.

II. MATERIALS AND METHODS

Plant material

Plant parts of *Madhuca longifolia* were collected from 25-30 year old trees, from a temple owned grove, in a Village, Rajendrum Arcot of Thanjavur district, Tamilnadu.The identity of the plant specimens was confirmed by the use of local Floras and standard references.The botanical identity was also authenticated by Dr.M.Jegadeesan, Professor and Head, Department of Environmental and Herbal Sciences, Tamil University, Thanjavur. Herbarium specimen of *Madhuca longifolia* are deposited at Tamil University Herbarium (TUH288).

Preparation of extracts

Fresh flowers of *Madhuca longifolia* were collected and macerated with 50% ethanol for 7 days with occasional shaking to get alcoholic extracts. The alcoholic extracts were concentrated in a rotary flash evaporator and dried in desicator.

III. TOXICOLOGICAL STUDIES

Gross behavioural and acute oral toxicity studies

Gross behavioural and acute oral toxicity studies (LD_{50}) of the extracts were determined as suggested by Turner.The mice weighing between 30-40 g were selected. The mice were grouped into 6 mice per group, each extract at different dose levels (100, 200, 300, 400, 500 mg/kg b.w.). Dissolved in distilled water were administered once orally per dose level to the overnight fasted animals. The group receiving water (1 ml/kg) was kept as control. The animals were subjected to primary screening studies at ½, 1, 2 and 4 hours respectively and finally overnight mortality was recorded. Behaviour of the animals and any other toxic symptoms were also observed for 24, 48 and 72 hours and the animals were kept under observation upto 14 days. After administration to find out delayed mortality if any.

Swiss adult albino male rats (b.w. 180-220 g) were employed for pharmacological evaluations of anti-inflammatory, antiulcer and analgesic activities; while swiss adult albino male rats were purchased from Sri Venkateswara Enterprises, Bangalore and maintained under standard experimental conditions (Temperature 27 ± 2°C, relative humility 60±5% and 12 hours light/dark cycle) and the animals were maintained as per the rules in the guidelines of CPCSEA. The animals were housed in standard microlon boxes and were given standard laboratory diet (Amrut Laboratory Animal Feed, Sangli-416436) and water ad libitum. All pharmacological experiments involving animals described in the present work were carried out and get approved by Local Animal Ethical Committee of Department of Pharmacology, Periyar College of Pharmacy for Women, Trichy.

ANTI-ULCER ACTIVITY (Modified pyloric ligated (Shay) rat model)

The experimental procedures of Shay *et al.* (1945), modified by Okabe *et al.* (1982) were used.

Rats weighing 180-220 g were divided into groups of six animals each and were placed in cages with grating floor to avoid coprophagy and fasted for 48 hours allowing the access to water. One group received water (1 ml/kg) and was served as control (Ranitidine (30 mg/kg) were selected as standard drugs and as given to a groups, for comparison. For the test group, each extract the animals were grouped into three, receiving the drug at a dose level of 100, 200 and 300 mg/kg body weight.

Under light ether anesthesia, the abdomen was opened by a small mid-incision now the xiphoid process, pyloric portion of stomach was slightly lifted out and legated avoiding traction to the pylorus or damage to its blood supply. The stomach was placed carefully and the abdomen wall closed by interrupted sutures. The test drugs were administered twice daily, orally, for two days and other drugs were administered once daily orally for two days prior to and one hour before to pyloric ligation. The animals were deprived of both food and water during the post-operative period. Four hours after the ligation, animals were sacrificed.

The stomach was excised carefully keeping the oesophagus closed, opened along the greater curvature and the luminal contents were removed as described.The gastric contents were collected in a beaker and centrifuged at 1000 rpm for 10 minutes as recommended.The samples were analysed for gastric volume, pH, free and total acidity, sodium and potassium output as recommended.Bio-medical estimations, like total proteins, total hexoses, hexosamine, fucose, sialic acid and pepsin were also done. The mucosa was flushed with saline and stomach pinned on a frog board and scored. The scoring is done as described by Laurence and Bacharach (1964).

Ulcer Score

Ulcer Score	Descriptive Observation
0	Normal rugal pattern
1	Alteration in normal rugal pattern
2	Scattered haemorrhage lesions
3	Haemorrhage lesions and ulcers
4	Penetrating and perforating ulcers

After completed the experimental regimen, the rats were sacrificed and the stomach was removed. The gastric content was collected and centrifuge for 5 min at 2000 × g and the supernatant was separated. The volume, pH, and total acidity, free acidity, sodium and potassium of gastric fluid were determined in flame photometer.

Dissolved mucosubstances were estimated in 90% alcoholic precipitate of the gastric juice. The precipitate, thus obtained was dissolved in 1 ml of 0.1 *N* NaOH or 1 ml of 0.01N H_2SO_4.The former was used for the estimation of protein, total hexoses, hexosamine and fucose, while the latter was used for the estimation of sialic acid. The ratio of total carbohydrate (TC) (Sum of total hexoses, hexosamine, fucose and sialic acid) to protein (P) has been taken as the index of mucin activity.

IV. PREPARATION OF HOMOGENATE

The stomach was then weighed and homogenized in chilled Tris buffer (10 mM, pH 7.4) at a concentration of 10% (w/v). The homogenates were centrifuged at 3000 × g for 20 min using centrifuge. The clear supernatant was used for the assays of lipid peroxidation (MDA content), endogenous antioxidant enzymes (Cu/Zn) Superoxide dismutase (SOD) and catalase (CAT)), and reduced glutathione (GSH). The sediment was resuspended in

ice-cold Tris buffer (10 mM, pH 7.4) to get a final concentration of 10% and was used for the estimation of different membrane bound enzymes (Na^+K^+ATPase, Ca^{2+}ATPase, Mg^{2+}ATPase) and proteins.

ESTIMATION OF STOMACH CONTENTS

DETERMINATION OF GASTRIC JUICE VOLUME AND pH

The volume and pH of centrifuged gastric juice were measured by pipette and digital pH meter. The volume was expressed as ml

DETERMINATION OF TOTAL AND FREE ACIDITY

The total and free acidity were determined by titrating with 0.01N NaOH using phenolphthalein and Topfer's reagent or methyl orange.

Reagents

1. 0.01N NaOH
2. Phenolphthalein
3. Topfer's reagent or methyl orange

Procedure

Pipette 1ml of filtered gastric contents into a small beaker, add 2 to 3 drops of Topfer's reagent or methyl orange and titrate with 0.01 N NaOH until all trace of the red colour disappears and the colour is yellowish orange. Note the volume of alkali added that indicate free acidity. Then add 2 or 3 drops of phenolphthalein and continue titrating until a definite red tinge reappears. Note the total volume of alkali added that indicate total acidity.

The results expressed as Meq/l

GASTRIC MUCOSAL DEFENSIVE STUDY

DETERMINATION OF PEPSIN ACTIVITY

The pepsin activity was determined by using BSA as a substrate.

Reagents

1. 10% TCA
2. 2.5 N NaOH
3. Folins phenol reagent (1:2)
4. BSA standard (0.5% BSA in 0.01N HCl)

Procedure

A mixture of gastric juice (0.1 ml) and 0.5% BSA in 0.01 N HCl (1 ml) was incubated at 37°C for 20 min and the reaction was stopped by adding 10% TCA (2 ml). After denaturation of protein by heating in boiling water bath for 5 min the precipitate was removed by centrifugation (3000 rpm/10 min). A total of 1 ml of the supernatant was mixed with 0.4 ml of 2.5N NaOH and 0.1 ml of Folin's reagent and total volume was adjusted to 10 ml with distilled water. Read 640 nm after 20 min.

The results were expressed in terms of μmole of L-tyrosine liberated.

ESTIMATION OF SODIUM

Sodium was estimated by colorimetric method

Reagents

1. Precipitating reagent: Magnesium Acetate 533 mMol/1
2. Coloring reagent: Potassium Ferrocynide 15 mMol/1 and Uranyl acetate 22 mMol/1.
3. Standard reagent: 150 mMol/1

Procedure

To the standard tube, about 1ml of precipitating reagent, 0.01 ml of standard reagent were taken. 1ml of precipitating reagent and 0.01 ml of sample was taken for the test mixed well and allowed to stand at room temperature for 5 minutes then centrifuged at 2000-3000 rpm for 2 minutes to obtain clear supernatant.

About 0.02 ml of supernatant was taken from each tube. To this 1 ml of colouring agent was added. Blank consists of 0.02 ml of precipitating reagent and 1 ml of colouring reagent mixed well and allowed to stand at room temperature for 5 minutes which was read at 530 nm. Standard also conducted similar way.

The values were expressed as Meq / L.

ESTIMATION OF POTASSIUM

Potassium was estimated by the method of Maruna & Trinders

Reagents

1. Boron reagent: Sodium Tetraphenyl Boron 30 mMol/1
2. Sodium hydroxide: 50 mMole/1
3. Standard reagent: 5 mMol/1

Procedure

To 0.05 of sample and 1ml of boron reagent were added. 0.1 ml of standard reagents and 1ml of boron reagent was added for standard. All the tubes were mixed well, incubated at room temperature for five minutes. The color developed was read at 620 nm colorimetrically within 10 minutes.

The values were expressed as Meq / L

ESTIMATION OF HEXOSE

Hexose level was estimated by the method of Niebes

Reagent

1. Orcino1- Sulphuric acid reagent
2. Solution A: 60 ml of concentrated sulphuric acid was mixed with 40 ml of distilled water.

Solution B: 1.6 g of orcinol was dissolved in 100 ml of distilled water.

Prepare reagent: 7.4 ml of solution A was mixed with 1 ml of solution B before use.

3. Standard: 5 mg of each of galactose and mannose were dissolved in 100 ml of distilled water (100μg/ml).

Procedure

0.5 ml of the neutralized solution was made upto 1 ml with distilled water and added 8.5 ml ice-cold orcinol reagent. The mixture was heated at 80°C for 15 minutes, cooled and left in the dark for 25 minutes for colour development. Then absorbance was read at 540 nm in a colorimeter. Standard solutions containing 25-100 μg of hexose were treated in a similar manner.

The hexose content was expressed as μg/ml

ESTIMATION OF HEXOSAMINE

Hexosamine content was estimated by the method of Wagner .

Reagent

1. Acetyl acetone reagent

Solution A: Trisodium phosphate 0.1M
Solution B: Potassium tetraborate 0.5N
3.5 ml of acetyl acetone was added to mixture of solution A and solution B in the ration of 98:2(v/v)

2. Ehrlich's reagent

320 mg of p-dimethy; aminobenzaldehyde was dissolved in 21 ml of isopropanol and 3 ml of concentrated HCl.

3. Standard: Galactosamine was prepared in the concentration range of 100 μg/ml in water.

Procedure

0.5 ml of the neutralized sample was made upto 1 ml with distilled water. Standard galactosamine (in the range of 10-4- μg) was also made upto 1 ml with distilled water. 0.6 ml of acetyl acetone reagent was added to all the tubes and heated in a boiling water bath for 30 minutes. After cooling, 2 ml of Ehrlich's reagent was added and the contents were shaken well. The pink colour developed was measured at 540 nm against the reagent blank.

Hexosamine content was expressed as μg/ml.

ESTIMATION OF FUCOSE

Fucose level was estimated by the method of Dische and Shettles

Reagent

1. Sulpuric acid: water mixture (6:1)
2. Cysteine reagent
3. Standard: 20 mg of methyl pentose was dissolved in 100 ml of distilled water.

Procedure

0.05 ml of the neutralized sample and 5 ml of sulphuric acid: water mixture was added and heated in a boiling water bath for 10 minutes. After cooling the tubes, 0.1 ml of cysteine reagent was added. The colour developed after 150 minutes was read at 420 nm. The standard was also treated in a similar manner.

The fucose level was expressed as μg/ml.

ESTIMATION OF SIALIC ACID

Sialic acid level was determined by the method of Warren

Reagents

1. Periodic acid 0.25M
2. 4% Sodium meta arsenite
3. Thiobarbituric acid
4. Acidified butanol
5. Standard sialic acid: 10 mg of N-acetyl neuraminic acid was dissolved in 100 ml of distilled water.

Procedure

0.5 ml of the neutralized sample was taken along with the standards (in the range of 10-40 μg). Blank contained 0.5 ml of 0.1 N sulphuric acids. 0.25 ml of periodate was added to all tubes at 37°C. After 30 minutes, 0.25 ml of arsenite solution was added to inhibit the reaction. Contents were mixed well and 2 ml of thiobarbituric acid was added and the tubes were heated in a boiling water bath for 6 minutes. After cooling, the pink colour developed was extracted into 5 ml of acidified butanol phase and was measured at 540 nm against a reagent blank.

The sialic acid content was expressed as μg/ml

V. STATISTICAL ANALYSIS

The raw data of the present study were subjected to simple statistical analysis to draw meaningful interpretation and conclusion.

1. The standardization values of study drugs were expressed in percentage (w.w.).
2. For Pharmacological Studies

The Mean ± SEM and student's 't' test are computed for all the biochemical estimations, to find out statistical significance at 1% and 5% probability levels.

The data were computed and analysed using Statistical Package for Social Sciences (SPSS) software version 11.5.

VI. RESULT AND DISCUSSION

The alcoholic of flowers of *Madhuca longifolia* were tested for their acute toxicity in Swiss albino mice. The acute oral toxicity was carried out as per OECD, revised draft guidelines 423, received from Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Ministry of Social Justice and Empowerment, Government of India (OECD, 2001). To determine acute toxicity of single oral administration of the extract, in a dose of 2000 mg/kg body weight were given. The extracts were prepared as a suspension by titrating with water and 1% gum acacia.

The test substances were administered as a single dose by intra gastric tube. Prior to dosing, animals were kept for 12 h of fasting. The animals were weighed and test substances were administered.

After administration of the extract, the animals were observed individually for 4 h and thereafter 14 days for any mortality and their behavioural pattern. The parameters noted were grooming, hyperactivity, sedation, loss of righting reflex, respiratory rate and convulsion.

In the acute toxicity study, the alcoholic extracts of *Madhuca longifolia* did not show significant toxic effects when observed for the parameters during the first four hours and followed by daily observations for 14 days and no mortality was also observed. The extracts were found to be safe at the tested dose level of 2000 mg/kg body weight indicating the high margin of safety of these extracts.

Alcoholic extract of *Madhuca longifolia* flowers was administered orally to rats in different dosages (100, 200 and 300 mg/kg b.w.) for their antiulcer activity in pyloric ligated (shay) model (Table1). Aggressive factors like free acidity, total acidity, protein and pepsin, ulcer score was found to be significantly decreased in a dose dependent manner. The protective factors like hexoses, hexosamine, fucose and sialic acid were found to be significantly increased in a dose dependent manner. The isolated

rat stomach treated with 300 mg/kg b.w. of alcoholic extracts of *Madhuca longifolia* flowers showed maximum antiulcer activity.

In the present investigation, the alcoholic extract of flowers of *Madhuca longifolia* exhibited a significant gastro protective effect. It has been postulated that histamine might be involved in the formation of pylorus-ligated ulcers and plays a mediating role in the gastric secretion stimulated by gastrin, vagal excitation and cholinergic agents.Thus the effect of the alcoholic extracts of flowers of *Madhuca longifolia* on gastric lesions induced by pylorus ligation could be due to the histamine inhibition and or scavenging the free radical. This gastro-protective effect of the extract can be attributed to the various bioactive principle detected in the ethanolic extract, pylorus ligation-induced ulcers are due to autodigestion of the gastric musoca and break down of the gastric mucosal barrier. In our present study alcoholic extract of *Madhuca longifolia* flowers showed maximum antiulcer activity at a dose of 300 mg/kg b.w. Aggressive factors like free acidity, total acidity, protein, pepsin and ulcer score were found to be significantly decreased in a dose dependent manner. The protective factors like hexoses, hexosamine, fucose and sialic acid were found to be significantly increased in a dose dependent manner. Thus the active principle in the extract might be enhancing the mucosal defensive factors (Hexose, Hexosamine, Fucose, Sialic acid) leading to increased mucus production protecting the surface epithelial cells.

Survey conducted in Australia and US indicated that respectively 48.5 and 34% of the respondents used at least one form of unconventional therapy, including herbal medicine.The most medicinal plants are enriched with bioflavonoids, which have antioxidant activity. Flavonoids as antioxidants exhibited several biological effects such as antiulcer, anti-hepatotoxic, anti-inflammatory, antiallergic, antidiabetic and antipyretic actions.Peptic ulcer is the most common gastro intestinal disorder in clinical practice. Considering the several side effects (arrythmias, impotence, gynaecomastia and haematopoeitic changes) of modern medicine, indigenous drugs possessing fewer side effects should be looked for as a better alternative for the treatment of peptic ulcer Currently, proton pump inhibitors such as omeprazole are extensively used to control increased acid secretion and acid related disorders including gastroesophageal reflux disease, Zollinger-Ellison syndrome and gastro duodenal ulcers caused by stress (stress related erosive syndrome), non-steroidal anti-inflammatory drugs and by *H. pylori*.Although, histamine-H_2 receptors blockers (ranitidine, famatidine etc.) the proton pump inhibitors (omeprazole, lansoprazole etc.) have been used for the efficient management of gastric hypersecretion and gastroduodenal ulcers, several adverse effects of these drugs have also been reported.

Madhuca longifolia flower extracts exhibited antiulcer activity by increasing hexosamine and carbohydrate protein ratio and decreasing pepsin content. This result in the increase in mucous secretion. The importance of mucous secretion as a response to gastric mucosal trauma has long been recognised.Apart from antiulcer effect the *Madhuca longifolia* flower, they possess significant antipyretic, anti-inflammatory, analgesic, antidiabetic and wound healing activity.Drugs with multiple mechanism of protective action, including antioxidant properties may be one way forward in minimizing tissue injury in human diseases.Although in most of the cases the aetiology of ulcer is unknown, it is generally accepted that it results from an imbalance between aggressive factors and the maintenance of the mucosal integrity through the endogenous defence mechanism.Studies have shown that alteration in the antioxidant status following ulceration, indicating that free radicals seem to be associated with the pylorus-ligation induced ulceration in rats.

The preliminary phytochemical analysis of *Madhuca longifolia* extract showed the presence of alkaloids, flavonoids, triterpenoids,carbohydrates and glycosides. The significant increase in the antiulcer activity of *Madhuca longifolia* could be attributed to the presence of flavonoids (quercetin), alkaloids, tannins,saponin glycosides and phenolic compounds. Flavonoids are among the cytoprotective materials for which antiulcerogenic efficacy has been extensively confirmed. It is suggested that, these active compounds would be able to stimulate mucus,bicarbonate and the prostaglandin secretion and counteract with the deteriorating effects of reactive oxidants in gastrointestinal lumen.So the antiulcer activity of *Madhuca longifolia* may be attributed to its flavonoids content. The results of the present study suggest that the ethanol extract of *Madhuca longifolia* may be beneficial in the treatment of gastric lesions. Further studies to identify the active moieties and elucidation of the mechanism of action are recommended.

ACKNOWLEDGEMENTS

I take this opportunity to express my endless gratitude and indebtedness to my venerable supervisor **Dr. M. Jegadeesan, M.Sc., Ph.D.,** Professor and Head, Department of Environmental and Herbal Sciences, Tamil University, Thanjavur. Iam also very thankful to my family for their support and encouragement.

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Table 1
Effect of Ethanalic extract of *Madhuca longifolia* flowers in modified pyloric ligated (Shay) rat model

ups	Drug Dose mg/kg	Ulcer score	pH	Gastric volume (ml)	Protein (µg/ml)	Pepsin (µg/ml)	Free acidity (meq/l)	Total acidity (meq/l)	Na^+ (mg/l)	K^+ (mg/l)	Hexoses (µg/ml)	Hexosamine (µg/ml)	Fucose (µg/ml)	S
nal	1 ml	-	3.600 ± 0.010	3.566 ± 0.136	420.66 ± 0.350	5.523 ± 0.008	48.83 ± 0.300	53.59 ± 0.420	1.642 ± 0.005	0.201 ± 0.005	308.21 ± 0.320	280.76 ± 0.523	46.10 ± 0.172	37
rol	1 ml	3.33 ± 0.12	2.618 ± 0.004	5.216 ± 0.147	662.91 ± 0.755	11.26 ± 0.014	85.66 ± 0.333	103.0 ± 0.894	1.053 ± 0.003	0.427 ± 0.006	280.33 ± 0.393	253.33 ± 0.714	27.20 ± 0.662	28
	30	1.43*** ± 0.04	3.361** ± 0.010	3.600** ± 0.136	424.99** ± 0.366	5.523* ± 0.008	46.83** ± 0.307	54.50** ± 0.428	1.643** ± 0.005	0.212** ± 0.007	315.27** ± 0.325	284.66** ± 0.557	47.12** ± 0.480	37
hu folia hol	100	1.65***± 0.04	4.156*** ± 0.037	4.333** ± 0.155	583.98* ± 0.728	7.083* ± 0.124	52.0** ± 0.365	67.50* ± 0.846	1.613*** ± 0.003	0.246*** ± 0.003	292.77* ± 0.268	261.49* ± 0.341	40.52* ± 0.563	40.
huca folia hol	200	1.48***± 0.03	4.563*** ± 0.020	3.150** ± 0.142	488.13* ± 0.601	6.011** ± 0.015	49.83*** ± 0.477	63.83** ± 0.477	1.851*** ± 0.003	0.258*** ± 0.004	332.99*** ± 0.242	298.82**□0.400	49.92** ± 0.655	47.
huca olia hol	300	1.33*** ± 0.21	5.811*** ± 0.004	2.283*** ± 0.094	477.02* ± 0.711	5.536*** ± 0.107	47.83*** ± 0.477	58.50*** ± 0.763	1.943*** ± 0.003	0.268*** ± 0.004	360.36*** ± 0.161	308.60*** ± 0.466	56.98*** ± 0.449	53.

Values are expressed in terms of Mean ± SEM.
*P < 0.05; **P <0.01; ***P <0.001 compared with control group.

Seasonal Variations in Haematological Parameters of Golden Mahseer, Tor *putitora*.

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Abstract- Present study was designed to investigate any seasonal (spring, summer, monsoon, autumn and winter) fluctuations in haematological parameters in the blood of *Tor putitora*. Significant seasonal variations in the number of white and red blood cells, haemoglobin, haematocrit, mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration have been observed. In general, higher values of RBC dependent parameters ;viz, TEC, Hb, PCV were recorded during spring, summer, monsoon and autumn, and lowest during winter. White blood cells on other hand, exhibited gradual decline during monsoon and autumn upto winter only to rise again in spring and summer. The proportions of different leucocytes though variable but lymphocytes have been observed to be the chief contributor in TLC fluctuation. Thrombocyte count was significantly higher during autumn and winter season. Relation between seasonal changes in environmental factors such as temperature and dissolved oxygen with various blood parameters have been discussed.

Index Terms- Seasonal, haematological parameters and *Tor putitora*.

I. Introduction

Tor putitora is an economically valuable freshwater fish. This cyprinid, indigenous to South Asian countries is popular with consumers as a highly esteemed food fish besides its role in sport fishery. However due to overexploitation and rise of growing number of hydroelectric projects in its natural habitat (Nautiyal and Singh, 1989), mahseer population has recorded a rapid decline over last few decades and thus have been accorded 'threatened' status in India (Khan and Sinha, 2000). This prompts us to work on its various biological aspects including haematology. Haematological parameters by acting as an early biomarker gives an insight of the health status the fish (Jawad et al, 2004). Moreover, haematological tests have prved useful in detection and diagnosis of metabolic disturbances and disease in fishes (Aldrin et al, 1982). To investigate fish blood factors and their changes in response to xenobiotics, normal range of these factors must initially be measured in healthy fishes. In light of the above, presently an attempt has been made to undertake a seasonal study on some haematological parameters of *Tor putitora* so as to generate referral values as well as their variations in the environmental conditions associated with season.

II. Materials and Methods

Study Area and Data collection:

Adult *Tor putitora* (30-35 cm in length and 405-460 gm in weight) were caught from tributaries of river Tawi in sunderbani area of jammu region. Sampling period was from February 2009 to January 2010 and every month a total of 10 fish were captured using cast net. Immediately after capturing, 2 ml blood was taken by cardiac puncture using heparanized syringe.

Haematological Analysis:

TEC and TLC was made using an improved Neubauer haemocytometer (Shah and Altindag, 2004). Hb was estimated by Sahli's haematin method. PCV was estimated by Wintrobe tube method. MCV (fl), MCH (pg) and MCHC (%) were calculated using following formulae:

MCV = PCV×10/RBC count
MCH= Hb /RBC count
MCHC= Hb×100/PCV

Determination of DO and Water temperature:

Water temperature values were recorded by mercury bulb thermometer. DO of the water was determined by sodium azide modification of winkler's method (A.P.H.A, 1985).

Determination of Gonadosomatic index:

G.S.I was calculated as- G.S.I= Gonad weight/Fish weight×100

Statistical Analysis:

Statistical analysis was performed with SPSS version 10.0 for windows (SPSS,1996). Data was presented as Mean±Standard deviation (S.D) of the mean and analyzed by one way analysis of variance (ANOVA).

III. Results and Discussion

Erythrocytes-

The results obtained (tab. 1) very clearly indicate rise in RBC dependent parameters; viz, TEC, Hb and PCV from spring season onwards till monsoon which are consequently followed by their decline during late autumn till winter season. Concerning calculated values, while MCH and MCHC were lowest during monsoon and highest during winter season, MCV was lowest during autumn and highest during winter.

Indepth study of the table further details that from January onwards, as temperature starts rising, TEC, Hb and PCV undergo gradual increase through spring and summer. Further, it is also evident from the results that inspite of the declining temperature a consistent increase in their numerical value was observed till early autumn when they reach maxima in the month of

September. From here onwards, a sharp drop in these values was observed with approaching low temperature in winter season. In this regards, present results though in agreement with these of Preston (1960), Joshi (1980), Syrov (1970), Radzinskaya (1966), Khan (1977), Jamalzadeh and Ghomi (2009) but partially. Similar to present findings, these workers reported an increase in blood parameters but only during spring and summer against the presently recorded increment upto early autumn. Winter decline, however, is in accordance with the op.cit workers. It appears that the rise in TEC, Hb and PCV values during spring and summer may be an outcome of the adaptive response to the respiratory stress caused by increasing water temperature related low DO. The fish perhaps tend to combat the conditions of high oxygen demand either by an increase in TEC, Hb or PCV or all of these parameters. That it is so gets strengthened by the findings of Di Prisco and Tamburrini (1992) who held water temperature to affect various blood parameters through its direct influence on the haemoglobin-oxygen binding properties and thus on oxygen transport. Guijarro et al (2003) and Jamalzadeh and Ghomi (2009) too explained temperature related seasonal variability to be the key factor responsible for increase in RBC dependent parameters during summer.

Positive correlation between feeding activity and temperature in *Tor putitora* (Malhotra, 2005) reflects the augmented nutritional status of the fish. Enhanced food consumption it appear also increases the rate of RBC formation through the process of erythropoiesis by making availability of required micronutrients to fishes. Rich RBC values and energy build up during these months also seems to be an adaptation on the part of presently studied fish, *Tor putitora* since they are in process of preparing them for the most important reproductive events. The present viewpoint gets corroborated from the previous reports wherein suggestions have been made that the contents of fish blood gets altered with season associated reproductive cycles (Kori-Siakepere (1985) and RBC dependent values elevate considerably prior to spawning (Bidwell and Heath, 1993). A consistent rise in TEC, Hb and PCV has been observed till September, which happens to be a protracted breeding season of the fish and is examplified by the rising GSI (tab. 3) during these months. Such rise can be very safely attributed to otherwise high energy demand of fishes during this period. Tor, which is known to show upstream breeding migrations, shows high rate of physical activity while paving their way to upper reaches of the river. For such strenous physical activity, apart from increased ATP production, a corresponding increase in the capacity for oxygen transport too is needed, which can probably be met by erythropoiesis. Thus inspite of low temperature and high DO during monsoon and autumn months, an increase in TEC along with Hb and PCV gets very clearly explained. Findings of Gallaugher and Farrel, (1998), that acute increase in haematocrit of exercising fish by release of erythrocytes from spleen lends a substantial support to present observation. The constant rise in TEC, Hb and PCV from spring (February) to early autumn (September) thus plausibly appears to be an adaptive response of the fish as a consequence of which they 1) can tide over the period of low DO from April to June very smoothly and 2) prepare them for intense physical activity during upstream migration for breeding events from June to September.

Winter decline in the TEC, Hb and MCV presently appear to be the result of hike in DO due to sharp drop in temperature. Much more oxygen available to the fish lowers the demand of oxygen carrier molecule; haemoglobin. Also, due to lack of food availability in general in the ecosystem and reduced food consumption by fish *Tor putitora* during this period (Malhotra, 2005) perhaps seems to be another causative factor for lower RBC dependent values in winter.

MCV, a reflection of TEC maintain an inverse relation with it. This inverse relationship between TEC and MCV justifies the decline in MCV in the period (March to September) during which TEC exhibits gradual increase and vice-versa. Increased erythropoiesis during spring and summer months seemingly may also contribute to lower MCV values. Prevalence of large number of young erythrocytes which are otherwise smaller in size than mature RBC's however result in lowering of overall corpuscular volume. It is so has earlier also been reported by Blaxhall and Daisley (1973) who observed lower MCV values at those times of year when erythropoiesis is greatest.

Both MCHC and MCH have been observed to behave in similar way and attain their maxima in the winter season (January) when Hb otherwise declined exhibiting an inverse relation between them. Possibly this inverse relationship observed presently finds its association to the nutritional status of the fish. High altitude water bodies usually are nutrient deficient more so during winter season and for most part of winter fish remain underfed. This natural phenomenon seems to be responsible for decline observed in TEC, Hb and PCV. These unfavourable conditions perhaps provoke the fish to increase haemoglobin concentration per cell and hence the swollen MCH and MCHC values can be taken as an adaptation to cold environment. Influx of young RBC's (erythroblasts), which are otherwise deficient in haemoglobin, in the circulation during summer months further contribute to the lowering of MCH and MCHC. In the months of August and September however increase in MCH and MCHC was found to be in accordance with increasing Hb which can be explained by the high energy requirement of fish for breeding purpose during this period.

Leucocytes:

Leucocytes by acting as first line of defence against any type of infection/pathogen makes an organism immune enough to fight any possible stress. This holds true for fishes also but due to less developed mechanisms of specific immunity, fishes rather depend on the non-specific resistance system (which include increase/decrease in number of leucocytes and their products; lysozymes, interferons, lysins etc (Sahoo et al, 2005). Also during times of stress, be it natural or antropogenic, fish responds by change in number and proportion of leucocytes (Christensen and Faindt-Poischi, 1978). Fluctuations in TLC observed presently during different seasons (tab. 2) also indicate that this may be a response to fluctuating weather conditions and/or some environmental stress encountered frequently in the water bodies now a days. TLC rise during hot part of the year; spring and summer with a peak in the month of June seems to be a response to elevated water temperature which by acting as natural stressor probably stimulates fish to increase those formed elements as leucocytes which prepare them to become immunologically strong enough to face any unfavourable condition. Guijjaro et al

(2003) attributed increased TLC values to the poor water quality of water during summer season. Moreover, enhanced prevalence of opportunistic pathogens and various type of infection during this time of the year can also trigger immunostimulatory response of the fish.

TLC decline initialized during monsoon and autumn culminates by reaching ever low values in winter (January). Immunodepression reported by early workers seemingly appear to be triggered by lower water temperature during winter hence is responsible for the low count of leucocytes. Sahoo et al (2005) too proposed lower temperature to adversely affect both cellular and humoral immune response. Earlier reports (Avtalion, 1981; Durborow and Crusboy, 1988 and Bly and Clem, 1991) that poikilothermic animals including fish suffer from immunodepression due to low temperature aptly substantiate the present findings. Starvation like condition during these months because of low availability of food, makes the fish deficient of important nutrients which ultimately may appear to be another reason for the lower TLC values encountered during colder months. DLC exhibited an increase in both granulocytes (monocytes and lymphocytes) and agranulocytes (neutrophils, eosinophils and basophils) and hence contribute in the elevated total leucocyte count during spring and summer. Decline in lymphocytes to the tune of 26% during winter season very safely credit them to be the chief contributor for decrementing in TLC during winter period.

Thrombocytes, on the other hand observed significant increase during autumn and winter and decrement right through spring, summer upto monsoon. Similar results were also reported by Joshi and Sharma (1991) while studying seasonal fluctuations in *Nemacheilus rupicola*. Since winter season appear to be immunodepressant for fishes, elevated thrombocyte count may rather be a sort of defence on the part of fish to tide over the immunologically weakened period. Thus it can be inferred that as a part of compensatory mechanism, these defence molecules might be playing a role to protect fish in general and *Tor putitora* in particular from either temperature related changes or pathogen attacks at various periods of the year.

IV. Conclusion

From the overview of present results, it can be concluded that all the haematological parameters were affected by endogenous and exogenous factors such as reproduction, water temperature and DO. This investigation may be helpful as a tool to monitor the health status of this and other related fish species since evaluation of haematological parameters definitely guarantees early detection of clinical pathology as well as the presence of any stressor in the environment.

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Tables:

Table 1. Seasonal variations in haematological values of *Tor putitora* in relation to DO and Water temperature. All values are mean±S.D for 10 fishes (5 males and 5 females) in each month.

Month	Lymphocyte	Monocyte	Neutrophil	Eosinophil	Basophil	Thrombocyte
February	31.1±2.3	1.5±0.4	23.0±2.6	0.5±0.2	0.8±0.3	38.6±5.2
March	33.3±3.4	1.6±0.7	23.3±2.4	1.2±0.4	1.5±0.6	35.3±4.8
April	33.9±2.8	1.8±0.6	24.7±3.2	1.4±1.0	1.7±0.7	34.4±3.6
May	34.6±4.6	2.0±1.2	25.4±2.7	1.5±0.8	2.1±1.2	33.8±4.0
June	35.1±5.0	2.5±0.8	27.0±2.5	1.6±0.5	2.4±1.3	32.1±3.5
July	35.9±2.5	2.3±1.4	26.8±3.8	1.6±1.1	2.0±0.9	30.4±2.8
August	33.3±2.8	2.2±1.5	25.5±4.5	1.3±0.9	1.7±1.1	31.5±2.5
September	30.1±3.1	1.9±1.0	26.6±3.6	1.3±0.8	1.4±0.8	32.5±3.4
October	28.4±4.5	1.7±0.8	24.0±4.0	1.2±0.6	1.0±0.6	35.7±4.2
November	27.6±3.4	1.6±1.2	23.5±3.5	0.8±0.7	0.8±0.2	36.6±3.5
December	27.8±3.5	1.4±0.6	23.2±3.0	0.7±0.4	0.8±0.3	36.8±2.0
January	26.3±2.8	1.2±0.5	22.9±2.8	0.6±0.3	0.7±0.1	37.5±3.2

Month	Water temp	DO	TEC ($\times 10^6$/cmm)	TLC (/cmm)	Hb (gm%)	PCV (%)	MCH (pg)	MCHC (%)	MCV (fl)
February	13.5	10	2.42±0.20	17265±309	8.8±0.85	36.1±3.2	36.1±3.20	23.4±0.65	149.46±11.05
March	16	9.4	2.60±0.20	17465±228	8.9±1.20	38.4±1.0	34.2±1.05	23.1±1.02	147.88±8.40
April	19	8.5	2.98±1.21	17854±236	9.3±0.68	39.2±2.1	31.2±0.75	23.6±0.58	131.77±5.62

May	23.5	8.7	3.10±0.85	18185±109	9.6±1.45	40.5±2.4	30.9±1.65	23.6±0.85	130.77±11.8
June	27	8.2	3.16±1.60	18650±203	9.8±2.30	41.0±0.2	30.9±2.50	23.8±1.30	129.90±10.2
July	26	8.3	3.36±1.32	18345±425	9.8±1.60	44.7±0.2	29.1±3.06	21.8±0.72	133.18±4.54
August	24	8.5	3.40±0.78	18048±235	10.0±2.15	45.0±2.7	29.4±2.55	22.2±1.15	132.23±10.0
September	21	8.8	3.42±1.40	17854±158	10.1±1.72	45.3±3.1	29.6±1.83	22.2±0.96	132.48±8.65
October	20	9.1	2.85±1.15	17670±324	9.5±0.10	41.0±2.6	33.2±2.70	23.1±0.15	144.03±4.00
November	17.5	10.0	2.61±0.62	17245±410	9.2±0.05	38.2±1.8	35.2±0.55	24.0±0.10	146.59±11.1
December	14	11.4	2.39±0.15	16985±265	8.6±0.90	35.7±2.3	35.9±0.50	24.0±0.86	149.45±3.53
January	11	13.6	2.31±0.14	16245±180	8.2±1.45	34.9±3.0	36.3±1.85	24.3±0.70	151.42±8.30

Table 2. Seasonal variations in Differential Leucocyte Count (%) of *Tor putitora*. All values are mean±S.D for 10 observations in each month.

Table 3. Seasonal variation in G.S.I of *Tor putitora*. All values are mean±S.D for 10 observations.

Month	Mean G.S.I
February	0.27±0.13
March	0.40±0.23
April	0.32±0.20
May	0.47±0.32

June	0.59±0.42
July	1.08±0.57
August	2.7±1.68
September	2.05±2.36
October	1.25±1.43
November	0.16±0.07
December	0.19±0.08
January	0.19±0.09

Detection and Analysis of Surface Defects in Metals Using Wavelet Transform

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Abstract- Surface tribology and metrology are one among the challenging tasks in the field of image processing and has extensive applications. Structural damage is one of the factors that causes machine breakdown. This paper is intended to propose a new method for explicit analysis of surface defects. In this proposal, the images are acquired using a Panasonic BB-HCM381 camera. These images are subjected to 2 dimensional discrete wavelet transform which uses sub band coding algorithm for feature extraction. The analysis of surface fissures is rendered by obtaining numerical data from the image. This data aids in performing statistical analysis that involves the calculation of mean, variance, standard deviation, skewness and kurtosis from the acquired image. These parameters are calculated for different wavelets like HAAR, Daubechies and a comparative study is made. LabVIEW is the system design platform used for developing this application.

Index Terms- 2D Wavelet transform, denoise, edge detection HAAR Wavelet, LabVIEW, Thresholding

I. INTRODUCTION

Nondestructive visual inspection techniques are in high demand for damage detection and localization. The process of manual inspection is very risky, labor intensive and tends to be erroneous since it purely depends on the psychology and experience of the human observers and is often influenced by his prior knowledge about the object under inspection. As visual monitoring systems require same type of images over and over again to recognize anomalies, an automated surface inspection technique is the only immediate alternative to human inspector in order to detect the abnormalities which deviate from the actual pattern. The surface defects generally result from textural irregularities on the outer surface. Hence, anomalies on surface are the main concern for visual surface inspection techniques. These methodologies have innumerous applications on various surfaces like wood, steel, wafer, ceramics, etc., yet they have extensive applications in industries in condition monitoring of machineries.

The term "machinery failure" indicates that the equipment has ceased to perform the way it was designed for. This is termed as "loss of usefulness". This loss of usefulness is an aftermath of the following phenomena: obsolescence (15%), surface degradation (70%) and collisions (15%). Among these three, surface degradation contributes to the majority of this loss based on this statistical data. Surface degradation constitutes mainly of corrosion (20%) and mechanical wear (50%).

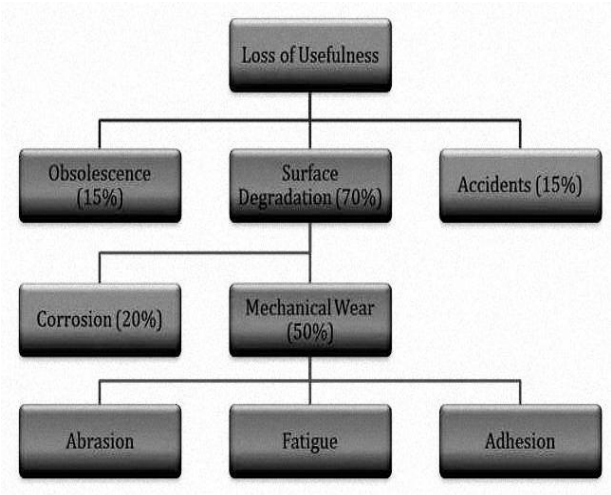

Fig.1. Causes of Machine Failure

The acids formed as a by-product of extreme pressure additives like oil leads to corrosive wear. Mechanical wear results from mechanical stroking or rubbing of machine surfaces with neighboring surfaces. Mechanical wear is the consequence of three actions – abrasion, fatigue and adhesion. Abrasive wear is a method in which contamination of particles causes majority of the wear. Adhesive wear incorporates two surfaces drawing into immediate contact with each other, delivering material from one face to the other. Metal fatigue is the phenomenon of aging of metal which is caused due to continuous cycles of stress on the metal. From all the statistical data furnished, it is evident that surface degradation is the factor that accounts for majority of machine failures.

Usually textures are classified into two types: structural and statistical. Structural textures are formulated by iterations of basic texture primitives such as oriented lines, with deterministic rules of displacement. Statistical texture cannot be explained with deterministic rules of displacement. This paper is concerned about developing a discrete wavelet transform technique to diagnose the defect in machineries. The prototype of an inspection system designed for monitoring using machine vision and the various image processing techniques used to inspect anomalies are presented.

II. EXISTING SYSTEM

A. Principle of operation

In conventional methods, structural damage in an image is detected using ultrasonic inspection. This technique uses high frequency sound waves for surface monitoring. For eg, ultrasonic steel testing is performed at 1 to 5 MHz. The frequency range for ultrasonic testing stretches from 200 KHz to 15 MHz. In ultrasonic inspection, sound energy was made to propagate through the object in the form of waves and any discontinuity in the wave signal signifies a crack or structural damage. This interruption is the effect of reflection of partial energy back from the flawed surface.

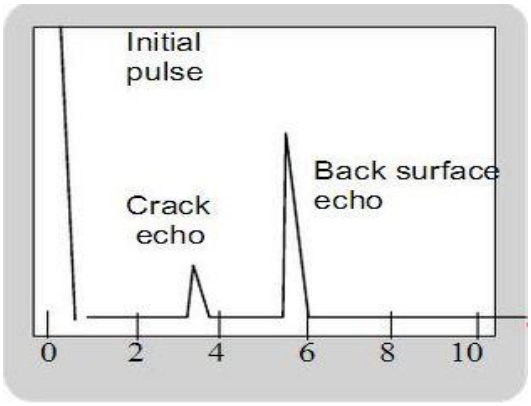

Fig.2. Ultrasonic Testing

B. Disadvantages in existing system

The Ultrasonic non-destructive testing system is a convenient and beneficial method since it has a very high sensitivity and penetrating power which assists in minute flaw detection. Yet, Ultrasonic NDT has its own limitations. This technique is incompatible for non-homogenous surface. Inspection of cast iron and other coarse grain materials are strenuous because of minimal acoustic transmission and maximum signal noise. The Ultrasonic NDT fails to detect the linear flaws that are oriented parallel to the Ultrasonic waves.

III. 2D WAVELET TRANSFORM

Due to a number of drawbacks in this method, we propose a method to detect the structural damages of a metal using wavelet analysis. The fundamental idea behind wavelet transforms is to produce smoothing and differencing operations and, at each level, maintain the same number of pixels as the original image.

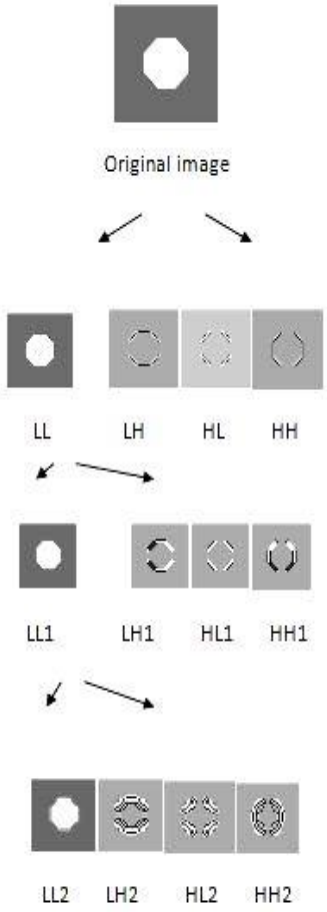

Fig.3. 2D Wavelet Transform

At Level 1, the image is smoothed and reduced to a 1/4 size of the original image producing a lower resolution version (Low_Low or LL), and 3 different local differencing operations are performed, providing edge detection of 3 kinds: horizontal component images (Low_High or LH), diagonal component images (High_Low or HL), and vertical component images (High_High or HH). The total number of pixels at this level is equal to that of the original image. Moreover, this Level 1 transform can be inverted: From the 4 sub images at Level 1, the original image can be reconstructed.

Level 2 of a wavelet transform repeats the averaging and differencing operations on the Level 1 smoothed sub image. This iterative process continues. We have stopped in Fig. 4 at Level 3. The Level 3 transform consists of a 1/64 size smoothed sub image, and all of the edge sub images created by local differencing at each level. The original image can be recovered from this 3-Level transform.

IV. HARDWARE AND SOFTWARE DESCRIPTION

A. Hardware used

Images are captured using the CCD camera of type Panasonic BB-HCM381.

Fig.4. Camera used- Panasonic BB-HCM381

A table mounted camera captures the image with a pan of 360° (-175° up to +175°in horizontal direction) maximum display range and tilt of 158° (-120° up to 0° in vertical direction) maximum display range. We use a PC or cell phone directly to change the direction of the camera while monitoring the image. This lets us monitor a large area with a single camera in JPEG standard. Image gets sampled at a rate of 12 frames/sec for the resolution of 640x480 and 30 frames/sec for the resolution of 320 x 240 and 160 x 120. The viewing angle for the camera are as follows: Horizontal: 2.6° (optical) /1.3° (digital) wide: 51° and Vertical: 1.9° (optical) /0.9° (digital), wide: 38°.The camera has a 42x zoom capacity (21x optical, 2x digital)[2] .

B. Use of Simulation software – About LabVIEW

LabVIEW (short for Laboratory Virtual Instrumentation Engineering Workbench) is a system design platform and development environment for a visual programming language from Instruments. LabVIEW is a comprehensive development environment that provides engineers and scientists unprecedented hardware integration and wide-ranging compatibility. LabVIEW through its unique graphical programming environment; built-in engineering-specific libraries of software functions and hardware interfaces; and data analysis, visualization, and sharing features helps in reduce time.[10]

V. HAAR WAVELET

Haar wavelet is very effective in edge detection.The Haar wavelet is a sequence of rescaled "square-shaped" functions which together form a wavelet family or basis. Wavelet analysis is similar to Fourier analysis in that it allows a target function over an interval to be represented in terms of an orthonormal function basis. The Haar sequence is now recognised as the first known wavelet basis and extensively used as a teaching example. Haar used these functions to give an example of a countable orthonormal system for the space of square-integrable functions on the real line. The study of wavelets, and even the term "wavelet", did not come until much later .

The technical disadvantage of the Haar wavelet is that it is not continuous, and therefore not differentiable. This property can, however, be an advantage for the analysis of signals with sudden transitions, such as monitoring of tool failure in machines [3].

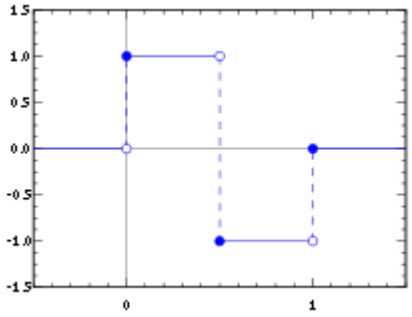

Fig.5. HAAR Wavelet

The Haar wavelet's mother wavelet function $\psi(t)$ can be described as

$$\psi(t) = \begin{cases} 1 & 0 \le t < 1/2, \\ -1 & 1/2 \le t < 1, \\ 0 & \text{otherwise.} \end{cases}$$

Its scaling function $\phi(t)$ can be described as

$$\phi(t) = \begin{cases} 1 & 0 \le t < 1, \\ 0 & \text{otherwise.} \end{cases}$$

The Haar transform decomposes a discrete signal into two sub signals of half its length. One sub signal is a running average or trend; the other subsignal is a running difference or fluctuation [9].

A. Denoise

[1] Although other types of noise (e.g., impulse or Poisson noise) have also been studied in the literature of image processing, the term "image denoising" is usually devoted to the problem associated with AWGN. Mathematically, if we use Y=X+W to denote the degradation process (X: clean image, Y: noisy image, $W \sim N(0,\sigma_w^2)$), the image denoising algorithm attempts to obtain the best estimate of X from Y. The optimization criterion can be mean squared error (MSE)-based or perceptual quality driven [4]. This VI in the labview completes the following steps to implement the noise reduction for signals and images using wavelet transforms. Firstly, it applies the wavelet transform to the noisy data and obtains the detail coefficients and the approximation coefficients. Then we apply soft or hard thresholding to the resulting coefficients, thereby suppressing those coefficients smaller than a certain threshold. The thresholding rule and the rescaling method determine the threshold. Finally we reconstruct the coefficients after thresholding and transform them back into the original domain. To perform denoising on complex signals, use the UWT method. The DWT is more efficient for decomposing signals, but the UWT provides better denoising performance because it can help reduce artifacts, such as Gibbs oscillation.

B. *Edge Detection using Thresholding*

Thresholding is the simplest method of image segmentation. From a gray scale image, thresholding can be used to create binary images. During the thresholding process, individual pixels in an image are marked as "object" pixels if their value is greater than some threshold value (assuming an object to be brighter than the background) and as "fault" pixels otherwise. An object pixel is given a value of "0" while a fault pixel is given a value of "1" [4].

C. *Experimental Setup*

Image is acquired using CCD camera of type Panasonic BB-HCM381 from any structures and further processed using DWT algorithm. Before further processing the image is denoised and MSE is calculated. PSNR is calculated for the original and image after denoising. When PSNR is 40dB or higher, then the original and the reconstructed images are virtually indistinguishable by human observers. DWT algorithm is an effective algorithm to identify defects in these images.

VI. FEATURE EXTRACTION

The key parameter in the thresholding process is the choice of the threshold value which can be computed by calculation of mean and standard deviation. For this purpose the various features such as minimum, maximum , median , mean , standard deviation are calculated from the resultant image .The features are calculated for the whole image [8].

The minimum for image f(x,y) can be calculated as
Minimum=Min (f(x, y)) (1)
x=1,2,…M
y=1,2,…N

The maximum point can be calculated for the image f(x, y) as
Maximum=Max (f(x, y)) (2)
x=1,2,…M
y=1, 2,…N
where x and y varies in both (1) and (2)

Mean is generally a measure of spread, in image processing mean helps in measure of location.The mean value of image f(x, y) can be calculated as

$\mu = \sum f(x, y)/(M \times N)$
x =1, 2,…M
y=1, 2,…N
x and y varies to identify the intensity of each pixel.

The standard deviation of an image f(x,y) can be calculated as

$$\sigma = \sqrt{\frac{\sum f(x,y) X D}{M X N}}$$
x =1,2,…M y= 1,2,…N

Peak Signal to Noise ratio(PSNR) used to be a measure of image quality. The PSNR between two images having 8 bits per pixel or sample in terms of decibels (dBs) is given by:
PSNR = 10 log10 (255^2/MSE)
Where MSE is mean square error.
Mean squared error (MSE) is defined for two $m \times n$ monochrome images I and K where one of the images is considered a noisy approximation of the other is defined as:

$$MSE = \frac{1}{m\,n} \sum_{i=0}^{m-1} \sum_{j=0}^{n-1} [I(i,j) - K(i,j)]^2$$

STATISTICAL PARAMETER FOR IMAGES WITHOUT CRACK							
	ORIGINAL	DENOISE	RECONSTRUCTED	LL	LH	HL	HH
MEAN	190.657143	190.412905	190.41290	380.7409	0.090434	-7.53E-16	1.96E-16
STANDARD DEVIATION	23.337749	21.16862	21.16862	40.80042	11.33717	6.64E-15	7.45E-15
VARIANCE	544.650549	448.110475	448.110475	1664.674	128.5315	4.41E-29	5.56E-29
SKEWNESS	0.884207	0.972111	0.972111	0.819976	1.83541	0.01515	-0.49497
KURTOSIS	3.413185	3.396065	3.396065	2.970318	13.76858	4.244779	3.360389
STATISTICAL PARAMETER FOR IMAGES WITH CRACK							
	ORIGINAL	DENOISE	RECONSTRUCTED	LL	LH	HL	HH
MEAN	180.945	181.6617	181.6617	363.3234	0.11	1.69E-16	-1.19E-15
STANDARD DEVIATION	14.29488	13.08342	13.08342	25.63471	5.568723	6.08E-15	6.60E-15
VARIANCE	204.3437	171.1758	171.1758	657.1382	31.01067	3.69E-29	4.36E-29
SKEWNESS	0.211185	0.143771	0.143771	0.088617	-1.59051	0.159933	-0.2662
KURTOSIS	2.530556	2.524504	2.524504	2.470523	12.38489	2.933341	2.773746

Fig.6. Statistical Parameters for images with and without crack

Generally when PSNR is 40 dB or greater, then the original and the reconstructed images are virtually indistinguishable by human observers.
The table illustrates the mean, standard deviation, variance, skewness and kurtosis values taken for uncracked and cracked images. It can be observed that the values for cracked image are of lower values due to lower pixel values.

Table.1 PSNR and MSE for original and denoised image

	PSNR	MSE
ORIGINAL	16.102	1849

DENOISE	16.2781	1721.79

VII. FEATURE EXTRACTION

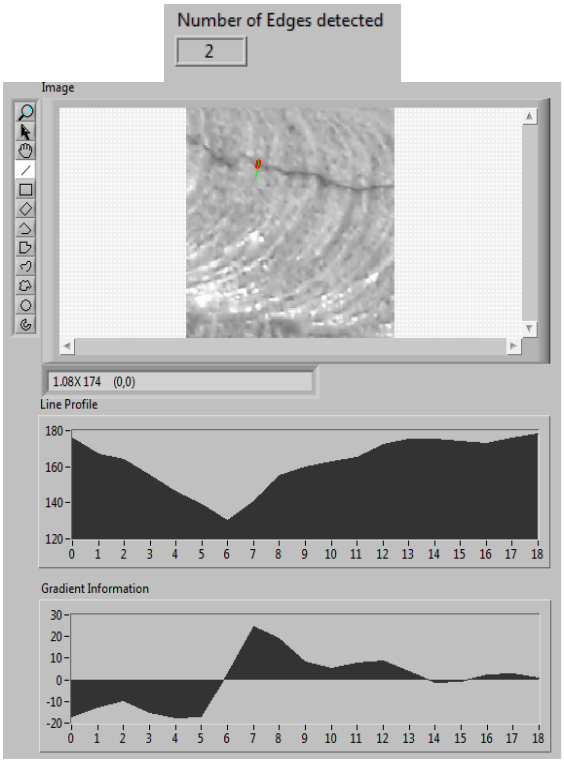

Fig.7. Line Profile graph

Finding the angle of inclination of the crack from the surface is a important feature to analyze the crack. The following procedure describes the methodology use to calculate the angle of inclination of crack. Line profile and gradient information are used for the analysis.

20 samples are selected from the image so as to cover the crack entirely. From the gradient information for those 20 samples, minimum and maximum values are noted.

A value A is calculated by finding the difference between the maximum and minimum values obtained. Mean value of A is calculated for 20 samples. The angle of inclination at each and every one of the sample is calculated by subtracting the calculated mean value and the minimum value.

SAMPLE NO.	MINIMUM	MAXIMUM	A=MAX-MIN	ANGLE=MEAN-MIN
1	-50	25	25	102.25
2	-20	20	40	72.25
3	-25	10	35	77.25
4	-30	50	80	82.25
5	-30	30	60	82.25
6	-30	20	50	82.25
7	-20	10	30	72.25
8	-15	25	40	67.25
9	-25	18	45	77.25
10	-30	38	68	82.25
11	-35	10	45	87.25
12	-25	20	45	77.25
13	-40	20	60	92.25
14	-30	20	50	82.25
15	-28	18	46	80.25
16	-38	20	58	90.25
17	-12	7	19	64.25
18	-38	38	76	90.25
19	-30	20	50	82.25
20	-35	38	73	87.25
MEAN VALUE = 52.25				

Fig.8. Angle of Inclination

VIII. SUPPORT VECTOR MACHINE

Support Vector Machine (SVM) performs classification by constructing an N-dimensional hyper plane that optimally separates the data into two categories. SVM models are closely related to neural networks. In fact, a SVM model using a sigmoid kernel function is equivalent to a two-layer, perceptron neural network[11]. Features such as mean, standard deviation, variance, skweness and kurtosis of a uncracked and cracked image are used to classify the good and bad data.The figure illustrates the classification based on features of uncracked and cracked image given as a input.The data is classified using a kernal function.

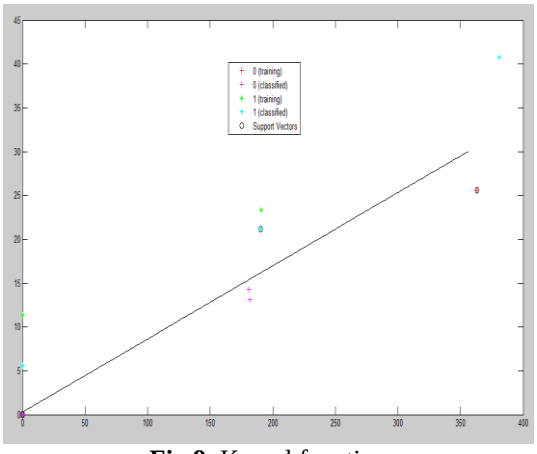

Fig.9. Kernel function

XI. RESULTS AND DISCUSSIONS

Detection of crack is the most important criterion. We use Discrete Wavelet Transform to split the images (LL, LH, HL and HH). The figure shown below shows the result of Discrete Wavelet Transform.

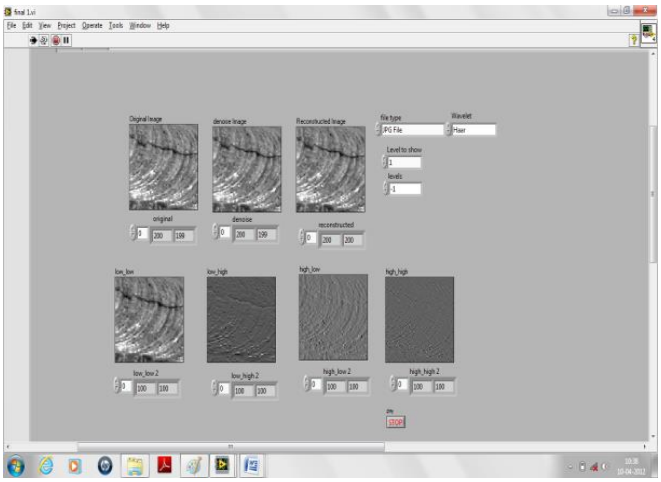

Fig.10. Front panel – Wavelet Transofrm

From the figure it can be inferred that the welding flaw is visible clearly in LH displaying the horizontal cracks.

1 D and 3D wavelet coefficient plot helps us to analyse the crack. By applying the threshold calculated by taking the difference of mean and standard deviation, the crack in the image is isolated from the surrounding.

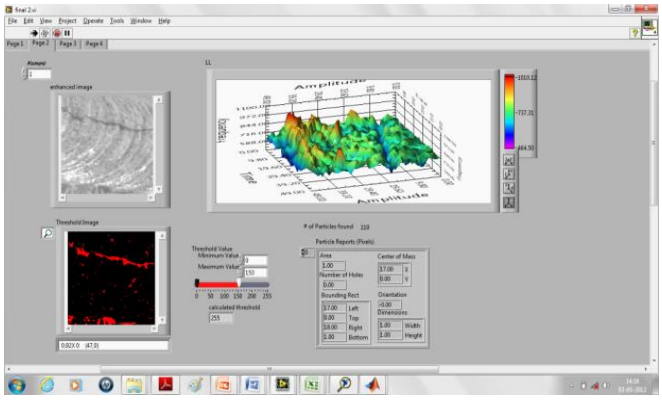

Fig.11. Front Panel - Thresholding

IX. CONCLUSION

In testing of welding flaws, the reliability and quality of tests are considerably affected by noise and spurious signals. Thus, signal de-noising and increasing of the signal-noise ratio (SNR) are a key to successful application. Using discrete wavelet transform the flaw has been isolated using threshold of the transformed image and different statistical features have been studied.

APPENDIX

Appendixes, if needed, appear before the acknowledgment.

ACKNOWLEDGMENT

The preferred spelling of the word “acknowledgment” in American English is without an “e” after the “g.” Use the singular heading even if you have many acknowledgments.

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Security of Network Using Ids and Firewall

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Abstract- An intrusion detection system (IDS) detects intruders that is, unexpected, unwanted or unauthorized people or programs on computer network. An IDS is used to determine if a computer network or server has experienced an unauthorized intrusion. An IDS works like a burglar alarm system. If it detects a possible intrusion, the IDS system will send out an alert or warning which would prompt an administrator to perform further investigation which might include computer forensics and prosecution.

Index Terms- IDS is Intrusion Detection Sytem, NIDS is Network based Intrusion Detection System, HIDS is Host based Intrusion Detection System.

I. INTRODUCTION

IDS is a security countermeasure. It monitors things looking for signs of intruders. An IDS monitors network and/or system activities for malicious activities or policy violations and produces reports to a Management Station. IDS is any hardware, software, or a combination of both that monitors a system or network of systems against any malicious activity. This is mainly used for detecting break-ins or misuse of the network. In short, we can say that IDS is the 'burglar alarm' for the network because much like a burglar alarm, IDS detects the presence of an attack in the network and raises an alert. An IDS provides three functions: monitoring, detecting and generating an alert. IDS is a system that will constantly monitor the corporate networks from all types of attacks and vulnerabilities. IDS looks for the attack signatures which are specific patterns that usually indicate malicious or suspicious event.

II. NEED OF IDS

Intrusion detection describes the intention - not the methodology. A network firewall will keep the bad guys off the network and anti-virus will recognize and get rid of any virus and password-protected access control will stop the office cleaner trawling through the network after we have gone.So that's it – we are fully protected. But we are wrong because a firewall has got holes to let things through: without it, you wouldn't be able to access the Internet or send or receive emails. Anti-virus systems are only good at detecting viruses they already know about. And passwords can be hacked or stolen .That's the problem. We can have all this security, and all we have really got is a false sense of security. If anything or anyone does get through these defenses, through the legitimate holes, it or they can live on your network, doing whatever they want for as long as they want. And then there's a whole raft of little known vulnerabilities, known to the criminals, who can exploit them and gain access for fun, profit or malevolence. A hacker will quietly change your system and leave a back door so that he can come and go undetected whenever he wants. A Trojan might be designed to hide itself, silently gather sensitive information and secretly mail it back to source. And we won't even know it's happening because we will believe it can't be happening because we have got a firewall, anti-virus and access control.

Unless, that is, you also have an intrusion detection system (IDS). While those other defenses are there to stop bad things getting onto your network, an IDS is there to find and defeat anything that might just slip through and already be on your system. And in today's world, you really must assume that things will slip through – because they most certainly will. From the outside, you will be threatened by indiscriminate virus storms; from hackers doing it for fun (or training); and more worryingly from organized criminals specifically targeting you for extortion, blackmail or saleable trade secrets. From the inside, you will have walk-in criminals using social engineering skills to obtain passwords to, or even use of, your own PCs; from curious staff who simply want to see what their colleagues are earning and from malcontents with a grievance.

III. IDS FUNCTIONALITY

Intrusion Detection System (IDS) is an essential tool that compliments any security suite such as a firewall and a good antivirus. These tools are ineffective if used separately as each one is tailored to fight off attackers in specific focused areas. It is good practice to build a security suite with well recognized reliable technologies that have been tried and tested, ensuring that the IDS application chosen suits your organizations needs closely like a well tailored piece of clothing. Many network security professionals know that a firewall is an essential element to a comprehensive security plan. It is also felt that IDS is an excellent complementary product that will complete the company's security strategy. What many security professionals overlook is the type of IDS that best fits the organization.

An IDS system is used to make security professional aware of packets entering and leaving the monitored network. IDS are often used to sniff out network packets giving you a good understanding of what is really happening on the network. There are two mainstream options when implementing **IDS Host based IDS and Network based IDS**. IDS have the ability to drop malicious packets that may cause your network harm. This is the latest technological advance on firewalls and because the IDS have pattern files you can be certain that the latest network bug will be swatted from your LAN, WAN, WLAN.IDS Systems have the capability of dropping potentially damaging packets that have been identified in a similar way that antivirus manufactures detect viruses. All packets that pass though the IDS are analyzed

and compared against a pattern or signature file that verifies that the packet is not an attack on the network integrity. If the packet is dropped the IDS can be configured to log this event and notify the security professional immediately so action can be taken against the attacker.

1. NIDS (network intrusion detection system)

NIDS are placed in key areas of network infrastructure and monitors the traffic as it flows to other host. An NIDS should best be describes as a standalone appliances that has network intrusion detection capabilities. A NDIS is a software package that you install on dedicated workstation that is connected to your network or a device that has the software embedded and is also connected to your network. The NIDS then scans any traffic that is transmitted over that segment of your network. The NIDS functions in very much the same way as high-end antivirus applications and it makes use of signature or pattern file method comparing each transmitted packet for patterns that may occur within the signature file. The IDS functions in a very conform way in order to increase packet throughput as inspecting every packet can slow traffic considerably. An IDS then uses the firewall approach when inspecting the packet by letting through the packets that are not potentially dangerous. This processing is done by the IDS's preprocessing filters that arranges that data that is scanned.

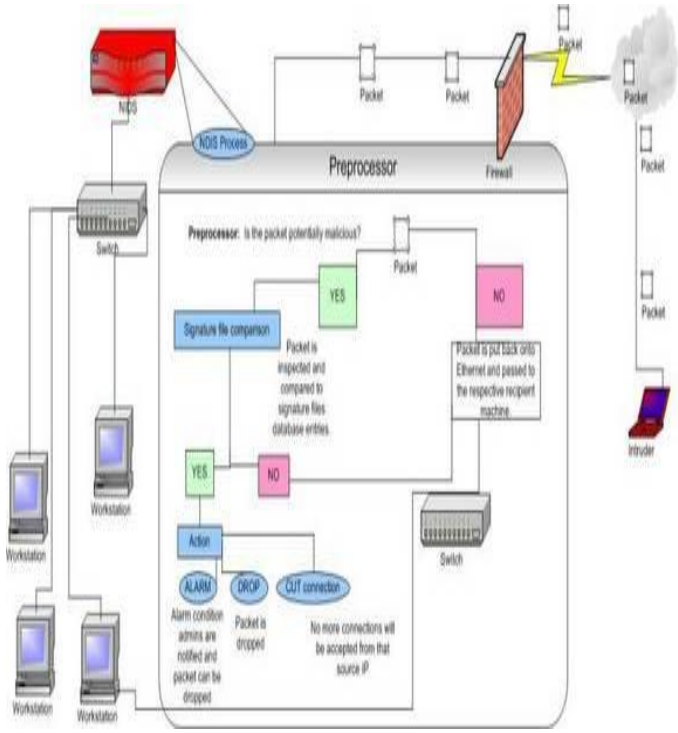

Fig1.The diagram above emulates the NIDS system; it shows the process of how the NIDS compares the potential intruder packet with the rule list and signature files that are stored within the NIDS database.

2. HIDS (Host intrusion detection system)

Intrusion Detection System is installed on a host in the network. HIDS collects and analyzes the traffic that is originated or is intended to that host. Host intrusion detection systems are installed locally on host machines making it a very versatile system compared to NIDS. HIDS can be installed on many different types of machines namely servers, workstations and notebook computers. Doing so gives you the edge that NIDS does not have especially if you have a segment that you NDIS can not reach beyond. Traffic transmitted to the host is analyzed and passed onto the host if there are not potentially malicious packets within the data transmission. HIDS are more focused on the local machines changing aspect compared to the NIDS. NIDS focus more greatly on the network those specific hosts themselves.

IV. COMPARITIVE ANALYSIS OF HIDS VS. NIDS

Do we need a NIDS or a HIDS? The answer is HIDS for a complete solution and NDIS for a LAN solution. When administering an HIDS solution we found it to require significantly less specialist knowledge while NIDS required undivided attention and after Lab setups the team got NIDS working. HIDS has more logging than NIDS when taking into account that HIDS logs all machines on the network. If you have LAN bandwidth constraints it is very feasible to look at a HIDS. If price is an issue I found that some NIDS solutions are considerably more expensive when compared to a HIDS solution as there is a capital outlay on the hardware and some vendors charge considerably more for the software. The **NIDS** handle security at the network level. The **HIDS** handle security at the host level. An NIDS needs dedicated hardware, and forms a system which can check packets traveling on one or more network lines, in order to find out if any malicious or abnormal activity has taken place. The H-IDS resides on a particular host, and its software therefore covers a broad range of operating systems, such as Windows, Solaris, Linux, HP-UX, Aix, etc

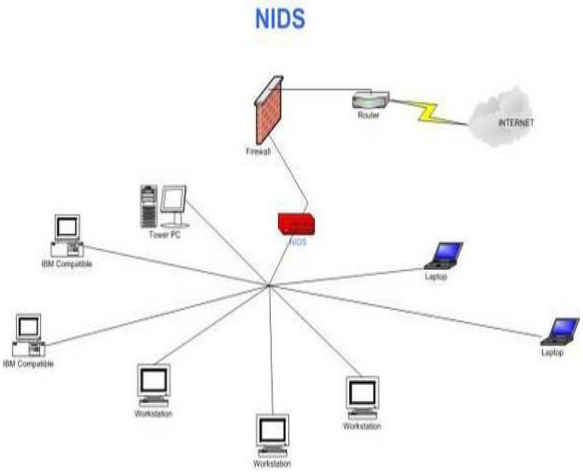

Fig2. Network Based Intrusion Detection System

The diagram above represents the typical NIDS scenario where an attempt has been made to funnel the traffic through the NIDS device on the network. It does not take a genius to see that if you had to isolate a single machine and take the machine away from the network like is done by many business people when in

transit that NIDS would be very flawed. The Red device represents where the NIDS has been installed.

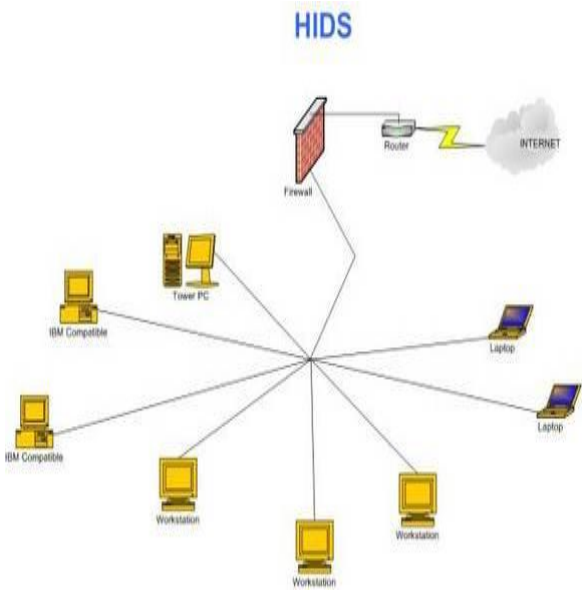

Fig3.Host Based Intrusion Detection System

Host based IDS are a more comprehensive solution and displays great strengths in all network environments. It does not matter where the machines are even if they are away from the network they will be protected at all times. The Orange machines represent where the HIDS is installed.

V. PREVENTING AND DETECTING INSIDER ATTACKS USING IDS

Insider Attacks are an unusual type of threat. Unlike external attacks, the intruder is someone who has been entrusted with authorized access to the network. In fact, the attacker requires access in order to fulfill their obligations to the victim organization. Furthermore, they often have a substantial amount of knowledge about the network architecture, including where their targeted files or systems are located. Because many organizations' security is focused on protecting the perimeter of the network, little attention is paid to what is occurring within the system. As a result, insider attacks may not be discovered for months after the attack, long enough for the perpetrator to get off scot-free. Creating a good rule set for the internal IDS. The reason the rule set needs to be different is due to the fact that different network users require a different amount of access to different services, servers, and systems for their work. The rule set of the internal IDS system should be created so that all the static of employees' day-to-day work activities, such as accessing various services and servers, does not trigger attack warnings, and only the important information is reported. This important information would include detected activities that users do not require for their daily work, as well as any other glaringly obvious attacks. The logging and reporting of attacks by the internal IDS systems can be used to do much more than detect specific, isolated, and unrelated attacks. By combining the data from all internal IDS systems, system administrators can identify attack trends and patterns. Once attack trends and patterns are identified, the admins will be more able to identify any network users who pose a threat to network security, have been exhibiting any malicious network behavior, or who are doing anything that is against company policy in general. Once these users have been identified, the proper action can be taken to prevent any successful intrusions or the continuance of the activity.

Further, the logs provided by IDS systems can allow the system administrators an audit trail in case there are in fact any successful intrusions. Identified attack trends and patterns can also allow system administrators to see where people are trying to attack against the most. This would allow them to identify any possible security holes, or policy oversights, as well as any servers on the network that have a higher risk of being attacked, and thus allow them to know which systems to keep security tighter on.

VI. IDS CHALLENGES

The computing media is starting to use the term IPS (Intrusion Prevention System) more and more, as a replacement for "traditional" IDSs or to make a distinction between them. The IPS is a prevention/protection system for guarding against intrusions, and not just recognizing and reporting them like most IDSs do. There are two main characteristics which distinguish a (network) IDS from a (network) IPS:

1. The IPS sits inline on the IPS network, and does not just passively listen to the network like an IDS (traditionally placed as a sniffer on the network).
2. An IPS has the ability to immediately block intrusions, no matter what transport protocol is used and without reconfiguring a third-party device, which means that the IPS can filter and block packets in native mode (using techniques such as dropping a connection, dropping offending packets, or blocking an intruder).

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Condition Monitoring and Vibration Analysis of Boiler Feed Pump

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Abstract- Condition Monitoring is an advanced and very useful tool of predictive maintenance techniques. It has made good progress in recent years in identifying many types of deterioration in plant machinery, so that pro-active maintenance can be performed, improving overall plant productivity. There is a wide variety of condition monitoring techniques currently in use for the diagnosis and prediction of machinery faults, but little attention has been paid to the occurrence and detection of vibration analysis of rotating equipments The application of computers and electronic measuring and detecting system has provided a new improvement for condition monitoring and has a particular relevance for plant engineers in utilities and service departments. It eliminates unnecessary opening of equipment with considerable savings in personnel resources.

This paper aims at the implementation of condition based maintenance on BOILER FEED pump critical Machine used in the thermal plant, by adopting Vibration spectrum analysis which is a predictive maintenance technology.

For the BOILER FEED pump the vibration readings show that values are more than normal readings. Spectrum analysis was done on readings and found that mass unbalance in vanes. It was corrected based on phase analysis and vibration readings were observed after modification which gives the values with in normal range. It eliminates unnecessary opening of equipment with considerable savings in personnel resources.

Nomenclature

BFP : Boiler Feed Pump
MNDE : Motor Non Driving End
MDE : Motor Driving End
FDE : Fan Driving End
FNDE : Fan Non Driving End
PDE : Pump Driving End
PNDE : Pump Non Driving End
BPNDE : Booster Pump Non Driving End
BPDE : Booster Pump Driving End
MMDE : Main Motor Driving End

I. INTRODUCTION

Condition monitoring pre-supposes knowledge of machines condition and its rate of change, which can be ascertained by selecting a suitable parameter for measuring deterioration and recording its value at intervals either on a routine or continuous basis. This is done while the machine is running. The data obtained may then be analyzed to give a warning on failure. This activity is called as condition monitoring.

Condition monitoring essentially involves regular inspection of equipment using human sensory facilities and a mixture of simple aids and sophisticated instruments. The central emphasis is however on the fact that most inspections should be preferably done while the machine is running.

In recent years as observed by R.K BISWAS, [1] states that Condition Monitoring is defined as the collection, comparison and storage of measurements defining machine condition. Almost everyone will recognize the existence of a machine problem sooner or later. One of the objectives of Condition Monitoring is to recognize damage that has occurred so that ample time is available to schedule repairs with minimum disruption to operation and production.

Broch [2] there has been considerable interest in the maintenance techniques based on condition monitoring, with the analysis of vibration characteristics generated by machines, which makes it possible to determine whether the machinery is in good or bad condition.

Simmons [3] opened that vibration from their sources origin may be small but excite the resonant frequencies of the rotating parts such as the rotor shaft and set-up considerable extra dynamic load on bearings. The cause and effect reinforce each other and the machine progresses towards ultimate break down. As per Gyarmathy [4] there are generally two situations in which vibration measurements are taken. One is surveillance mode to check the health of machinery on routine basis. The second situation is during an analysis process where the ultimate goal is to tag the problem. In the later case, vibration measurements are taken to understand the cause, so that an appropriate fix can be undertaken.

Lingaraju [5] Vibration monitoring which is most frequently used method in condition monitoring provides information about machinery health as it can reveal the cause of potential problem and provide an early indication of mechanical failure. This gives the possibility for diagnosing and converting malfunctions leading to an optimum management of engine operation.

1.1 Background:

In the early days, equipment maintenance was conducted only when equipment actually failed. The work was more “fix it” than maintenance. Shortly thereafter, came the recognition that performing regular maintenance and refurbishment tasks on equipment could keep equipment operating longer between failures. This became known, variously, as Periodic Maintenance, Calendar Based Maintenance or Preventive Maintenance (PM). The goal was to have most of the equipment be able to operate most of the time until the next scheduled

maintenance outage. This approach is also outdated. Now Condition monitoring has made good progress in recent years maintenance is being carried out based on condition of machine which reduces the cost of unnecessarily opening of equipment. Most of the defects encountered in the rotating machinery give rise to a distinct vibration pattern (vibration signature analysis techniques)Vibration Monitoring is the ability to record and identify vibration "Signatures" which makes the technique so powerful for monitoring rotating machinery. Vibration analysis is normally applied by using transducers to measure acceleration, velocity or displacement. The choice largely depends on the frequencies being analyzed

1.2 Condition Monitoring

Condition monitoring pre-supposes knowledge of machines condition and its rate of change, which can be ascertained by selecting a suitable parameter for measuring deterioration and recording its value at intervals either on a routine or continuous basis. This is done while the machine is running. The data obtained may then be analyzed to give a warning on failure. This activity is called as condition monitoring.

Condition monitoring essentially involves regular inspection of equipment using human sensory facilities and a mixture of simple aids and sophisticated instruments

The central emphasis is however on the fact that most inspections should be preferably done while the machine is running.

Condition monitoring is concerned with the analysis and interpretation of signals from sensors and transducers installed on operational machinery, employing sensors positioned outside the machine, often remove from the machine components being monitored, normally does the monitoring of a machine condition and health, using established techniques, the analysis of information provided by the sensor output and interpretation of the evaluated out put is the needed to establish what actions to be taken.

Condition monitoring can also be a test and quality assurance, system for continuous processes as well as discrete component manufacture. It maximizes the performance of the company's assets by monitoring their condition and ensuring that they are installed and maintained correctly, it aims of detecting condition leading to catastrophic breakdowns and loss of service, reducing maintenance overhauls, fine turning of operating equipment increasing production and operating efficiency and minimizing the replacement parts inventory. This is because a readily monitor able parameter of deterioration can be found in every plant, Machinery and probabilistic element in future prediction is highly reduced or almost eliminated thus maximizing the items life by minimizing the effect of failure

Condition monitoring techniques

There are only seven main techniques of condition monitoring. They are:

a) Visual monitoring
b) Contaminant or debris monitoring
c) Performance and behavior monitoring
d) Corrosion monitoring thermograph
e) Sound monitoring.
f) Shock pulse monitoring.
g) Vibration monitoring.

Vibration monitoring:

Vibration monitoring measures the frequency and amplitude of vibrations. It is Known that readings will change as machinery wear sets in. such readings can be interpreted as indicators of the equipments condition, and timely maintenance actions can be scheduled accordingly. Electrical machines and mechanical reciprocating or rotating machines generate their own vibration signatures (patterns) during operation. However such raw signals contain a lot of background noise, which makes it difficult or even impossible to extract useful, precise information by simply measuring the over all signal. It is thus necessary to develop an appropriate filter to remove the operationally and environmentally contaminated components of signals (the background noise) so as to reveal the clear signals generated by the events under study. To capture useful condition monitoring data, vibration should be measured at carefully chosen points and directions.

Vibration monitoring is a well established method for determining the physical Movements of the machine or structure due to imbalance mounting an alignment this method can be obtained as simple. Easy to use and understand or sophisticated real time analysis, vibration monitoring usually involves the attachment of a transducer to a machine to record its vibration level special equipments is also available for using the out put from sensor to indicate nature vibration problem and even its precise cause.

Transducers for the measurement of vibrations employ electromagnetic electrodynamics, capacitive, piezoelectric, or strain gauge principles out of these piezoelectric accelerometers is most widely used since the recent past, Among the monitoring techniques vibration monitoring as gained considerable importance because of following fundamental factors

1) All rotation and reciprocating machines vibrate either to a smaller or greater extent machines vibrate because of defects or incurrence in system
2) When inaccuracies or more it results in increased vibration each kind of defect provides a vibration characterized in the unique way.

Therefore vibration characteristics reveal the health condition of machine.

1.0 Vibration Analysis

There are literally hundreds of specific mechanical and operational problems that can result in excessive machinery vibration. However, since each type of problem generates vibration in a unique way, a thorough study of the resultant vibration characteristics can go a long way in reducing the number of possibilities—hopefully to a single cause. A simple, logical and systematic approach that has been proven successful in pinpointing the vast majority of the most common day-to-day machinery problems.

Define the problem

The following lists some of the reasons for performing a vibration analysis:

1. **Establish "baseline data" for future analysis needs**.
2. **Identify the cause of excessive vibration.**
3. **Identify the cause of a significant vibration increase**.
4. **Identify the cause of frequent component failures**
5. **Identify the cause of structural failures**
6. **Identify the source of a noise problem.**

II. Description of the Equipment

BOILER FEED PUMP 4B

Boiler Feed Pump (BFP) is used to pump the feed water (chemically treated water) in to the boiler. The FK6D30 type BFP consists of FAiB56 Booster Pump (BP) directly driven from one end of the shaft of an electric motor. BFP is driven from the opposite end of Motor shaft through a spacer type flexible coupling.

The BP is a single stage, horizontal, axial split casing type, having the suction and discharge branches on the casing bottom half, thus allowing the pump internals to be removed without disturbing the suction and discharge pipe work or the alignment between the pump and the driving motor.

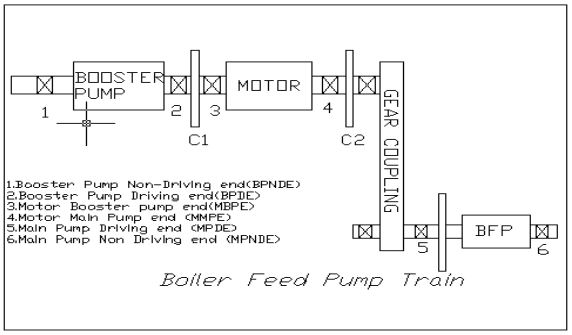

Fig: 1 Boiler feed pump train

The rotating assembly consists of the shaft, Impeller, nuts, keys, seal sleeves, thrust collar, the rotating parts of the mechanical seals, pump coupling. The rotating assembly is supported at each end of the shaft by a white metal lined journal bearing. The residual axial thrust is taken up by a tilting double thrust bearing mounted at the non drive end of the pump. The present work deals with the BP which is connected to the motor directly. The pump motor unit is supported by four Bearings. The line diagram of the entire unit is shown in fig

III. 4.0 Experimentation

The measurements are recorded using "Data PAC 1500", dual channel seismic pick-up, with a frequency range of 10cpm to 4518000cpm(0.18hz to 75.3 Hz), with A/D converter, VGA resolution screen data collector of Entek IRD,USA make, over a period of 12 months at regular monthly intervals. The instrument is mounted on the 4 bearing supports along horizontal (H), vertical (V), and axial (A) directions, the axial direction being in line with the axis of the shaft. The measurements are made in displacement and velocity modes. Accelerations have been computed. Regular logging of the data has provided on the basis for performance trend monitoring of the rotating structure and prediction of faults to apply reasoning to trace the root cause.

4.1 Experimental data

Measurements are taken on regular basis at all bearing supports along horizontal vertical and axial directions

ISO standards iso-10816
Good: 0 to 5.4mm / sec
Satisfactory: 5.4 to 10.6mm / sec
Alarm: 10.6 to 16.mm / sec
Not permitted: >16. mm / sec

Table 1.0 Vibration readings before rectification

DATE	SUPPORT POINT	DISPLACEMENT (um) H	DISPLACEMENT (um) V	VELOCITY (mm/sec) H	VELOCITY (mm/sec) V
17th FEBRUARY 2009	1	24.0	12.0	4.70	3.90
	2	13.8		3.10	
	3	19.0	7.00	4.30	2.50
	4	16.0		3.70	
	5	13.0	9.00	2.70	2.10
	6	13.0		3.10	
		10.0	7.00	1.90	1.20
		6.00		1.40	
		24.0	170	9.10	9.40
		4.00		7.80	
		38.0	28.0	9.80	9.70
		12.0		16.2	
30th MARCH 2009	1	17.0	6.42	2.95	2.34
	2	8.88		1.49	
	3	12.9	3.56	1.85	1.21
	4	9.56		1.60	
	5	10.3	7.35	1.47	1.13
	6	8.55		1.18	
		8.95	5.51	1.48	1.04
		3.63		1.15	
		11.3	11.0	4.97	5.74
		9.05		5.40	
		31.8	18.1	11.3	4.40
		9.19		20.7	
14th APRIL 2009	1	26.8	8.60	5.10	3.90
	2	10.0		3.00	
	3	16.6	5.20	3.70	2.10
	4	10.5		3.20	
	5	12.4	8.20	2.30	2.20
	6	11.4		3.00	
		12.6	6.40	2.50	1.80
		5.70		2.30	
		68.6	29.6	15.2	17.1
		26.4		18.1	
		68.4	98.0	23.6	27.7
		27.2		18.1	

17th APRIL 2009	1	26.8	8.60	5.10	3.90
	2	10.0		3.00	
	3	16.6	5.20	3.70	2.10
	4	10.5		3.20	
	5	12.4	8.20	2.30	2.20
	6	11.4		3.00	
		12.6	6.40	2.50	1.80
		5.70		2.30	
		35.8	21.1	9.50	6.60
		20.2		11.7	
		62.89	87.9	16.6	21.5
		20.7		10.0	

4.2 Spectrum Analysis

The following are spectrums taken at the bearings in three directions.

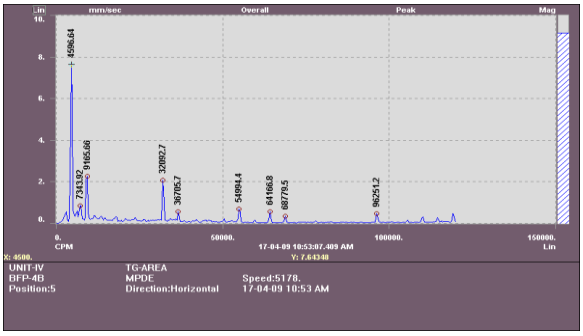

Fig: 1 Velocity spectrum of MPDE bearing in horizontal direction

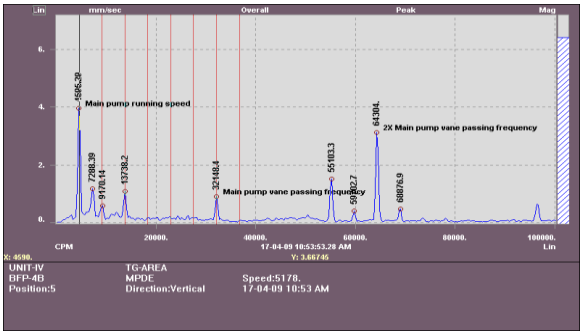

Fig: 2 Velocity spectrum of MPDE bearing in vertical direction

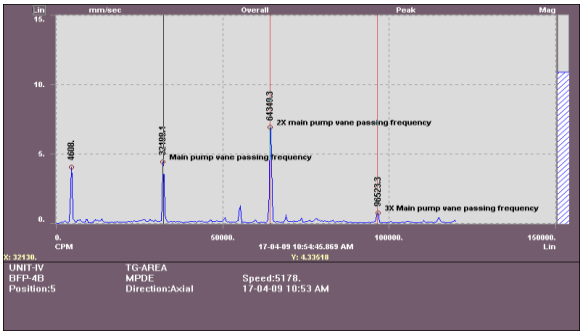

Fig: 3 Velocity spectrum of MPDE bearing in axial direction

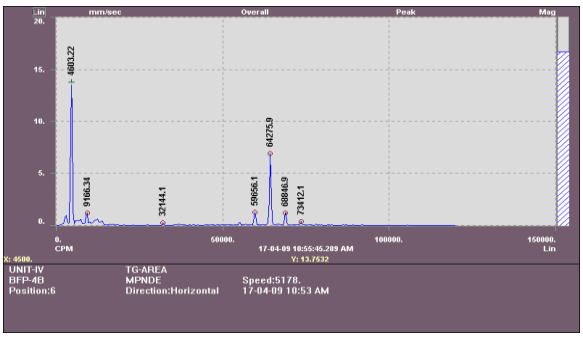

Fig: 4 Velocity spectrum of MPNDE bearing in horizontal direction

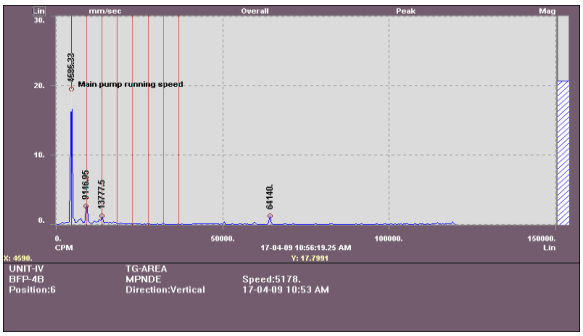

Fig: 5 Velocity spectrum of MPNDE bearing in vertical direction

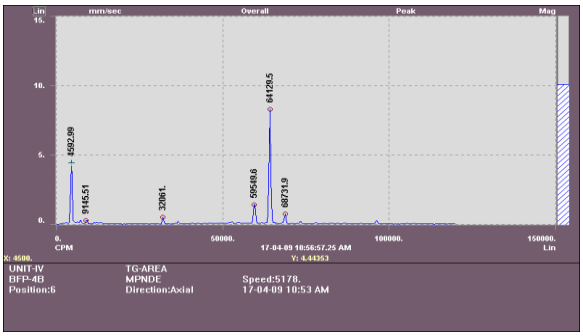

Fig: 6 Velocity spectrum of MPNDE bearing in axial direction

OBSERVATIONS FROM THE SPECTRUMS:

1. In all the spectrums of MPDE and MPNDE 1x running speed harmonic are present
2. In all the spectrums of MPNDE 1x running speed frequency peak is predominant and having higher value armed 19.9 mm /see
3. In all the spectrums of MPNDE &MPNDE pump vane passing frequency and its harmonics are found and 2x of v p f peak is predominant having value 7.9 mm /see
4. In all the spectrums of MPNDE side bank to v p f peak harmonics are found
5. In all the spectrums of MPDE both the booster pump and main pump vane passing frequency peaks are found
6. In all the spectrums of MPDE no bearing defective frequency are found.

CONCLUSIONS:

1. All the vibration values of BPNDE, BPDE MMBPE, and MMNDE are in the good zone. But MPDE and MPNDE are in alarm level.
2. Here 1x is predominant frequency peak in the MPDE & MPNDE spectrums Misalignment/ Looseness of the main pump bed were suspected.
3. A harmonic with vpf of the main pump are found and is having predominant peak value. So the looseness of the pump impeller was suspected.
4. In all the spectrums bearing defective frequency peaks are not found so, bearings are in good condition.
5. The main pump casing and bed bolts are checked for looseness and must be tightened.
6. The impeller casing of the shelter of the main pump was checked for looseness and adjusted so that the vibration must be reduced.

4.3 Action taken

Due to high vibration on pump side (at NDE vertical) pump stopped on 18-04-2009 and attend for the rectification. Pump NDE side bed bolts were tightened and thrust bearing top cover is lifted by 0.01mm. After attending the work pump taken into the work on 21-04-2009 and vibration readings were taken and observed that vibration readings were reduced to normal value i.e. in the good zone.

Table: 2. Data collection after rectification

DATE	SUPPORT POINT	DISPLACEMENT (um) H	V	VELOCITY (mm/sec) H	V
21st APRIL 2009	1	16.3	6.65	3.21	2.53
	2	9.05		2.02	
	3	13.4	3.84	2.26	1.10
	4	9.40		1.55	
	5	12.4	7.99	1.63	1.61
	6	9.17		1.59	
		10.9	5.94	1.50	1.14
		4.71		1.52	
		16.4	19.7	5.27	5.61
		12.6		6.19	
		33.1	23.2	8.44	6.20
		8.35		6.34	
28th APRIL 2009	1	19.0	9.08	3.19	3.19
	2	11.0		2.30	
	3	15.5	3.60	2.26	1.26
	4	9.68		1.51	
	5	11.4	7.08	1.48	1.27
	6	9.18		1.98	
		9.24	5.29	1.92	1.34
		4.29		1.11	
		20.4	15.2	5.52	6.54
		6.25		5.82	
		30.0	19.3	8.10	5.29
		6.38		14.2	
12th MAY 2009	1	25.0	10.8	5.40	4.10
	2	12.0		3.10	
	3	18.4	4.60	3.20	2.50
	4	10.8		3.00	
	5	12.6	9.00	2.50	2.10
	6	10.8		2.90	
		12.2	6.00	3.40	1.80
		5.20		2.40	
		22.0	20.8	9.30	11.6
		15.0		11.4	
		36.4	28.0	13.9	9.70
		18.2		10.1	

IV. SPECTRUMS AFTER RECTIFICATION

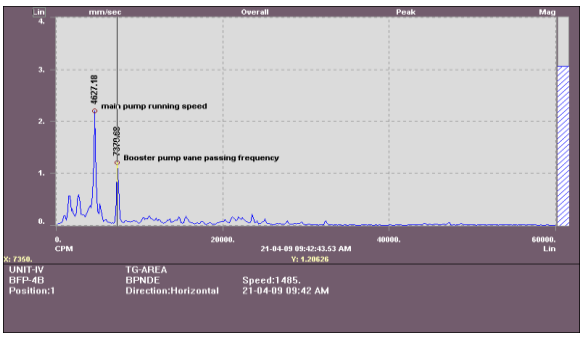

Fig: 7 Velocity spectrum of BPNDE bearing in horizontal direction

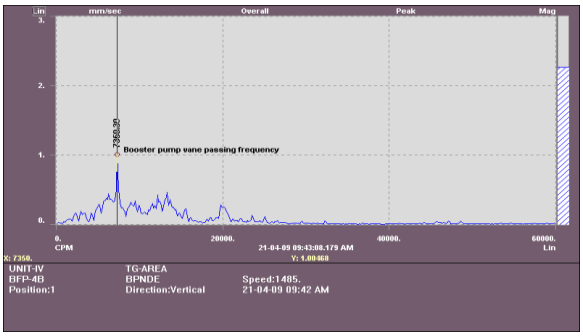

Fig: 8 Velocity spectrum of BPNDE bearing in horizontal direction (Booster pump vane passing frequency peak)

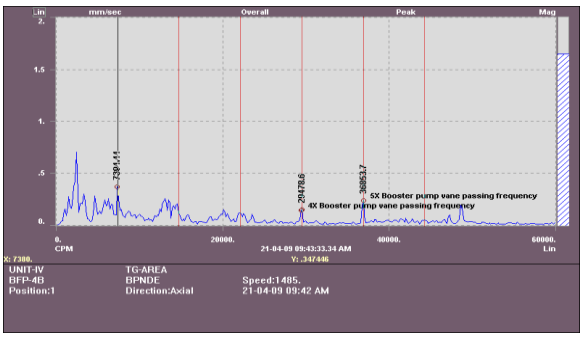

Fig: 8 Velocity spectrum of BPNDE bearing in horizontal direction (Booster pump vpf & harmonics)

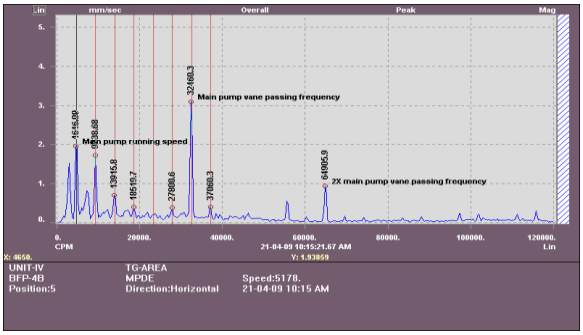

Fig: 9 Velocity spectrum of MPDE bearing in horizontal direction (1x main pump harmonics &vane passing frequency and its harmonics)

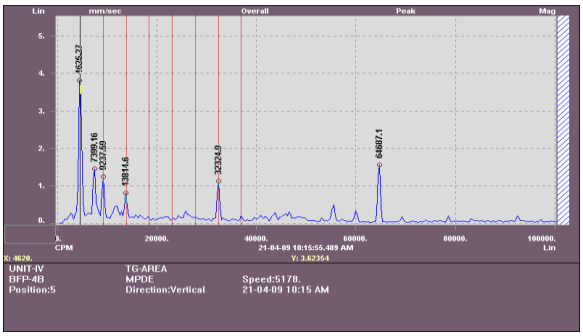

Fig: 10 Velocity spectrum of MPDE bearing in vertical direction (1x harmonics)

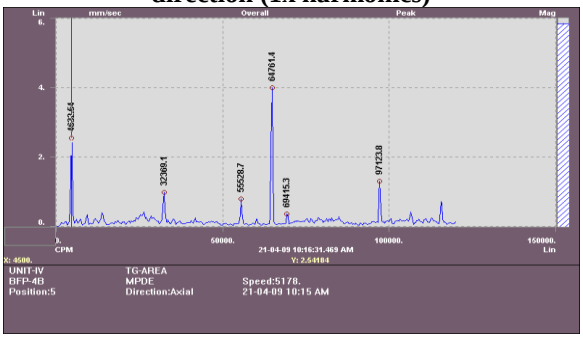

Fig: 11Velocity spectrum of MPDE bearing in axial direction

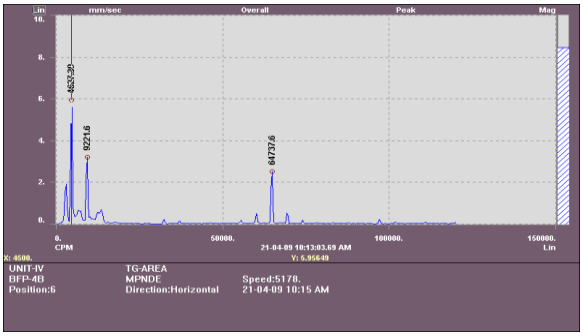

Fig: 12 Velocity spectrum of MPNDE bearing in horizontal direction

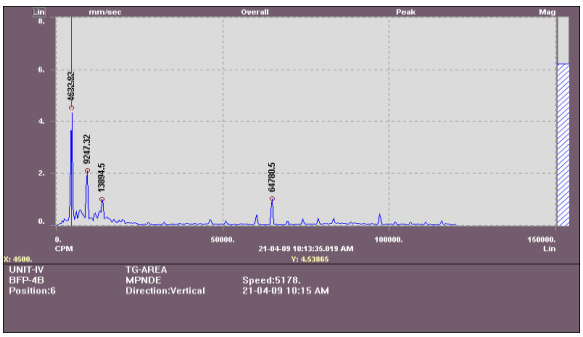

Fig: 13 Velocity spectrum of MPNDE bearing in vertical direction

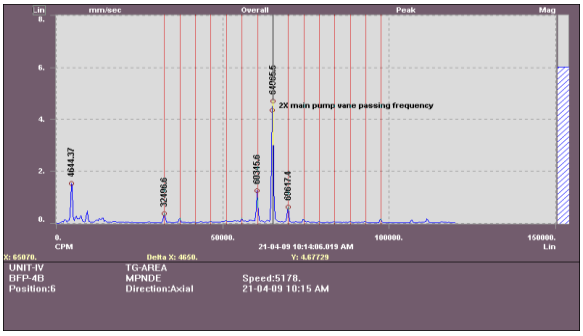

Fig: 14 Velocity spectrum of MPNDE bearing in horizontal direction (side bands of main pump vpf)

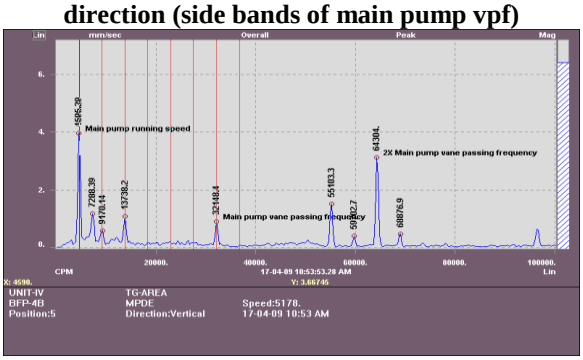

Fig: 15 Velocity spectrum of MPDE bearing in vertical direction (main pump vpf & harmonics)

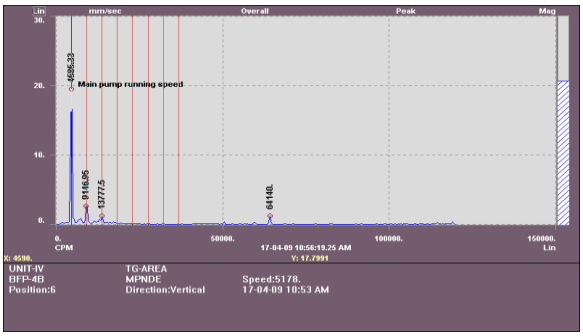

Fig: 16 Velocity spectrum of MPNDE bearing in vertical direction (1x harmonics)

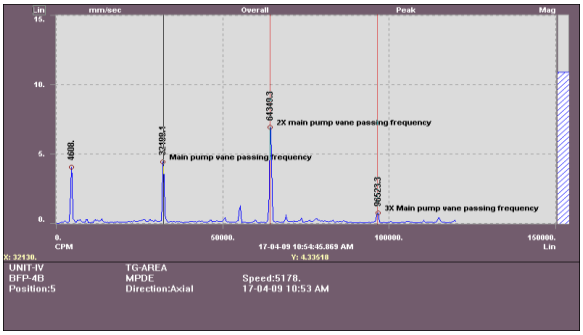

Fig: 17 Velocity spectrum of MPDE bearing in axial direction (main pump vpf & harmonics)

V. RESULTS AND DISCUSSIONS

The reason for the frequent increase in vibration was found to be due to looseness problem in the main pump bed bolts and it is also the fact that, the vibrations may arise due to looseness of the main pump impeller casing. This problem was conformed using the spectrum analysis. The spectrums were collected using DATAPAC 1500.

In order to rectify this problem various operations were performed. It was found that the main pump bed bolts and the impeller casing of the main pump are not properly tightened and having some looseness. To rectify this, the main pump bed bolts were tightened and the impeller casing of the shelter of the main pump was checked for looseness and adjusted so that the vibration must be reduced.

After the operations were performed the vibration readings and spectrums were taken using the analyzer. The readings were found to be feasible to satisfy ISO standards.

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Radiation and Mass Transfer Effects on MHD Free Convective Flow of a Micropolar Fluid past an Infinite Vertical Porous Moving Plate Embedded in a Porous Medium with Viscous Dissipation

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Abstract- The objectives of the present study are investigate the unsteady two-dimensional laminar flow of a viscous dissipative micropolar fluid past a semi-infinite, vertical porous plate moving steadily and subjected to a thermal radiation and mass transfer. The plate moves with constant velocity in the longitudinal direction and free stream velocity follows an exponentially small perturbation law. The Rosseland approximation is used to describe radiative heat transfer in the limit of optically thick fluids. The method of solution can be applied for small perturbation approximation. Numerical results of velocity profiles of micropolar fluids are compared with the corresponding flow problems for a Newtonian fluid. Also, the results of the skin friction coefficient, the couple stress coefficient, the rate of heat and mass transfers at the wall are prepared with various values of the fluid properties and flow conditions.

Index Terms- Radiation; Mass transfer; MHD; Micropolar fluid; Porous medium; Viscous dissipation.

Nomenclature:

A suction velocity parameter
C **c**oncentration..
C_f skin friction coefficient.
C_m couple stress coefficient
C_p specific heat at constant pressure .
D chemical molecular diffusivity
Ec Eckert number
g acceleration due to gravity.
Gc modified Grashof number.
Gr Grashof number.
j microinertia per unit mass.
k thermal conductivity
n parameter related to microgyration vector and shear stress.
Nu Nusult number.
p pressure.
Pr Prandtl number.
Re_x local Reynolds number
R Radiation parameter
Sc Schmidt number.
Sh Sherwood number.
t time.
T temperature.
u, v components of velocities along and perpendicular to the plate.
U_0 scale of free stream velocity.
V_0 scale of suction velocity.
x, y distances of along and perpendicular to the plate.

Greek symbols

α fluid thermal diffusivity
β ratio of vertex viscosity and dynamic viscosity
β_c coefficient of volumetric expansion with concentration
β_f coefficient of volumetric expansion of the working fluid
γ spin gradient viscosity
δ scalar constant
ε scalar constant $(<<1)$
θ dimensionless temperature
Λ coefficient of vertex(microrotation) viscosity
μ fluid dynamic viscosity
ρ fluid density
σ electrical conductivity.
ν fluid kinematic viscosity
ν_r fluid dynamic rotational viscosity
τ friction coefficient
ω angular velocity vector

Subscripts

w wall condition
∞ free steam condition

Superscripts

$( )'$ differentiation with respect to y.
$*$ dimensional properties

I. INTRODUCTION

Simultaneous heat and mass transfer from different geometries embedded in porous media has many engineering and geophysical applications such as geothermal reservoirs, drying of porous solids, thermal insulation, enhanced oil recovery, packed-bed catalytic reactors, cooling of nuclear reactors, and under ground energy transport. Cheng and Minkowycz [1] presented similarity solutions for free thermal convection from a plate in a fluid-saturated porous medium. Bejan and Khair [2] reported on the natural convection boundary layer flow in a saturated porous medium with combined heat and mass transfer. Lai and Kulacki [3] extended the problem of Bejan and Khair [2] to include wall fluid injection effects. Bestman [4] examined the natural convection boundary layer with suction and mass transfer in a porous medium. In all these studies the fluids are assumed to be Newtonian.

In recent years, the dynamics of micropolar fluids has been a popular area of research. As the fluids consist of randomly oriented molecules, and as each volume element of the fluid has translation as well as rotation motions, the analysis of physical problems in these fluids has revealed several interesting phenomena, which are not found in Newtonian fluids. The theory of micropolar fluids and thermo micropolar fluids developed by Eringen [5, 6] can be used to explain the characteristics in certain fluids such as exotic lubricants, colloidal suspensions, or polymeric fluids, liquid crystals and animal blood. The micropolar fluids exhibit certain microscopic effects arising from local structure and microrotation of fluid elements. An excellent review about micropolar fluid mechanics was provided by Ariman et al. [7, 8].

The study of flow and heat transfer of an electrically conducting micropolar fluid past a porous plate under the influence of a magnetic field has attracted the interest of numerous researchers in view of its applications in many engineering problems, such as MHD generators, nuclear reactors, geothermal energy extractions and the boundary layer control in the field of aerodynamics. Keeping in mind some specific industrial applications such as polymer processing technology, numerous attempts have been made to analyze the effect of transverse magnetic field on boundary layer flow characteristics. Mansour and Gorla [9] reported on micropolar fluid flow past a continuously moving in the presence of magnetic field. El-Hakiem et al. [10] have studied Joule heating effects on MHD free convection flow of a micropolar fluid. El-Amin [11] solved the problem of MHD free convection and mass transfer flow in a micropolar fluid with constant suction. Helmy et al. [12] have studied on MHD free convection flow of a micropolar fluid past a vertical porous plate. Seddeek [13] reported the flow of a micropolar fluid by the presence of magnetic field over a continuously moving plate. Kim [14] presented an unsteady MHD mixed convection with mass transfer flow for a micropolar fluid past a vertical moving porous plate via a porous medium.

For some industrial applications such as glass production and furnace design, and in space technology applications such as cosmical flight aerodynamics rocket, propulsion systems, plasma physics and spacecraft re-entry aerothermodynamics which operate at higher temperatures, radiation effects can be significant. Perdikis and Raptis [15] studied heat transfer of a micropolar fluid in the presence of radiation. Kim and Fedorov [17] analyzed transient mixed radiative convective flow of a micropolar fluid past a moving semi-infinite vertical porous plate. Later Raptis [16] studied the same fluid flow past a continuously moving plate in the presence of radiation. Recently, Rahman and Sattar [18] studied transient convective heat transfer flow of a micropolar fluid past a continuously moving vertical porous plate with time dependent suction in the presence of radiation. Cookey et al. [19] studied the influence of viscous dissipation and radiation on unsteady MHD free convection flow past an infinite heated vertical plate in a porous medium with time-dependent suction. Ramachandra Prasad and Bhaskar Reddy [20] investigated radiation and mass transfer effects on an unsteady MHD free convection flow past a heated vertical plate in a porous medium with viscous dissipation. Sankar Reddy et al. [21] reported unsteady MHD convective heat and mass transfer flow of micropolar fluid past a semi-infinite vertical moving porous plate in the presence radiation. Sankar Reddy et al. [22] have studied the problem of radiation effects on MHD mixed convection flow of a micropolar fluid past a semi-infinite moving porous plate in a porous medium with heat absorption.

Viscous dissipation, which appears as a source term in the fluid flow generates appreciable temperature, gives the rate at which mechanical energy is converted into heat in a viscous fluid per unit volume. This effect is of particular significance in natural convection in various devices that are subjected to large variation of gravitational force or that operate at high rotational speeds, as pointed by Gebhart [23] in his study of viscous dissipation on natural convection in fluids. Similarity solution for the same problem with exponential variation of wall temperature was obtained by Gebhart and Mollendorf [24].

However, the effect of radiation and viscous dissipation on heat and mass transfer flow of a micropolar fluid has not received any attention. Hence, the objective of the present chapter is to study the effect of thermal radiation on magnetohydrodynamic free convection heat and mass transfer flow of a micropolar fluid past an infinite vertical porous moving plate embedded in a porous medium in the presence of viscous dissipation. The dimensionless governing equations of the flow, heat and mass transfer are solved analytically using a regular perturbation technique. Numerical results are reported in figures and tables, for various values of the physical parameters of interest.

II. MATHEMATICAL ANALYSIS

An unsteady two-dimensional laminar free convective flow of a viscous, incompressible, electrically conducting and micropolar fluid past an infinite vertical permeable moving plate, embedded in a uniform porous medium in the presence of thermal radiation and viscous dissipation is considered. The x' - axis is taken along the vertical plate and the y' - axis normal to the plate. A uniform magnetic field is applied in the direction perpendicular to the plate. The transverse applied magnetic field and magnetic Reynolds number are assumed to be very small and hence the induced magnetic field is negligible [25]. Also, it is assumed that the there is no applied voltage, so that the electric field is absent. Since the plate is of infinite length, all the flow

variables are functions of normal distance y' and time t' only. Now, under the usual Boussinesq's approximation, the governing boundary layer equations of the problem are

$$\frac{\partial v'}{\partial y'} = 0 \tag{1}$$

$$\frac{\partial u'}{\partial t'} + v'\frac{\partial u'}{\partial y'} = (\nu + \nu_r)\frac{\partial^2 u'}{\partial y'^2} + g\beta_f (T' - T'_\infty) + g\beta_c (C' - C'_\infty) - \left(\frac{\sigma}{\rho} B_0^2 + \frac{\nu}{K'}\right)u' + 2\nu_r \frac{\partial \omega'}{\partial y'} \tag{2}$$

$$\rho j'\left(\frac{\partial \omega'}{\partial t'} + v'\frac{\partial \omega'}{\partial y'}\right) = \gamma \frac{\partial^2 \omega'}{\partial y'^2} \tag{3}$$

$$\frac{\partial T'}{\partial t'} + v'\frac{\partial T'}{\partial y'} = \alpha\left[\frac{\partial^2 T'}{\partial y'^2} - \frac{1}{k}\frac{\partial q'}{\partial y'}\right] + \frac{\nu}{c_p}\left(\frac{\partial u'}{\partial y'}\right)^2 \tag{4}$$

$$\frac{\partial C'}{\partial t'} + v'\frac{\partial C'}{\partial y'} = D\frac{\partial^2 C'}{\partial y'^2} \tag{5}$$

where u', v' are the velocity components in x', y' directions respectively, t' - the time, ρ - the fluid density, g - the acceleration due to gravity, β_f and β_c the thermal and concentration expansion coefficients respectively, K' - the permeability of the porous medium, j' is the micro-inertia density, ω' is the component of the angular velocity vector normal to the $x'y'$-plane, γ is the spin-gradient viscosity, T' - the temperature of the fluid in the boundary layer, ν - the kinematic viscosity, ν_r is the kinematic rotational velocity, σ - the electrical conductivity of the fluid, T'_∞ - the temperature of the fluid far away from the plate, C' - the species concentration in the boundary layer, C'_∞ - the species concentration in the fluid far away from the plate, B_0 - the magnetic induction, α - the fluid thermal diffusivity, k - the thermal conductivity, c_p is the specific heat at constant pressure, q' - the radiative heat flux and D- chemical molecular diffusivity. The second and third terms on the right hand side of the Eq. (2) denote the thermal and concentration buoyancy effects respectively. Also, the last two terms on the right hand side of the Eq. (4) represents the radiative heat flux and viscous dissipation, respectively.

It is assumed that the permeable plate moves with a constant velocity in the direction of fluid flow. The appropriate boundary conditions for the velocity, microrotation, temperature and concentration fields are

$$\begin{aligned} &u' = u'_p, \quad w' = -\frac{\partial u'}{\partial y'}, T' = T_w, C' = C'_w \quad at\ y' = 0 \\ &u' = U'_\infty\ ,\ \omega' \to 0,\ T' \to T'_\infty, C' \to C'_\infty \quad as\ y' \to \infty \end{aligned} \tag{6}$$

where u'_p is the plate velocity, T'_w and C'_w - the temperature and concentration of the plate respectively, U'_∞ - the free stream velocity and U_0 and n' - the constants.

By using Rosseland approximation (Brewster [26]), the radiative heat flux q_r is given by

$$q_r = \frac{-4\sigma_S \partial T'^4}{3K_e \partial y'} \tag{7}$$

where σ_s is the Stefan - Boltzmann constant and K_e - the mean absorption coefficient. It should be noted that by using the Rosseland approximation, the present analysis is limited to optically thick fluids. If temperature differences with in the flow are sufficiently small, then Eq. (6) can be linearised by expanding T'^4 into the Taylor series about T'_∞ , which after neglecting higher order terms takes the form.

$$T'^4 \cong 4T'^3_\infty \quad -3T'^4_\infty \tag{8}$$

In view of Eqs. (6) and (7), Eq. (4) reduces to

$$\frac{\partial T'}{\partial t'} + v'\frac{\partial T'}{\partial y'} = \frac{k}{\rho c_p}\frac{\partial^2 T'}{\partial y'^2} + \frac{16\sigma_S}{3\rho c_p K_e}\frac{\partial^2 T'}{\partial y'^2} + \frac{\mu}{\rho c_p}\left(\frac{\partial u'}{\partial y'}\right)^2 \tag{9}$$

It is clear from Eq. (1) that the suction velocity normal to the plate is a constant. Here, it is assumed to be

$$v' = -V_0 \tag{10}$$

where V_0 is the scale of suction velocity which is a non-zero positive constant. The negative sign indicates that the suction is towards the plate.

In order to write the governing equations and the boundary conditions in dimensionless form, the following non-dimensional quantities are introduced.

$$\begin{aligned} &u = \frac{u'}{U_0}, v = \frac{v'}{V_0}, y = \frac{V_0 y'}{\upsilon}, U_p = \frac{u'_p}{U_0}, n = \frac{n'\nu}{V_0^2}, \omega = \frac{\nu}{U_0 V_0}\omega', \\ &M = \frac{\sigma B_0^2 \upsilon}{\rho V_0^2}, K = \frac{K' V_0^2}{\nu^2}, t = \frac{t' V_0^2}{\nu}, \theta = \frac{T - T_\infty}{T_w - T_\infty}, C = \frac{C' - C'_\infty}{C'_w - C'_\infty}, \\ &\beta = \frac{\nu_r}{\nu}, Gr = j = \frac{V_0^2}{\nu^2} j', \frac{\nu\beta_f g(T_w - T_\infty)}{U_0 V_0^2}, Gc = \frac{\nu\beta_c g(C'_w - C'_\infty)}{U_0 V_0^2} \\ &\Pr = \frac{\nu\rho C_p}{k} = \frac{\nu}{\alpha} = \frac{\mu C_p}{k}, R = \frac{16\sigma_s T_\infty^3}{3K_e k}, Ec = \frac{V_0^2}{C_p(T_w - T_\infty)}, Sc = \frac{\nu}{D'} \end{aligned} \tag{11}$$

Furthermore, the spin-gradient viscosity γ which gives some relationship between the coefficients of viscosity and micro-inertia, is defined as

$$\gamma = (\mu + \frac{\Lambda}{2}) j' = \mu j'\left(1 + \frac{1}{2}\beta\right); \beta = \frac{\Lambda}{\mu}; \tag{12}$$

In view of Eqs. (10) - (12), Eqs. (2), (3), (5) and (9) reduce to the following dimensionless form.

$$\frac{\partial u}{\partial t}-\frac{\partial u}{\partial y}=(1+\beta)\frac{\partial^2 u}{\partial y^2}-Nu+G_r\theta+G_C C+2\beta\frac{\partial \omega}{\partial y}, \quad (13)$$

$$\frac{\partial \omega}{\partial t}-\frac{\partial \omega}{\partial y}=\frac{1}{\eta}\frac{\partial^2 \omega}{\partial y^2}, \quad (14)$$

$$\frac{\partial \theta}{\partial t}-\frac{\partial \theta}{\partial y}=\frac{1}{\Gamma}\frac{\partial^2 \theta}{\partial y^2}+Ec\left(\frac{\partial u}{\partial y}\right)^2 \quad (15)$$

$$\frac{\partial C}{\partial t}-\frac{\partial C}{\partial y}=\frac{1}{Sc}\frac{\partial^2 C}{\partial y^2}. \quad (16)$$

where $\eta=\frac{\mu j^*}{\gamma}=\frac{2}{2+\beta}, N=M+\frac{1}{K}, \Gamma=\left(1-\frac{4}{3R+4}\right)\Pr$

and *Gr*, *Gm*, *Pr*, *R*, *Ec* and *Sc* are the thermal Grashof number, solutal Grashof Number, Prandtl Number, radiation parameter, Eckert number and Schmidt number, respectively.
The corresponding boundary conditions are

$$u=U_p, \omega=-\frac{\partial u}{\partial y}, \theta=1, C=1 \ \ at \ \ y=0$$
$$u\to 0, \ \omega\to 0, \ \theta\to 0 \ , \ C\to 0 \ \ as \ \ y\to\infty \quad (17)$$

III. SOLUTION OF THE PROBLEM

In order to reduce the above system of partial differential equations to a system of ordinary differential equations, we perform an asymptotic analysis by representing the linear velocity, microrotation, temperature and concentration in the neighbourhood of the porous plate as

$$\begin{aligned} u&=u_0(y)+\varepsilon e^{nt}u_1(y)+O(\varepsilon^2)+\ldots \\ \omega&=\omega_0(y)+\varepsilon e^{nt}\omega_1(y)+O(\varepsilon^2)+\ldots \\ \theta&=\theta_0(y)+\varepsilon e^{nt}\theta_1(y)+O(\varepsilon^2)+\ldots \\ C&=C_0(y)+\varepsilon e^{nt}C_1(y)+O(\varepsilon^2)+\ldots \end{aligned} \quad (18)$$

Substituting Eq. (18) into Eqs. (13)-(16), and equating the harmonic and non-harmonic terms, and neglecting the higher-order terms of O(ε^2), we obtain the following pairs of equations for $(u_0,\omega_0,\theta_0,C_0)$ and $(u_1,\omega_1,\theta_1,C_1)$.

$$(1+\beta)u_0''+u_0'-Nu_0=-G_r\theta_0-G_C C_0-2\beta\omega_0' \quad (19)$$
$$(1+\beta)u_1''+u_1'-(N+n)u_1=-G_r\theta_1-G_c C_1-2\beta\omega_1' \quad (20)$$
$$\omega_0''+\eta\omega_0'=0 \quad (21)$$
$$\omega_1''+\eta\omega_0'-n\eta\omega_1=0 \quad (22)$$
$$\theta_0''+\Gamma\theta_0'=-\Gamma Ec(u_0')^2 \quad (23)$$
$$\theta_1''+\Gamma\theta_1'-n\Gamma\theta_1=-2\Gamma Ec\,u_0'u_1' \quad (24)$$
$$C_0''+ScC_0'=0, \quad (25)$$
$$C_1''+ScC_1'-nScC_1=0 \quad (26)$$

where the primes denote differentiation with respect to y only.
The corresponding boundary conditions can be written as

$$u_0=U_p, u_1=0, \omega_0=-u_0', \omega_1=-u_1', \ \theta_0=1, \theta_1=0, C_0=1, C_1=0 \ \ at \ y=0$$
$$u_0=0, u_1=0, \omega_0\to 0, \omega_1\to 0, \ \theta_0\to 0, \theta_1\to 0, C_0\to 0, C_1\to 0 \ \ as \ y\to\infty \quad (27)$$

The Eqs. (19) - (26) are still coupled and non-linear, whose exact solutions are not possible. So we expand (u_0,ω_0,θ_0) and (u_1,ω_1,θ_1) in terms of *Ec* in the following form, as the Eckert number is very small for incompressible flows.

$$\begin{aligned} &u_0(y)=u_{01}(y)+Ecu_{02}(y), \ u_1(y)=u_{11}(y)+Ec\ u_{12}(y), \\ &\omega_0(y)=\omega_{01}(y)+Ec\omega_{02}(y), \omega_1(y)=\omega_{11}(y)+Ec\omega_{12}(y), \\ &\theta_0(y)=\theta_{01}(y)+Ec\,\theta_{02}(y), \theta_1(y)=\theta_{11}(y)+Ec\,\theta_{12}(y) \end{aligned} \quad (28)$$

Substituting (27) in equations (19) - (26), equating the coefficients of *Ec* to zero and neglecting the terms in Ec^2 and higher order, we get the following equations.
The zeroth order equations are

$$(1+\beta)u_{01}''+u_{01}'-Nu_{01}=-Gr\,\theta_{01}-Gm\,C_{01}-2\beta\omega_{01}' \quad (29)$$
$$(1+\beta)u_{02}''+u_{02}'-N\,u_{02}=-Gr\,\theta_{02}-Gm\,C_{02}-2\beta\omega_{02}' \quad (30)$$
$$\omega_{01}''+\eta\omega_{01}'=0 \quad (31)$$
$$\omega_{02}''+\eta\omega_{02}'=0 \quad (32)$$
$$\theta_{01}''+\Gamma\theta_{01}'=0 \quad (33)$$
$$\theta_{02}''+\Gamma\theta_{02}'=-\Gamma Ecu_{01}'^{\,2} \quad (34)$$

and the corresponding boundary conditions are

$$u_{01}=U_p, u_{02}=0, \theta_{01}=1, \theta_{02}=0, \omega_{01}=-u_{01}', \omega_{02}=-u_{02}' \ \ at \ y=0$$
$$u_{01}\to 0, u_{02}\to 0, \theta_{01}\to 0, \theta_{02}\to 0, \omega_{01}\to 0, \omega_{02}\to 0 \ \ as \ y\to\infty \quad (35)$$

The second order equations are

$$(1+\beta)u_{11}''+u_{11}'-Nu_{11}=-Gr\,\theta_{11}-Gm\,C_{11}-2\beta\omega_{11}' \quad (36)$$
$$(1+\beta)u_{12}''+u_{12}'-N\,u_{12}=-Gr\,\theta_{12}-Gm\,C_{12}-2\beta\omega_{12}' \quad (37)$$
$$\omega_{11}''+\eta\omega_{11}'-n\eta\omega_{11}=0 \quad (38)$$
$$\omega_{12}''+\eta\omega_{12}'-n\eta\omega_{12}=0 \quad (39)$$
$$\theta_{11}''+\Gamma\theta_{11}'-n\Gamma\theta_{11}=0 \quad (40)$$
$$\theta_{12}''+\Gamma\theta_{12}'-n\Gamma\theta_{12}=-2\Gamma Ec\,u_{01}'u_{11}' \quad (41)$$

and the corresponding boundary conditions are

$$u_{11}=0, u_{12}=0, \theta_{11}=1, \theta_{12}=0, \omega_{11}=-u_{11}', \omega_{12}=-u_{12}' \ \ at \ y=0$$
$$u_{11}\to 1, u_{12}\to 0, \theta_{11}\to 0, \theta_{12}\to 0, \omega_{11}\to 0, \omega_{12}\to 0 \ \ as \ y\to\infty \quad (42)$$

By solving Eqs. (29) - (34) under the boundary conditions (35), and Eqs. (36)-(41) under the boundary conditions (42), and using Eqs. (28) and (18), we obtain the velocity, microrotation, temperature and concentration distributions in the boundary layer as

$$u(y) = a_1 e^{-m_1 y} + a_2 e^{-\Gamma y} + a_3 e^{-Scy} + a_4 e^{-\eta y} + Ec\{a_5 e^{-m_1 y} + a_6 e^{-\Gamma y} + a_7 e^{-2m_1 y} + a_8 e^{-2\Gamma y} + a_9 e^{-2Scy} + a_{10} e^{-2\eta y} + a_{11} e^{-(m_1+\Gamma)y}$$
$$+ a_{12} e^{-(m_1+Sc)y} + a_{13} e^{-(m_1+\eta)y} + a_{14} e^{-(\Gamma+Sc)y} + a_{15} e^{-(\Gamma+\eta)y} + a_{16} e^{-(Sc+\eta)y} + a_{17} e^{-\eta y}\} + \varepsilon e^{nt}[\{b_2 e^{-m_2 y} + b_3 e^{-m_3 y} + b_4 e^{-m_4 y}$$
$$+ b_5 e^{-m_5 y}\} + Ec\{b_6 e^{-m_2 y} + b_7 e^{-m_4 y} + b_8 e^{-(m_1+m_2)y} + b_9 e^{-(m_1+m_3)y} + b_{10} e^{-(m_1+m_4)y} + b_{11} e^{-(m_1+m_5)y} + b_{12} e^{-(m_2+\Gamma)y} + b_{13} e^{-(m_3+\Gamma)y}$$
$$+ b_{14} e^{-(m_4+\Gamma)y} + b_{15} e^{-(m_4+\Gamma)y} + b_{16} e^{-(m_2+Sc)y} + b_{17} e^{-(m_3+Sc)y} + b_{18} e^{-(m_4+Sc)y} + b_{19} e^{-(m_5+Sc)y} + b_{20} e^{-(m_2+\eta)y} + b_{21} e^{-(m_3+\eta)y}$$
$$+ b_{22} e^{-(m_4+\eta)y} + b_{23} e^{-(m_5+\eta)y} + b_{24} e^{-m_3 y}\}]$$

$$\omega(y) = c_1 e^{-\eta y} + Ec\{c_2 e^{-\eta y}\} + \varepsilon e^{nt}[c_3 e^{-m_3 y} + Ec\{c_4 e^{-m_3 y}\}]$$

$$\theta(y) = e^{-\Gamma y} + Ec\{c_1 e^{-\Gamma y} + c_2 e^{-2m_1 y} + c_3 e^{-2\Gamma y} + c_4 e^{-2Scy} + c_5 e^{-2\eta y} + c_6 e^{-(m_1+\Gamma)y} + c_7 e^{-(m_1+Sc)y} + c_8 e^{-(m_1+\eta)y} + c_9 e^{-(\Gamma+Sc)y}$$
$$+ c_{10} e^{-(\Gamma+\eta)y} + c_{11} e^{-(Sc+\eta)y}\} + \varepsilon e^{nt}[\{e^{-m_4 y}\} + Ec\{c_{12} e^{-m_4 y} + c_{13} e^{-(m_1+m_2)y} + c_{14} e^{-(m_1+m_3)y} + c_{15} e^{-(m_1+m_4)y} + c_{16} e^{-(m_1+m_5)y}$$
$$+ c_{17} e^{-(m_2+\Gamma)y} + c_{18} e^{-(m_3+\Gamma)y} + c_{19} e^{-(m_4+\Gamma)y} + c_{20} e^{-(m_4+\Gamma)y} + c_{21} e^{-(m_2+Sc)y} + c_{22} e^{-(m_3+Sc)y} + c_{23} e^{-(m_4+Sc)y} + c_{24} e^{-(m_5+Sc)y}$$
$$+ c_{25} e^{-(m_2+\eta)y} + c_{26} e^{-(m_3+\eta)y} + c_{27} e^{-(m_4+\eta)y} + c_{28} e^{-(m_5+\eta)y}\}]$$

$$C(y) = e^{-Scy} + \varepsilon e^{nt}\{e^{-m_5 y}\}$$

where

$$m_1 = \frac{1}{2(1+\beta)}\left[1+\sqrt{1+4N(1+\beta)}\right],\ m_2 = \frac{1}{2(1+\beta)}\left[1+\sqrt{1+4(N+n)(1+\beta)}\right]$$

$$m_3 = \frac{\eta}{2}\left[1+\sqrt{1+\frac{4n}{\eta}}\right],\ m_4 = \frac{\Gamma}{2}\left[1+\sqrt{1+\frac{4n}{\Gamma}}\right],\ m_5 = \frac{Sc}{2}\left[1+\sqrt{1+\frac{4n}{Sc}}\right]$$

and the expressions for the remaining constants are given in the appendix.

From the engineering point of view, the most important characteristics of the flow are the skin friction coefficient C_f, couple stress coefficient C_m, Nusselt number Nu and Sherwood number Sh, which are discussed below.

Given velocity field in the boundary layer, we can now calculate the skin-friction coefficient C_f at the porous plate, which is given by

$$C_f = \frac{2\tau_w^*}{\rho U_0 V_0}, \text{ where } \tau_w' = (\mu+\Lambda)\left.\frac{\partial u'}{\partial y'}\right|_{y'=0} + \Lambda w'|_{y'=0}$$

$$= 2\{1+(1-n)\beta\}\left[\frac{du}{dy}\right]_{y=0}$$

$$= 2\{1+(1-n)\beta\}\left[\frac{du_{01}}{dy} + Ec\frac{du_{02}}{dy} + \varepsilon e^{nt}\left\{\frac{du_{11}}{dy} + Ec\frac{du_{12}}{dy}\right\}\right]_{y=0}$$

$$= -\left\{ \begin{array}{l} a_1 m_1 + a_2 \Gamma + a_3 Sc + a_4 \eta + Ec\{a_5 m_1 + a_6 \Gamma + 2a_7 m_1 + 2\Gamma a_8 + 2Sca_9 + 2\eta a_{10} + a_{11}(m_1 + \Gamma) \\ + a_{12}(m_1 + Sc) + a_{13}(m_1 + \eta) + a_{14}(\Gamma + Sc) + a_{15}(\Gamma + \eta) + a_{16}(Sc + \eta) + a_{17}\eta\} \\ + \varepsilon e^{nt}[\{b_2 m_2 + b_3 m_3 + b_4 m_4 + b_5 m_5\} + Ec\{b_6 m_2 + b_7 m_4 + b_8(m_1 + m_2) + b_9(m_1 + m_3) \\ + b_{10}(m_1 + m_4) + b_{11}(m_1 + m_5) + b_{12}(m_2 + \Gamma) + b_{13}(m_3 + \Gamma) + b_{14}(m_4 + \Gamma) + b_{15}(m_4 + \Gamma) \\ + b_{16}(m_2 + Sc) + b_{17}(m_3 + Sc) + b_{18}(m_4 + Sc) + b_{19}(m_5 + Sc) + b_{20}(m_2 + \eta) + b_{21}(m_3 + \eta) \\ + b_{22}(m_4 + \eta) + b_{23}(m_5 + \eta) + b_{24} m_3\}] \end{array} \right\}$$

The couple stress coefficient C_m at the porous plate is written as

$$C_m = \frac{M_w}{\mu j U_0}, \quad M_w = \gamma \left. \frac{\partial w^*}{\partial y^*} \right|_{y^*=0}$$ where

$$= \left(1 + \frac{1}{2}\beta\right)\omega'(0),$$

$$= -\left(1 + \frac{1}{2}\beta\right)\left\{\left(c_1 + Ec\,c_2\right)\eta + \left(c_3 + Ec\,c_4\right)m_3\right\}$$

We can also calculate the heat transfer coefficient at the porous plate in terms of the Nusselt number, as follows

$$Nu_x = x\frac{\left(\partial T/\partial y^*\right)_{y^*=0}}{T_w - T_\infty},$$

$$Nu_x \,\mathrm{Re}_x^{-1} = -\left[\frac{d\theta}{dy}\right]_{y=0} = -\left(\frac{\partial \theta_0}{\partial y} + \varepsilon e^{\delta t}\frac{\partial \theta_1}{\partial y}\right)_{y=0}$$

$$= -\left[\frac{d\theta_{01}}{dy} + Ec\frac{d\theta_{02}}{dy} + \varepsilon e^{nt}\left\{\frac{d\theta_{11}}{dy} + Ec\frac{d\theta_{12}}{dy}\right\}\right]_{y=0}$$

$$= \Gamma + Ec\{c_1\Gamma + 2m_1c_2 + 2\Gamma c_3 + 2Scc_4 + 2\eta c_5 + c_6(m_1 + \Gamma + c_7(m_1 + Sc) + c_8(m_1 + \eta) + c_9(\Gamma + Sc) + c_{10}(\Gamma + \eta)$$
$$+ c_{11}(Sc + \eta)\} + \varepsilon e^{nt}[\{m_4\} + Ec\{c_{12}m_4 + c_{13}(m_1 + m_2) + c_{14}(m_1 + m_3) + c_{15}(m_1 + m_4) + c_{16}(m_1 + m_5)$$
$$+ c_{17}(m_2 + \Gamma) + c_{18}(m_3 + \Gamma) + c_{19}(m_4 + \Gamma) + c_{20}(m_4 + \Gamma) + c_{21}(m_2 + Sc) + c_{22}(m_3 + Sc) + c_{23}(m_4 + Sc)$$
$$+ c_{24}(m_5 + Sc) + c_{25}(m_2 + \eta) + c_{26}(m_3 + \eta) + c_{27}(m_4 + \eta) + c_{28}(m_5 + \eta)\}]$$

Finally, we can calculate the mass transfer coefficient at the porous plate in terms of the Sherwood number is given by

$$Sh_x = \frac{j_w x}{D^*\left(C_w^* - C_\infty^*\right)}, \quad j_w = -D^*\left.\frac{\partial C^*}{\partial y^*}\right|_{y^*=0}$$ where

$$Sh_x \,\mathrm{Re}_x^{-1} = -\left[\frac{dC}{dy}\right]_{y=0} = -\left[\frac{dC_0}{dy} + \varepsilon e^{nt}\frac{dC_1}{dy}\right]_{y=0}$$

$$= Sc + \varepsilon e^{nt} m_5.$$

where $\mathrm{Re}_x = \frac{V_0 x}{\nu}$ is the Reynolds number.

IV. Results and Discussion

The formulation of the problem that accounts for the effects of radiation and viscous dissipation on the MHD free convection mass transfer flow of an incompressible, micropolar fluid along an infinite vertical porous moving plate embedded in porous medium is carried out in the preceding sections. This enables us to carry out the numerical computations for the velocity, microrotation, temperature and concentration for various values of the flow and material parameters. In the present study we have chosen $t = 1, \varepsilon = 0.01$ and $n = 0.1$, while β, Gr, Gc, M, K, Sc, Pr, R, Up and Ec are varied over a range, which are listed in the figure legends.

The effect of viscosity ratio β on the translational velocity and microrotation across the boundary layer are presented in Fig. 1. It is noted that the velocity distribution is lower for a Newtonian fluid ($\beta = 0$) for prescribed values of flow parameters, as compared with that of micropolar fluid. The translational velocity increases near the plate, as the viscosity ratio β increases and then approaches to zero. In addition, the microrotation increases, with an increase in β near to the plate, but the effect is opposite far away from the plate.

Fig. 2 illustrates the variation of velocity and microrotation distribution across the boundary layer for various values of the plate velocity Up. It is observed that both the translational velocity and microrotation increase, as the plate moving velocity increases.

For different values of the magnetic field parameter M, the translational velocity and microrotation profiles are plotted in Fig 3. It is seen that the velocity distribution across the boundary layer decreases, as M increases. Further, the results show that the values of microrotation increases, as M increases.

The translational velocity and the microrotation profiles against spanwise coordinate y for different values of Grashof number Gr and modified Grashof number Gc are described in Fig. 4. It is observed that an increase in Gr or Gc leads to a rise in the values of velocity, but a fall in the microrotation. Here the positive values of Gr corresponds to a cooling of the surface by natural convection.

For different values of the thermal radiation parameter R, the translational velocity, microrotation and temperature profiles are plotted in Fig.5. It is observed that as the radiation parameter R increases, both the velocity and temperature decrease whereas the microrotation increases.

For different values of the Schmidt number Sc, translational velocity and the microrotation profiles are plotted in Fig. 6. It is observed that as Sc increases, the velocity decreases across the boundary layer and the microrotation increases.

The effect of viscous dissipation parameter i.e., Eckert number *Ec* on the velocity, Microrotation and temperature are shown in Fig.7. It is noticed that as Ec increases, there is an increase in the velocity distribution across the boundary layer and a decrease in both the Microrotation and temperature.

Fig.8 illustrates the influence of the radiation parameter R on the temperature in the boundary layer. From this figure, it is clear that the temperature decreases, as R increases.

Fig.9 shows the concentration profiles across the boundary layer for various values of Schmidt number Sc. It is seen that as Sc increases, the concentration decreases, because the smaller values of Sc are equivalent to increasing the chemical molecular diffusivity.

Numerical values of the skin-friction coefficient C_f, couple stress coefficient C_m, Nusselt number Nu and Sherwood number Sh are tabulated in Table 1 for different values of thermophysical parameters. Analysis of the tabular data shows that the skin friction coefficient decreases, as β or M or Pr or R increases, whereas it increases, as Gr or Gc or Ec or Sc increases. The couple stress follows same trend. Further, it is observed that the Nusselt number decreases, as β or M or Pr or R increases, whereas it increases, as Gr or Gc or Ec increases. The effect of increasing values of Sc has the tendency to increase the Sherwood number, but the remaining parameters β, M, Gr, Gr, Ec, Pr and R have no effect on the Sherwood number.

V. Conclusions

An analysis is presented for the problem of thermal radiation on the MHD free convection mass transfer flow of an incompressible, micropolar fluid along an infinite vertical porous moving plate in a porous medium in the presence of viscous dissipation. Numerical results are presented to illustrate the details of the MHD convective flow and mass transfer characteristics and their dependence on the fluid properties and flow conditions. We may conclude that the translational velocity across the boundary layer and the microrotation at the wall are decreased with increasing values of *M*, *Sc* and *Pr*, while they show opposite trends with increasing values of *n*, *Gr* and *Gc*.

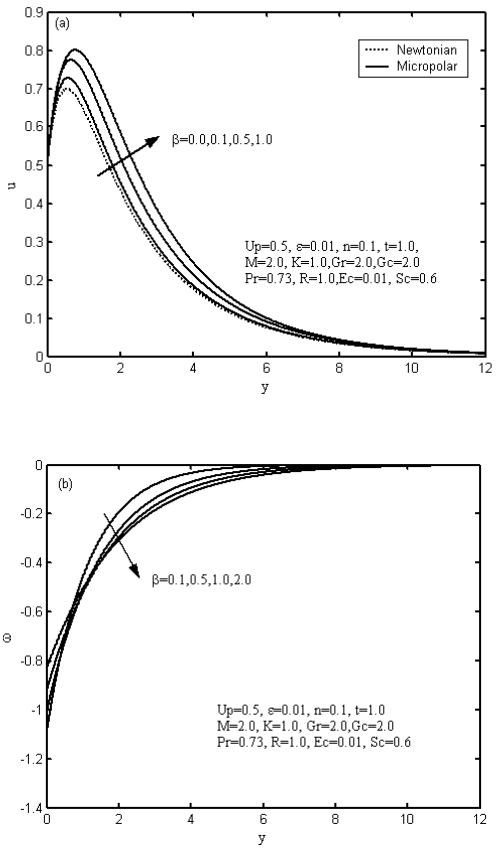
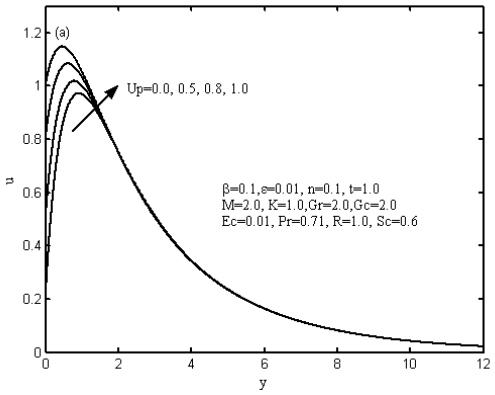


Fig. 1 Velocity and microrotation profiles for various values of β


(a)
Up=0.0, 0.5, 0.8, 1.0
β=0.1,e=0.01, n=0.1, t=1.0
M=2.0, K=1.0,Gr=2.0,Gc=2.0
Ec=0.01, Pr=0.71, R=1.0, Sc=0.6
u
y

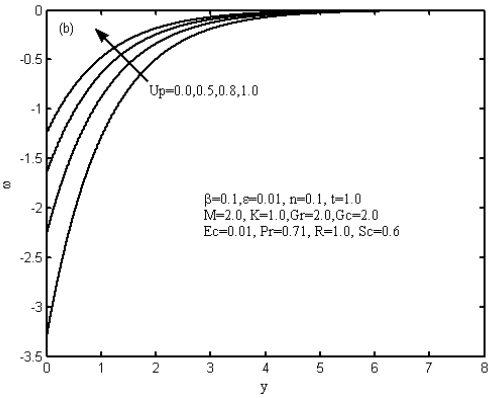

(b)
Up=0.0,0.5,0.8,1.0
β=0.1,e=0.01, n=0.1, t=1.0
M=2.0, K=1.0,Gr=2.0,Gc=2.0
Ec=0.01, Pr=0.71, R=1.0, Sc=0.6
ω
y

Fig. 2 Velocity and microrotation profiles for various values of *Up*

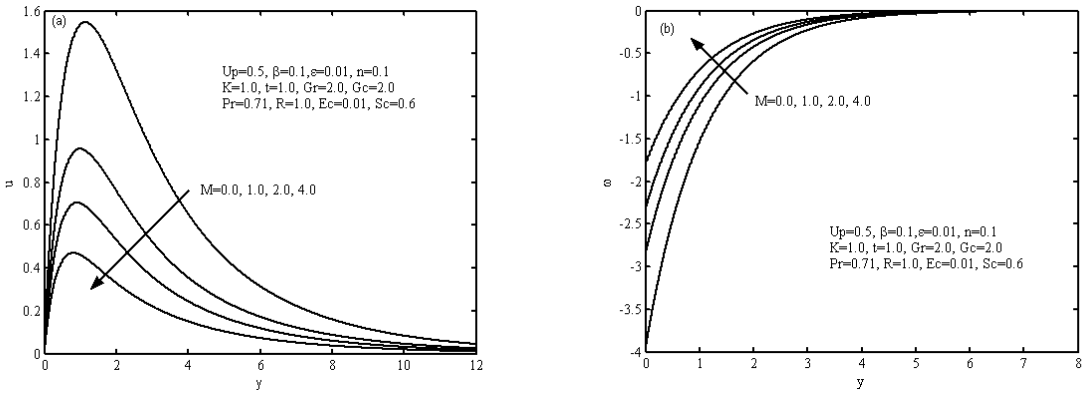


Fig. 3 Velocity and microrotation profiles for various values of M

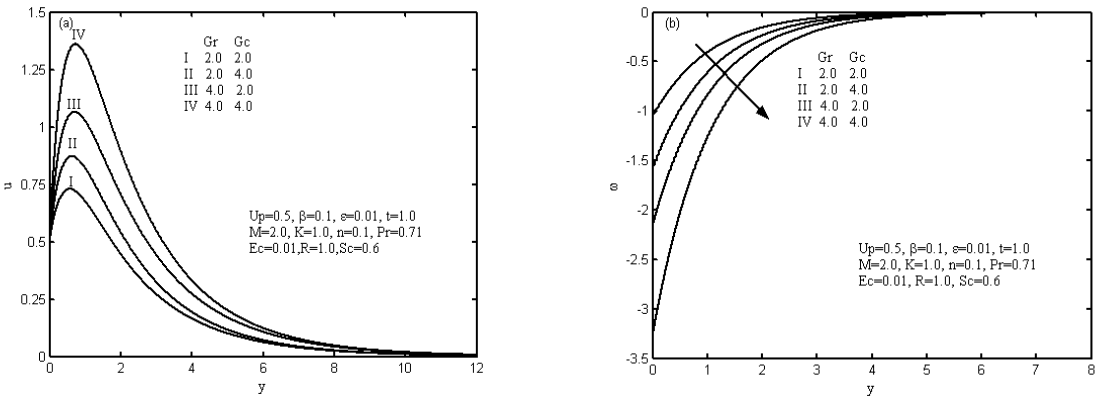


Fig. 4 Velocity and microrotation profiles for various values of *Gr* & *Gc*

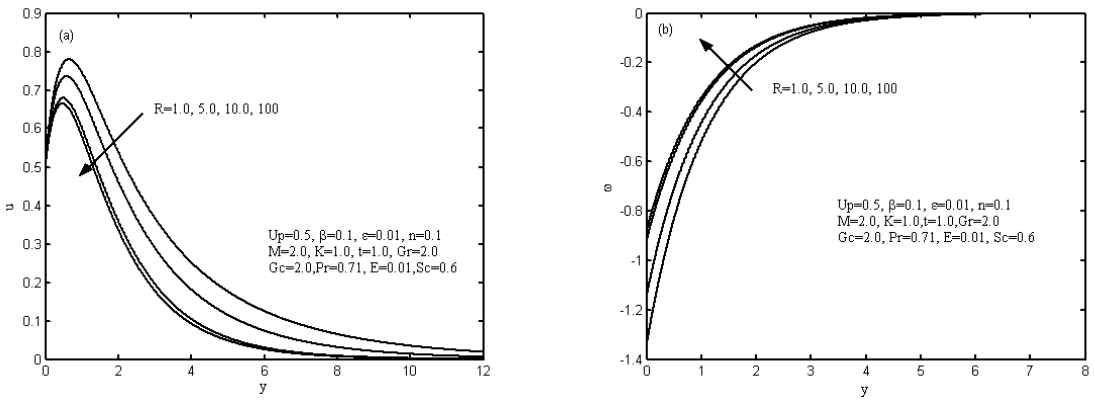


Fig. 5 Velocity and microrotation profiles for various values of R

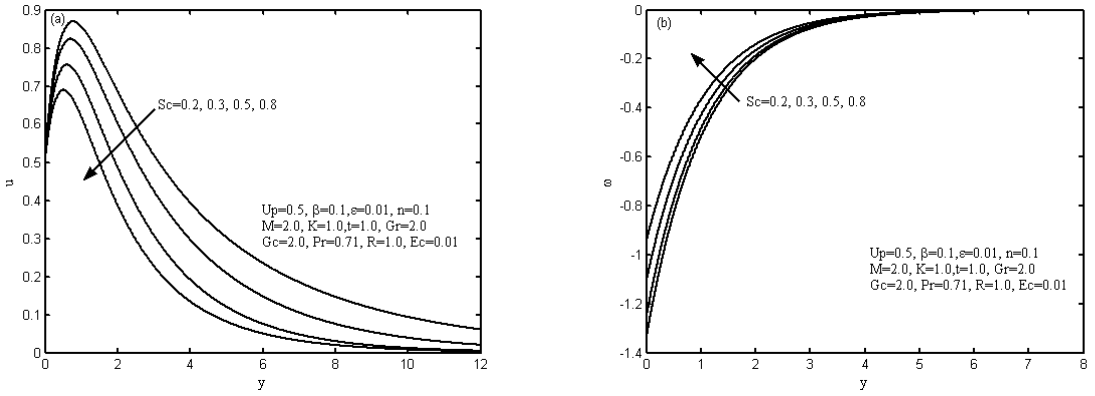
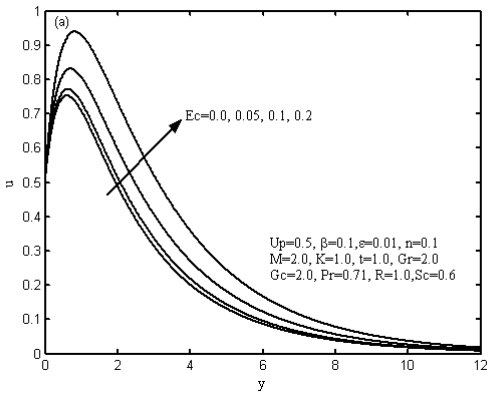


Fig. 6 Velocity and microrotation profiles for various values of *Sc*

ISSN 2250-3153



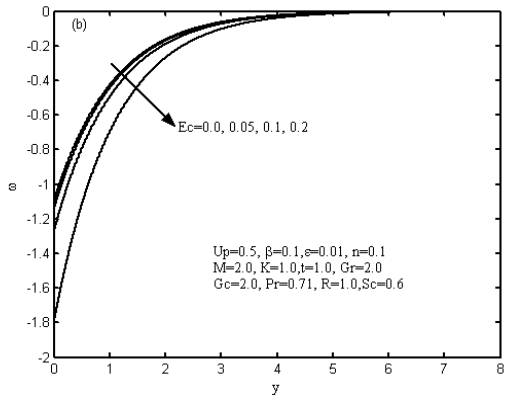


Fig. 7 Velocity and microrotation profiles for various values of *Ec*

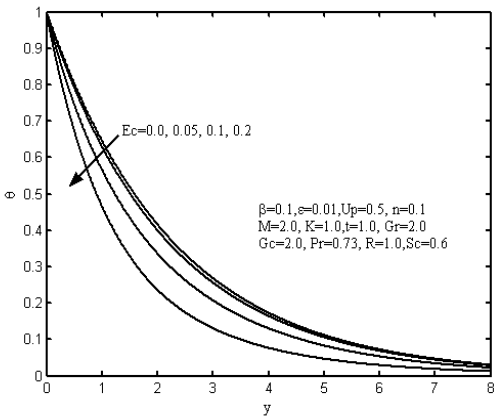


Fig. 7 (c) Temperature profiles for various values of Ec

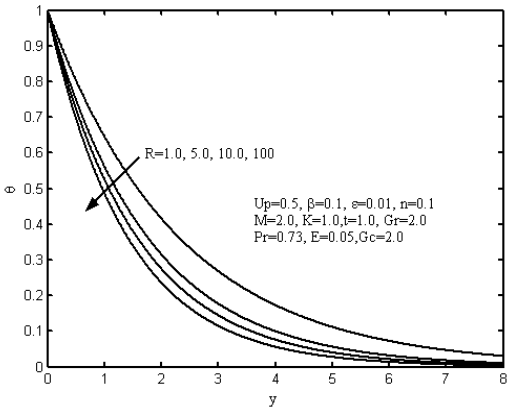


Fig. 8 Temperature profiles for various values of R

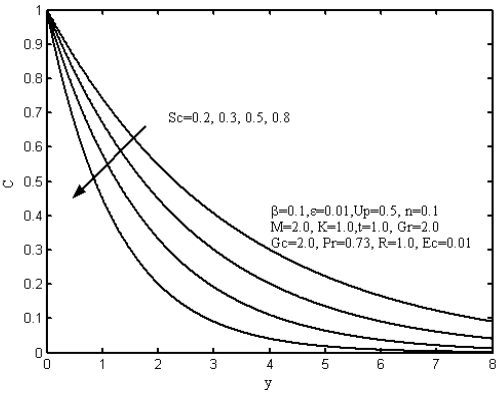


Fig.9 Concentration profiles for various values of Sc

Table 1: Effects of various parameters on C_f, C_m, $Nu\,\mathrm{Re}_x^{-1}$ and $Sh_x\,\mathrm{Re}_x^{-1}$ for values of β, M, Gr Gc, Ec, Pr, R, Sc with t=1, n=0.1, $\varepsilon = 0.01$ and U_p=0.5.

β	M	Gr	Gc	Ec	Pr	R	Sc	C_f	C_m	$Nu\,\mathrm{Re}_x^{-1}$	$Sh_x\,\mathrm{Re}_x^{-1}$
0.0	2.0	2.0	2.0	0.01	0.71	2.0	0.6	3.3742	3.6832	0.4267	0.6008
0.1								0.6444	0.6446	0.4269	0.6008
0.5								0.5991	0.5990	0.4274	0.6008
0.5	0.0	2.0	2.0	0.01	0.71	2.0	0.6	1.7233	1.7232	0.4265	0.6008
	1.0							1.0339	1.0338	0.4263	0.6008
	2.0							0.5991	0.5990	0.4253	0.6008
0.5	2.0	2.0	2.0	0.01	0.71	2.0	0.6	0.5991	0.5990	0.4253	0.6008
		4.0						1.6116	1.6113	0.4240	0.6008
		6.0						2.6247	2.6244	0.4228	0.6008
0.5	2.0	2.0	2.0	0.01	0.71	2.0	0.6	0.5991	0.5990	0.4253	0.6008
		4.0						1.5199	1.5200	0.4240	0.6008
		6.0						2.4408	2.4410	0.4228	0.6008
0.5	2.0	2.0	2.0	0.01	0.71	2.0	0.6	0.5991	0.5990	0.4253	0.6008
			0.05					0.6068	0.6067	0.3945	0.6008
			1.0					3.8376	3.8434	-12.4087	0.6008
0.5	2.0	2.0	2.0	0.01	0.71	2.0	0.6	0.5991	0.5990	0.4253	0.6008
				1.0				0.5076	0.5075	0.6011	0.6008
				3.0				0.1553	0.1554	1.8037	0.6008
0.5	2.0	2.0	1.0	0.01	0.71	1.0	0.6	0.6740	0.6739	0.3046	0.6008
					2.0			0.5991	0.5990	0.4253	0.6008
					5.0			0.5268	0.5267	0.5617	0.6008
0.5	2.0	2.0	1.0	0.01	0.71	2.0	0.2	0.8389	0.8388	0.4285	0.2003
							0.6	0.5991	0.5990	0.4253	0.6008
							0.8	0.5125	0.5124	0.4265	0.8010

VI. CONCLUSIONS

The present paper deals with the analysis of thermal radiation on the MHD free convection mass transfer flow of an incompressible, micropolar fluid along an infinite vertical porous moving plate in a porous medium in the presence of viscous dissipation. Numerical results are presented to illustrate the details of the MHD convective flow and mass transfer characteristics and their dependence on the fluid properties and flow conditions. Following conclusions can be drawn from the numerical results obtained:

(i) Velocity increases with increase in the thermal Grashof number and solutal Grashof number but reverse trend is seen by increasing the Hartman number and inertia coefficient parameter.

(ii) Microrotation increases with increase in the thermal Grashof number and solutal Grashof number but reverse trend is seen by increasing the Hartman number and inertia coefficient parameter.

(iii) Temperature decreases with increase in the value of the Prandtl number whereas opposite effect is seen by enhancing the value of the thermal radiation, magnetic field, inverse Darcy number and inertia coefficient parameter.

(iv) Concentration decreases with increase in the value of the Schmidt number whereas reverse trend is seen with increase in the value of inverse Darcy number and inertia coefficient parameter.

APPENDIX

$$a_1 = U_p - (a_2 + a_3 + a_4),\ a_2 = \frac{-Gr}{(1+\beta)\Gamma^2 - \Gamma - N},\ a_3 = \frac{-Gc}{(1+\beta)Sc^2 - Sc - N},\ a_4 = \frac{2\beta\eta k_1}{(1+\beta)\,\eta^2 - \eta - N} = \theta_1 k_1$$

$$a_5 = -\sum_{j=5}^{17} a_j \quad a_6 = \frac{-Grc_1}{(1+\beta)\Gamma^2 - \Gamma - N}, \quad a_7 = \frac{-Grc_2}{4(1+\beta)m_1^{\,2} - 2m_1 - N},$$

$$a_8 = \frac{-Grc_3}{4(1+\beta)\Gamma^2 - 2\Gamma - N}, \quad a_9 = \frac{-Gr\,c_4}{4(1+\beta)\,Sc^2 - 2\,Sc - N} \quad a_{10} = \frac{-Gr\,c_5}{4(1+\beta)\,\eta^2 - 2\eta - N}$$

$$a_{11} = \frac{-Grc_6}{(1+\beta)(m_1+\Gamma)^2 - (m_1+\Gamma) - N}, \quad a_{12} = \frac{-Gr\,c_7}{(1+\beta)\,(m_1+Sc)^2 - (m_1+Sc) - N}$$

$$a_{13} = \frac{-Grc_8}{(1+\beta)(m_1+\eta)^2 - (m_1+\eta) - N}, \quad a_{14} = \frac{-Grc_9}{(1+\beta)(Sc+\Gamma)^2 - (Sc+\Gamma) - N}$$

$$a_{15} = \frac{-Grc_{10}}{(1+\beta)(\Gamma+\eta)^2 - (\Gamma+\eta) - N}, \quad a_{16} = \frac{-Gr\,c_{11}}{(1+\beta)\,(Sc+\eta)^2 - (Sc+\eta) - N},$$

$$a_{17} = \frac{2\beta\eta k_2}{(1+\beta)\;\eta^2 - 2\eta - N}, \quad b_2 = -(b_3+b_4+b_5), \quad b_3 = \frac{2\beta m_3 k_3}{(1+\beta)\;m_3^2 - m_3 - N},$$

$$b_4 = \frac{-Gr}{(1+\beta)m_4^{\,2} - m_4 - N}, \quad b_5 = \frac{-Gr}{(1+\beta)m_5^{\,2} - m_5 - N}, \quad b_6 = -\left(\sum_{i=6}^{22} b_i\right), \quad b_7 = \frac{-Grc_{12}}{(1+\beta)m_4^{\,2} - \Gamma m_4 - n\,\mathrm{Pr}},$$

$$b_8 = \frac{-Grc_{13}}{(1+\beta)(m_1+m_3)^2 - \Gamma(m_1+m_3) - n\Gamma}, \quad b_9 = \frac{-Grc_{14}}{(1+\beta)(m_1+m_3)^2 - \Gamma(m_1+m_3) - n\Gamma}$$

$$b_{10} = \frac{-Grc_{15}}{(1+\beta)(m_1+m_4)^2 - \Gamma(m_1+m_4) - n\Gamma}, \quad b_{11} = \frac{-Grc_{16}}{(1+\beta)(m_1+m_5)^2 - \Gamma(m_1+m_5) - n\Gamma}$$

$$b_{12} = \frac{-Grc_{17}}{(1+\beta)(m_2+\Gamma)^2 - \Gamma(m_2+\Gamma) - n\Gamma}, \quad b_{13} = \frac{-Grc_{18}}{(1+\beta)(m_3+\Gamma)^2 - \Gamma(m_3+\Gamma) - n\Gamma}$$

$$b_{14} = \frac{-Grc_{19}}{(1+\beta)(m_4+\Gamma)^2 - \Gamma(m_4+\Gamma) - n\Gamma}, \quad b_{15} = \frac{-Grc_{20}}{(1+\beta)(m_5+\Gamma)^2 - \Gamma(m_5+\Gamma) - n\Gamma}$$

$$b_{16} = \frac{-Grc_{21}}{(1+\beta)(m_2+Sc)^2 - \Gamma(m_2+Sc) - n\Gamma}, \quad b_{17} = \frac{-Grc_{22}}{(1+\beta)(m_3+\Gamma)^2 - \Gamma(m_3+\Gamma) - n\Gamma}$$

$$b_{18} = \frac{-Grc_{23}}{(1+\beta)(m_4+\Gamma)^2 - \Gamma(m_4+\Gamma) - n\Gamma}, \quad b_{19} = \frac{-Grc_{24}}{(1+\beta)(m_5+Sc)^2 - \Gamma(m_5+Sc) - n\Gamma}$$

$$b_{20} = \frac{-Grc_{25}}{(1+\beta)(m_2+\eta)^2 - \Gamma(m_2+\eta) - n\Gamma}, \quad b_{21} = \frac{-Grc_{26}}{(1+\beta)(m_3+\eta)^2 - \Gamma(m_3+\eta) - n\Gamma},$$

$$b_{22} = \frac{-Grc_{27}}{(1+\beta)(m_4+\eta)^2 - \Gamma(m_4+\eta) - n\Gamma}, \quad b_{23} = \frac{-Grc_{28}}{(1+\beta)(m_5+\eta)^2 - \Gamma(m_5+\eta) - n\Gamma},$$

$$b_{24} = \frac{2\beta m_3}{(1+\beta)m_3^2 - \Gamma m_3 - n\Gamma}, \quad c_1 = -\left(\sum_{i=2}^{11} c_i\right), \quad c_2 = \frac{-\Gamma E a_1^2 m_1^2}{4m_1^2 - 2\Gamma m_1}, \quad c_4 = \frac{-\Gamma E a_3^2 Sc^2}{(2Sc)^2 - 2\Gamma Sc}, \quad c_5 = \frac{-\Gamma E a^2{}_4 \eta}{4\eta - 2\Gamma},$$

$$c_6 = \frac{-2E a_1 a_2 m_1 \Gamma^2}{(m_1+\Gamma)^2 - \Gamma(m_1+\Gamma)}, \quad c_7 = \frac{-2\Gamma E a_1 m_1 a_3 Sc}{(m_1+\eta)^2 - \Gamma(m_1+\eta)}, \quad c_8 = \frac{-2\Gamma E a_1 m_1 a_4 \eta}{(m_1+\eta)^2 - \Gamma(m_1+\eta)}, \quad c_9 = \frac{-2\Gamma E a_2 \Gamma a_3 Sc}{(\Gamma+Sc)^2 - \Gamma(\Gamma+Sc)},$$

$$c_{10} = \frac{-2\Gamma E a_2 \Gamma a_4 \eta}{(\Gamma+\eta)^2 - \Gamma(\Gamma+\eta)}, \quad c_{11} = \frac{-2\Gamma E a_3 Sc a_4 \eta}{(Sc+\eta)^2 - \Gamma(Sc+\eta)}, \quad c_{12} = -\left(\sum_{i=13}^{28} c_i\right), \quad c_{13} = \frac{-2\Gamma E a_1 m_1 b_2 m_2}{(m_1+m_2)^2 - \Gamma(m_1+m_2) - n\Gamma},$$

$$c_{14}=\frac{-2\Gamma Ea_1m_1b_3m_3}{(m_1+m_3)^2-\Gamma(m_1+m_3)-n\Gamma}, c_{15}=\frac{-2\Gamma Ea_1m_1b_4m_4}{(m_1+m_4)^2-\Gamma(m_1+m_4)-n\Gamma}, c_{16}=\frac{-2\Gamma Ea_1m_1b_5m_5}{(m_1+m_5)^2-\Gamma(m_1+m_5)-n\Gamma},$$

$$c_{17}=\frac{-2\Gamma^2 Ea_2b_2m_2}{(\Gamma+m_2)^2-\Gamma(\Gamma+m_2)-n\Gamma}, c_{18}=\frac{-2\Gamma^2 Ea_2b_3m_3}{(\Gamma+m_3)^2-\Gamma(\Gamma+m_3)-n\Gamma}, c_{19}=\frac{-2\Gamma^2 Ea_2b_4m_4}{(\Gamma+m_4)^2-\Gamma(\Gamma+m_4)-n\Gamma},$$

$$c_{20}=\frac{-2\Gamma^2 Ea_2b_5m_5}{(\Gamma+m_5)^2-\Gamma(\Gamma+m_5)-n\Gamma}, c_{21}=\frac{-2\Gamma Ea_3Scb_2m_2}{(Sc+m_2)^2-\Gamma(Sc+m_2)-n\Gamma}, c_{23}=\frac{-2\Gamma Ea_3Scb_4m_4}{(Sc+m_4)^2-\Gamma(Sc+m_4)-n\Gamma}$$

$$c_{24}=\frac{-2\Gamma Ea_3Scb_5m_5}{(Sc+m_5)^2-\Gamma(Sc+m_5)-n\Gamma}, c_{25}=\frac{-2\Gamma Ea_4\eta b_2m_2}{(\eta+m_2)^2-\Gamma(\eta+m_2)-n\Gamma}, c_{26}=\frac{-2\Gamma Ea_4\eta b_3m_3}{(\eta+m_3)^2-\Gamma(\eta+m_3)-n\Gamma},$$

$$c_{27}=\frac{-2\Gamma Ea_4\eta b_4m_4}{(\eta+m_4)^2-\Gamma(\eta+m_4)-n\Gamma}, \quad c_{28}=\frac{-2\Gamma Ea_4\eta b_5m_5}{(\eta+m_5)^2-\Gamma(\eta+m_5)-n\Gamma}.$$

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Software Testing using Evolutionary Approach

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Abstract- Software testing is one of the very essential phase of the SDLC .in this phase we have to generate lots of test cases for testing applications. As principal says 'exhaustive testing' is not possible, here we can use the genetic algorithm to reduce the number of test cases as well as select best test cases that can give effective result. Genetic algorithm is based on 'fittest of survival' concept so here we select fittest test case that can give appropriate result.

Index Terms- Testing, GA

I. INTRODUCTION

The verification and validation of software through dynamic testing is an area of software engineering where progress towards automation has been slow. In particular the automation design and generation of test data remains, by and large, a manual activity. Software testing remains the primary technique used to gain consumers' confidence in the software. The process of testing any software system is an enormous task which is time consuming and costly . Software testing is laborious and time-consuming work; it spends almost 50% of software system development resources Generally, the goal of software testing is to design a set of minimal number of test cases such that it reveals as many faults as possible. As mentioned earlier, software testing is a lengthy and time-consuming work . Absolutely, an automated software testing can significantly reduce the cost of developing software. Other benefits include: the test preparation can be done in advance, the test runs would be considerably fast, and the confidence of the testing result can be increased. However, software testing automation is not a straight forward process. For years, many researchers have proposed different methods to generate test data automatically, i.e. different methods for developing test data/case generators . The development of techniques that will also support the automation of software testing will result in significant cost savings. The application of artificial intelligence (AI) techniques in Software Engineering (SE) is an emerging area of research that brings about the cross fertilization of ideas across two domains. A number of researchers did the work on software testing using artificial inelegance; they examine the effective use of AI for SE related activities which are inherently knowledge intensive and human-centered. These issues necessitate the need to investigate the suitability of search algorithms, e.g. simulated annealing, genetic algorithms, and ant colony optimization as a better alternative for developing test data generators Using evolutionary computations, researchers have done some work in developing genetic algorithms (GA)-based test data generators . A variety of techniques for test data generation have been developed previously and these can be categorized as structural and functional testing.

In this paper, we present the results of our research into the application of GA search approach, to identify the most appropriate test case for testing.

Testing is one of the most used software quality assessment methods. There are two important processes when testing object oriented software are used. First, the software has to be initialized with a set of values. These values are used to set a number of variables that are relevant for the test case. The values of these variables define a single state from the possible set of states, the software can be determined. These values can either be a primitive value such as an integer or complex values such as an object. With the software testing initialized, its method takes one or more software specification, defines the output of the software and what a valid input is. Since the number of more objects as parameters, these objects also have to be initialized. To determine if the test case passed or fail, a software specification has to be used. The number of possible states software may have is exponential, it is impossible to test all of them. Software testing , is one of the major and primary techniques for achieving high quality software. Software testing is done to detect presence of faults [, which cause software failure. However, software testing is a time consuming and expensive task.

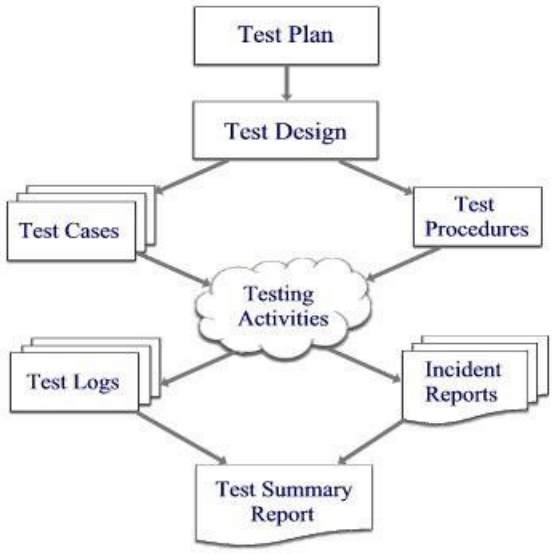

Figure 1 shows all the activities of software testing according to IEEE829.

II. TESTING TECHNIQUES

2.1 Black box testing:

In black box testing, the internal structure and behavior of the program under test is not considered. The objective is to find out solely when the input-output behavior of the program does not agree with its specification. In this approach, test data for software are constructed from its specification, Beizer [1990], Ince [1987] and Frankl and Weiss [1993]. The strength of black box testing is that tests can be derived early in the development cycle. This can detect *missing logic* faults mentioned by Hamlet [1987].

The software is treated as a black box and its functionality is tested by providing it with various combinations of input test data. Black box testing is also called *functional* or *specification based testing*. In contrast to this is white box testing.

2.2 White box testing:

In *white box* testing, the internal structure and behaviour of the program under test is considered. The structure of the software is examined by execution of the code. Test data are derived from the program's logic. This is also called *program-based* or *structural testing*, Roper [1994]. This method gives feedback e.g. on coverage of the software.

There are several white box (structural) testing criteria:

• *Statement Testing*: Every statement in the software under test has to be executed at least once during testing. A more extensive and stronger strategy is branch testing.

• *Branch testing*: Branch coverage is a stronger criterion than statement coverage. It requires every possible outcome of all decisions to be exercised at least once Huang [1975], i.e. each possible transfer of control in the program be exercised. This means that all control transfers are executed, Jin [1995]. It includes statement coverage since every statement is executed if every branch in a program is exercised once. However, some errors can only be detected if the statements and branches are executed in a certain order, which leads to path testing.

• *Path testing*: In path testing every possible path in the software under test is executed; this increases the probability of error detection and is a stronger method than both statement and branch testing. A path through software can be described as the conjunction of predicates in relation to the software's input variables. However, path testing is generally considered impractical because a program with loop statements can have an infinite number of paths. A path is said to be '*feasible*', when there exists an input for which the path is traversed during program execution, otherwise the path is unfeasible.

III. GENETIC ALGORITHM

Genetic Algorithms have been introduced in the sixties by Professor John Holland at university of Michigan as models of an Artificial Evolution . In the thirty past years, they have been successfully applied to a wide range of problems such as Natural Systems Modeling (e.g. Artificial Life environments, immune system modeling , Machine Learning systems, and optimization. GAs handle a population of individual (chromosomes) often modeled by vector of binary genes. Each one encodes a potential solution to the problem and so-called fitness value, which is directly correlated to how good it is to solve the problem. In general, the basic approaches are to test software consists of using formal specifications to design an application. This approach is very strict but unfortunately not often used because the breadth of formal specification methods does not encompass all the functionality needed in today's complex applications.

The second approach consists of doing test as part of the traditional engineering models (e.g. waterfall, spiral, prototyping) that have a specific phase for testing generally occurring after the application has been implemented.

The Genetic Algorithms are the heuristic search and optimization techniques that mimic the process of natural evolution." Select The Best, Discard The Rest".

Ex. Giraffes have long necks

1-Giraffes with slightly longer necks could feed on leaves of higher branches when all lower ones had been eaten off.

2- They had a better chance of survival.

3-Favorable characteristic propagated through generations of giraffes.

4-Now, evolved species has long necks.

Fig-2

This longer necks may have due to the effect of mutation initially. However as it was favorable, this was propagated over the generations.

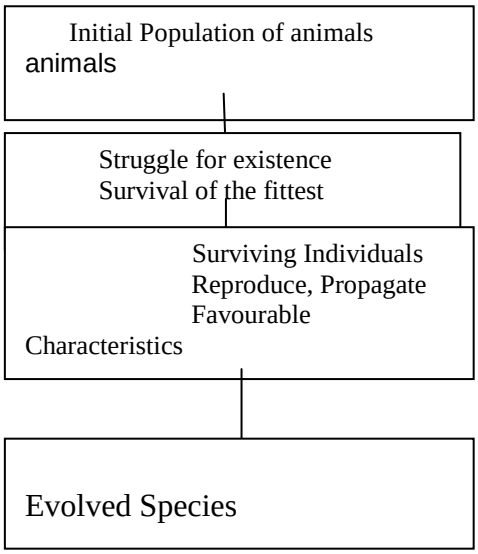

Fig-3 Evolution of Species

Thus genetic algorithms implement the optimization strategies by simulating evolution of species through natural selection

3.1 Biological Background:

All living organisms consist of cells. In each cell there is the same set of **chromosomes**. Chromosomes are strings of DNA and serves as a model for the whole organism. A chromosome consist of **genes**, blocks of DNA. Each gene encodes a particular protein. Basically can be said, that each gene encodes a **trait**, for example color of eyes. Possible settings for a trait (e.g. blue, brown) are called **alleles**. Each gene has its own position in the chromosome. This position is called **locus**. Complete set of genetic material (all chromosomes) is called **genome**. Particular set of genes in genome is called **genotype**. The genotype is with later development after birth base for the organism's **phenotype**, its physical and mental characteristics, such as eye colour, intelligence etc. During reproduction, first occurs **recombination** (or **crossover**). Genes from parents form in some way the whole new chromosome. The new created offspring can then be mutated. **Mutation** means, that the elements of DNA are a bit changed. This changes are mainly caused by errors in copying genes from parents. The **fitness** of an organism is measured by success of the organism in its life.

3.2 Search Space:

If we are solving some problem, we are usually looking for some solution, which will be the best among others. The space of all feasible solutions (it means objects among those the desired solution is) is called **search space** (also state space). Each point in the search space represent one feasible solution. Each feasible solution can be "marked" by its value or fitness for the problem. We are looking for our solution, which is one point (or more) among feasible solutions - that is one point in the search space. The looking for a solution is then equal to a looking for some extreme (minimum or maximum) in the search space. The search space can be whole known by the time of solving a problem, but usually we know only a few points from it and we are generating other points as the process of finding solution continues.

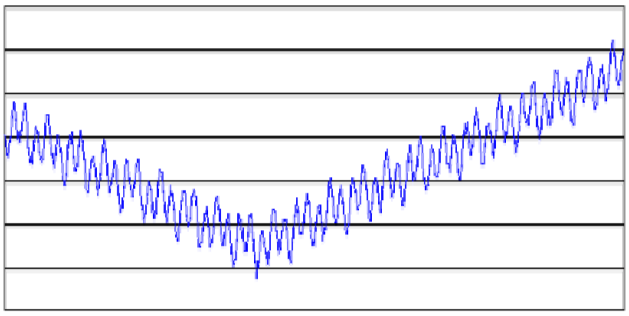

Fig-3 search Space

The problem is that the search can be very complicated. One does not know where to look for the solution and where to start. There are many methods, how to find some **suitable solution** (ie. not necessarily the **best solution**), for example **hill climbing**, **tabu search**, **simulated annealing** and **genetic algorithm**. The solution found by this methods is often considered as a good solution, because it is not often possible to prove what is the real optimum.

3.3 Basic Description:

Genetic algorithms are inspired by Darwin's theory about evolution. Solution to a problem solved by genetic algorithms is evolved. Algorithm is started with a **set of solutions** (represented by **chromosomes**) called **population**. Solutions from one population are taken and used to form a new population. This is motivated by a hope, that the new population will be better than the old one. Solutions which are selected to form new solutions (**offspring**) are selected according to their fitness - the more suitable they are the more chances they have to reproduce. This is repeated until some condition (for example number of populations or improvement of the best solution) is satisfied.

3.3.1 Outline of the Basic Genetic Algorithm :

1. **[Start]** Generate random population of *n* chromosomes (suitable solutions for the problem)
2. **[Fitness]** Evaluate the fitness *f(x)* of each chromosome *x* in the population
3. **[New population]** Create a new population by repeating following steps until the new population is complete
    1. **[Selection]** Select two parent chromosomes from a population according to their fitness (the better fitness, the bigger chance to be selected)
    2. **[Crossover]** With a crossover probability cross over the parents to form a new offspring (children). If no crossover was performed, offspring is an exact copy of parents.
    3. **[Mutation]** With a mutation probability mutate new offspring at each locus (position in chromosome).
    4. **[Accepting]** Place new offspring in a new population
4. **[Replace]** Use new generated population for a further run of algorithm

5. **[Test]** If the end condition is satisfied, **stop**, and return the best solution in current population
6. **[Loop]** Go to step **2**

3.3.2 Operators of GA:

As you can see from the genetic algorithm outline, the crossover and mutation are the most important part of the genetic algorithm. The performance is influenced mainly by these two operators. Before we can explain more about crossover and mutation, some information about chromosomes will be given.

Encoding of a Chromosome:

The chromosome should in some way contain information about solution which it represents. The most used way of encoding is a binary string. The chromosome then could look like this:

Chromosome 1	1101100100110110
Chromosome 2	1101111000011110

Each chromosome has one binary string. Each bit in this string can represent some characteristic of the solution. Or the whole string can represent a number - this has been used in the basic GA applet.

Of course, there are many other ways of encoding. This depends mainly on the solved problem. For example, one can encode directly integer or real numbers; sometimes it is useful to encode some permutations and so on.

Crossover:

After we have decided what encoding we will use, we can make a step to crossover. Crossover selects genes from parent chromosomes and creates a new offspring. The simplest way how to do this is to choose randomly some crossover point and everything before this point point copy from a first parent and then everything after a crossover point copy from the second parent.

Crossover can then look like this (| is the crossover point):

Chromosome 1	11011 | 00100110110
Chromosome 2	11011 | 11000011110
Offspring 1	11011 | 11000011110
Offspring 2	11011 | 00100110110

There are other ways how to make crossover, for example we can choose more crossover points. Crossover can be rather complicated and very depends on encoding of the encoding of chromosome. Specific crossover made for a specific problem can improve performance of the genetic algorithm.

Mutation:

After a crossover is performed, mutation take place. This is to prevent falling all solutions in population into a local optimum of solved problem. Mutation changes randomly the new offspring. For binary encoding we can switch a few randomly chosen bits from 1 to 0 or from 0 to 1. Mutation can then be following.

Original offspring 1	1101111000011110
Original offspring 2	1101100100110110
Mutated offspring 1	1100111000011110
Mutated offspring 2	1101101100110110

The mutation depends on the encoding as well as the crossover. For example when we are encoding permutations, mutation could be exchanging two genes.

Crossover and Mutation Probability:

There are two basic parameters of GA - crossover probability and mutation probability.

Crossover probability says how often will be crossover performed. If there is no crossover, offspring is exact copy of parents. If there is a crossover, offspring is made from parts of parents' chromosome. If crossover probability is **100%**, then all offspring is made by crossover. If it is **0%**, whole new generation is made from exact copies of chromosomes from old population (but this does not mean that the new generation is the same!).

Crossover is made in hope that new chromosomes will have good parts of old chromosomes and maybe the new chromosomes will be better. However it is good to leave some part of population survive to next generation.

Mutation probability says how often will be parts of chromosome mutated. If there is no mutation, offspring is taken after crossover (or copy) without any change. If mutation is performed, part of chromosome is changed. If mutation probability is **100%**, whole chromosome is changed, if it is **0%**, nothing is changed.

Mutation is made to prevent falling GA into local extreme, but it should not occur very often, because then GA will in fact change to **random search**.

IV. Application of GA in Software Testing

We proposed in this paper application of genetic algorithm in testing of software application. when we test any application or any program we can use three things to generate fitness function. GA helps in selecting the various test cases whose fitness function is based on these factors.

- Likelihood
- Close to boundary value
- Branch coverage

These factors contribute to the selection of the test suit. These factors here are used as the evaluation of the test suit for its goodness. These factors can be used as the fitness function of the GA to find the optimal solution i.e. the best set of test cases. These factors evaluate the goodness of a test suit (set of test cases). A good test case has more chances of finding a bug in a program.

4.1 Likelihood:

The paths, which are more likely to be executed then others should be given higher priority for testing. *Likelihood* of any test suit is higher than the likelihood of any other test suit, if the test cases of the test suit follow the paths that are more likely to be executed. The likelihood factor will contribute to the selection of any particular test suite for execution. More the likelihood of a test suite higher is its probability to be selected for executions.

4.2 Close to boundary value:

As the chances of bugs are mostly at the boundary values, so the test cases close to boundary values must be given higher priority than the other ones for testing. *Close to boundary value* is the factor that represents the 'how much the test case values are closer to the boundaries'.

4.3 Branch coverage:

Most of the earlier automated test tools use the branch coverage criterion for selecting test cases. Branch coverage means the percentage of no of edges/branches of the control flow graph covered by the test suit. *Control flowgraph* is graphical notation of the program that shows the flow of control of that program.

V. Conclusion

Genetic Algorithms can be applied n software testing, and . Software testing is also an optimization problem with the objective that the efforts consumed should be minimized and the number of faults detected should be maximized. Software testing is considered most effort consuming activity in the software testing. Although a number of testing techniques and adequacy criteria have been suggested in the literature but it has been observed that no technique/criteria is sufficient enough to ensure the delivery of fault free software consequential to the need of automatic test case generation to minimize the cost of testing. The simulation shows that the proposed GAs with the specification can find solutions with better quality in shorter time. The developer uses this information to search, locate, and segregate the faults that caused the failures. While each of these areas for future consideration could be further investigated with respect to applicability for software testing, as demonstrated by the examples of this paper, the simple genetic algorithm approach presented in this paper provides in itself a useful contribution to the selection of test cases and a focused examination of test results.

Acknowledgments

This work is supported by Mobile QA Zone (An Application Testing Community), resources from Prof. Dr. M. Rizwan Beg, Head of department of computer science and engineering, Integral University, Lucknow. They would also thank the anonymous reviewers for their significant and constructive critiques and suggestions, which substantially improved the quality of this paper.

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Application of Low Specific on Resistance and High Thermal Stability 6H –SIC DIMOSFET using with Uniform Distribution in the Drift Region

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***Abstract*-** Silicon carbide(SiC) has lowest specific on resistance and high thermal stability as compared to silicon. This has made use of Silicon carbide in design of domestic electrical appliances to assist in energy saving. Silicon carbide power devices can operate at much higher junction temperature than those made of silicon. However, this does not mean that SiC devices can operate without a good cooling system

***Index Terms*-** Silicon carbide, Power electronics, High temperature techniques

I. INTRODUCTION

While SiC's smaller on-resistance and faster switching helps minimize energy loss and heat generation, SiC's higher thermal conductivity enables more efficient removal of waste heat energy from the active device. Because heat energy radiation efficiency increases greatly with increasing temperature difference between the device and the cooling ambient, SiC's ability to operate at high junction temperatures permits much more efficient cooling to take place, so that heat sinks and other device-cooling hardware (i.e., fan cooling, liquid cooling, air conditioning, heat radiators, etc.) typically needed to keep high-power devices from overheating can be made much smaller or even eliminated. While the preceding discussion focused on high-power switching for power conversion, many of the same arguments can be applied to devices used to generate and amplify RF signals used in radar and communications applications. In particular, the high breakdown voltage and high thermal conductivity coupled with high carrier saturation velocity allow SiC microwave devices to handle much higher power densities than their silicon or GaAs RF counterparts, despite SiC's disadvantage in low-field carrier Uncooled operation of high-temperature and high-power SiC electronics would enable revolutionary improvements to aerospace systems. Replacement of hydraulic controls and auxiliary power units with distributed "smart" electromechanical controls capable of harsh ambient operation will enable substantial jet-aircraft weight savings, reduced maintenance, reduced pollution, higher fuel efficiency, and increased operational reliability. Performance gains from SiC electronics could enable the public power grid to provide increased consumer electricity demand without building additional generation plants, and improve power quality and operational reliability through "smart" power management.

More efficient electric motor drives enabled by SiC will also benefit industrial production systems as well as transportation systems such as diesel-electric railroad locomotives, electric mass-transit systems, nuclear-powered ships, and electric automobiles and buses.

Applications of high-temperature power devices include aircraft, space, oil and gas exploration [3], where power systems are expected to operate in an elevated ambient temperature. These devices are also interesting in milder environments, because they should require less cooling. This latter approach is described in [4]: using a power module designed for 250°Cin a 150°C environment allows for the use of a much smaller heatsink. Si-based devices indeed offer less headroom between the ambient and maximum junction temperatures, requiring very efficient cooling. This is of great importance, as the thermal management system is one of the bulkiest and heaviest parts of a converter.

II. UNIFORM DOPING PROFILE IN DIMOSFET

In this section the basic device equations and a derivation to evaluate effective carrier concentration of Uniform distribution are given .Considering the depletion region between the p –base and n drift region as one dimensional abrupt p-n junction .

III. BASIC EQUATION USED IN TO EVALUATE SPECIFIC ON RESISTANCE OF UNIFORM DISTRIBUTION OF DRIFT LAYER

The width of depletion region is given by

- $R_{on\text{-}sp} = 1/ [\mu_{eff} q N_B (Wt\text{-}Wj\text{-}Wd\text{-}L_p \tan\acute{\alpha})$ (1)
- where
- Wt=40x10-4cm
- Wj=10x10-4cm
- Lp=25x10-4cm
- α =25°
- N_B is drift region doping
- μ_{eff} is effective mobility

The total resistance is given sum of resistances

- $R_{onsp} = R_{n+} + R_c + R_A + R_J + R_D + R_{S\,(2)}$ (2)

  R_{n+} is the contribution from the N+ source region,
  R_c is the channel resistance,
  R_A is the accumulation layer resistance,
  R_J is the resistance of the JFET pinchoff region,
  R_D is the drift region resistance and,
  R_S is the substrate resistance

Power dissipation is given by

- $P_D=1/2(j_{on}{}^2R_{on\text{-}sp}+J_LV_B)$ (3)

Where j_{on} is on state current density
J_L is reverse saturation current
$V_{B\ is}$ breakdown voltage

Theoretical Analysis

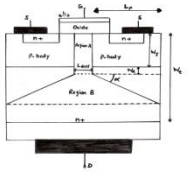


Figure 1 basic structure of dimosfet

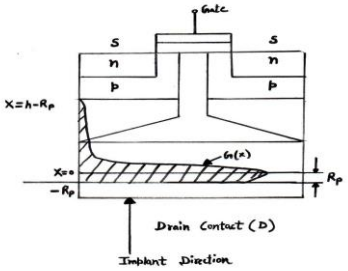


Figure 2 The Effective Carrier Concentration (Neff) of a Gaussian profile in the drift region

B Maximum Operating Temperature of Power Devices

Silicon Carbide remains solid up to 2730°C. However, the actual maximum operating temperature of a SiC device is One of the limits is the Semiconductor Thermal Runaway (STR) Above a certain temperature, the intrinsic carrier density becomes higher than the maximum doping level sustaining a given voltage. So at the STR, the material is no longer able to block its rated voltage. The device becomes more and more conductive as the temperature increases, and the temperature increases as more current flows through the device (runaway phenomenon). It can be seen from figure 1 that a 1200 V (4H-SiC) device has a maximum operating temperature of around 1500 K (1230°C). A device of with the capacity to capacity to carry currents of 10A level was created. The Silicon semiconductor was inadequate for handling large amount of power, but are widely used in products such as diode rectifiers and invertors controllers inspite of inadequacy.

TABLE I
TEMPERATURE LIMITS FOR VARIOUS ELEMENTS OF A SIC DIE.

	material	max. temp.	cause
Semiconductor	SiC	2730°C	sublimation
Schottky metal	Ti	1668°C	melting point
Top metallization	Al	660°C	melting point
secondary passivation	polyimide	500-620°C	decomposition
contact anneal. [8]	Ti/Ni	350-500°C	solid state reaction

Ref[4]

As stated by the first law of thermodynamics, the variation of the internal energy in the device (U) is

$$\frac{dU}{dt} = P - Q \quad (3)$$

Where P is the electrical power dissipated in the device and Q is the heat flux removed from the device. At the electrical steady state, in conduction mode, I _V , with V , the voltage across the device being a function of I and Tj , the junction temperature. I is the current flowing through the device . Therefore, P is itself a function of I and Tj only:

$$\frac{dU}{dt} = P(T_{j0}) + \frac{\partial P}{\partial T_j}\varepsilon - \frac{T_{j0} - T_A}{R_{Th}} - \frac{\varepsilon}{R_{Th}} \quad (4)$$

In figure 3, this corresponds to the intersects between thedevice (dashes) and cooling (plain) characteristics. This figure represents the power P(Tj) dissipated by an imaginary device (at a constant current) depending on its junction temperature, and the cooling capability

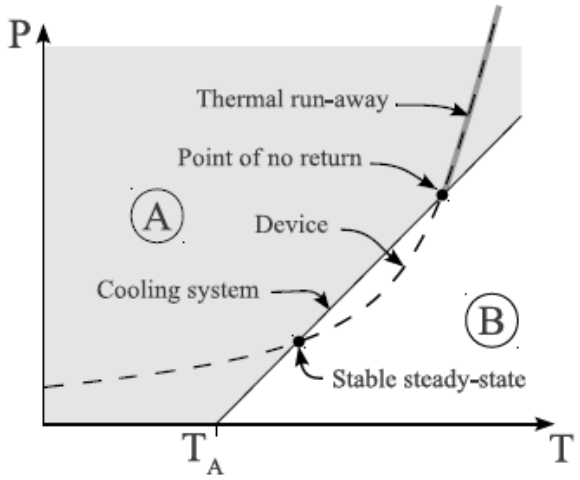


Figure 3 Conditions of thermal equilibrium: when the device is in region it tends to heat up (because its power dissipation is higher than the cooling capabilities). When in region B, it tends to cool down

IV. CALCULATION & RELATED GRAPH

The blocking voltage is supported across the drift layers and serves as minimum possible theoretical limit for the on resistance of power MOSFET. Finally, it must be noted that in this study, the thermal conductivity of SiC was considered constant. This is a coarse approximation, as this conductivity (hence the cooling performance) tends to decrease dramatically as the temperature rises

Values of Power Dissipation at different values of Breakdown Voltages(volts) for different Doping levels(N_B) level at Uniform Distribution					
$N_B=10^{15}$	$N_B=10^{15}$	$N_B=10^{16}$	$N_B=10^{16}$	$N_B=10^{17}$	$N_B=10^{17}$
$V_{B(VOLTS)}$	P_D(w)	$V_{B(VOLTS)}$	P_D(w)	$V_{B(VOLTS)}$	P_D(w)
208.5	0.92	89.09	0.097	38.11	0.0064
294.92	2.62	125.99	0.29	53.9	0.021
361.21	4.45	154.29	0.51	66.01	0.04
417.09	6.29	178.17	0.76	76.23	0.061
466.32	7.98	199.21	0.99	85.23	0.083
510.82	9.57	218.22	1.22	93.36	0.1
551.76	10.97	235.71	1.45	100.84	0.12
589.86	12.27	251.97	1.66	107.8	0.15

Table 2.

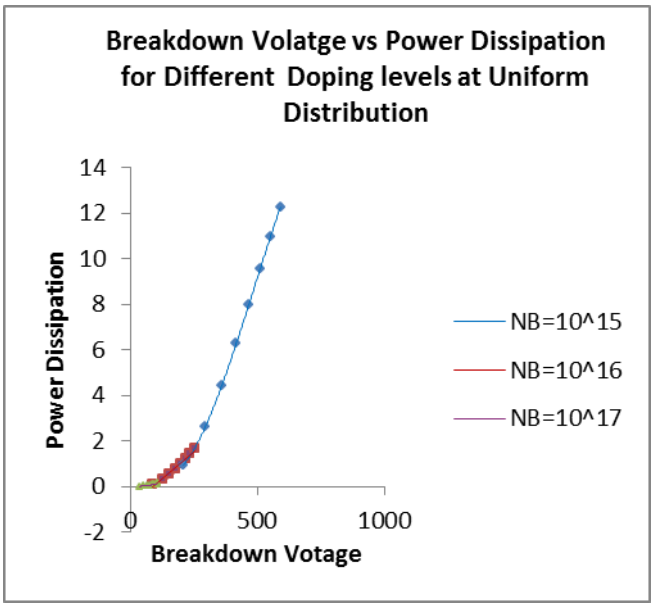


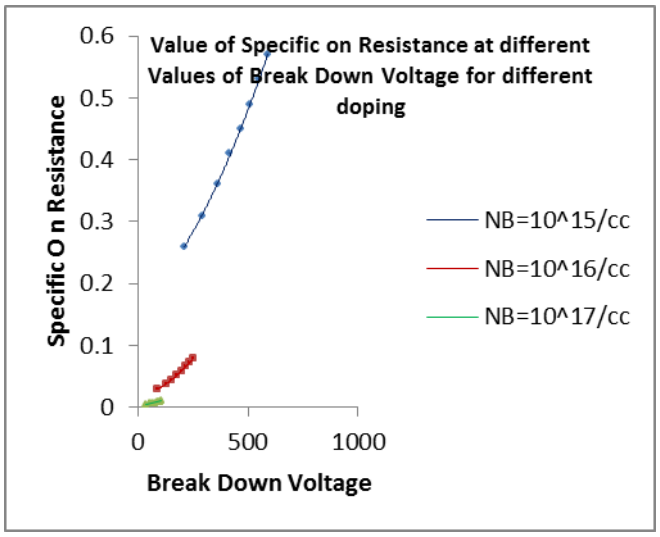
Figure4

Values of specific On-Resistance at different values of Breakdown voltages(volts) for different Doping levels(NB) of uniform Distribution					
$N_B=10^{15}$/CC	$N_B=10^{15}$/CC	$N_B=10^{16}$/CC	$N_B=10^{16}$/CC	$N_B=10^{17}$/CC	$N_B=10^{17}$/CC
$V_{B(VOLTS)}$	$R_{ON-SPX}X10^{-1}$	$V_{B(VOLTS)}$	$R_{ON-SPX}X10^{-1}$	$V_{B(VOLTS)}$	$R_{ON-SPX}X10^{-1}$
208.5	0.26	89.09	0.03	38.11	0.0048

294.92	0.31	125.99	0.037	53.9	0.0056
361.21	0.36	154.29	0.044	66.01	0.0064
417.09	0.41	178.17	0.052	76.23	0.0072
466.32	0.45	199.21	0.059	85.23	0.008
510.82	0.49	218.21	0.066	93.36	0.0088
551.76	0.53	235	0.073	100.84	0.0096
589.86	0.57	251.97	0.079	107.8	0.0103

Table 3

$V_{DS(}$ Volts)	$P_{D(mw)}$	$P_{D(mw)}$	$P_{D(mw)}$	$P_{D(mw)}$	$P_{D(mw)}$



V. Result

The increase in doping reduces power dissipation the shallower the doping more the power Dissipation The specific on resistance increase with decrease in doping.This is ideal for construction Power electronics device.

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Performance Assessment of Macrophyte Stabilization Pond- A case Study of Eight Parameters

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Abstract- Now-a-days safe and pure water is a major issue all over the world. A research reveals that one third of the world's people are in water stressed region, and this proportion will be increased to two-thirds in 2025. 80% to 90% of the per capita consumption of water becomes wastewater [1]. Now-a-days wastewater treatment is common in practice to fulfill the water consumption demand. The aim of this project is to determine the feasibility and efficiency of water hyacinth (Eicchornia crassipes) in treating wastewater by construction of wetland. This treated wastewater can be reused for irrigation purposes and in order to improve the groundwater water recharge.

Index Terms- Macrophytes, Water Hyacinth (*Eicchornia crassipes)*, Wastewater Stabilization Pond.

I. INTRODUCTION

Macrophytes play important roles in balancing aquatic ecosystem. They have capacity to improve the water quality by absorbing nutrients with their effective root system. Macrophytes are advantageous to lakes because they provide cover for fish and substrate for aquatic invertebrates [2].They also produce oxygen, which assists with overall lake functioning, and provide food for some fish and other wildlife. Crowder and Painter (1991) indicate that a lack of macrophytes in a system where they are expected to occur may suggest a reduced population of forage fish and waterfowl [2, 3]. In addition, the absence of macrophytes may also indicate water quality problems as a result of excessive turbidity, herbicides, or salinization [3, 4, 5].

This project objective is to evaluate the usefulness of macrophytes (Biofilters) in reducing the nutrient content of the water i.e. to reduce the pollution level of water, and check the efficiency of stabilization pond. In this project, one Macrophyteic Species *Eicchornia crassipes* commonly known as water hyacinth is taken to improve water quality by reducing nutrient concentration. This floating perennial has been used in aquatic systems for wastewater purification for many years worldwide. In this project, a frame structure made by steel and covered with high strength tempered glasses consisting three tanks (inlet, main and outlet tank) is used as Macrophytes Stabilization Pond. The municipal wastewater sample for the examination and study is taken from main outlet chamber of UET, Taxila. Six trials is performed with detention period of each trial is 10 days. Throughout the project 72 samples are taken on. 1st, 3rd, 5th, 7th and 10th day of each trial and perform laboratory test to check the improved water quality and the efficiency of the treatment plant. Treated wastewater quality is than compared with the NEQS (NATIONAL ENVIRONMENTAL QUALITY STANDARDS OF PAKISTAN) and WHO values that give an effective result. Purification of water through macrophytes is a good example of purification of water with natural means.

II. IMPORTANT MUNICIPAL WASTEWATER PARAMETER

In this project, Eight (08) parameters of municipal wastewater are chosen for lab test that are given below:

1) Total Suspended Solids (TSS)
2) Total Dissolved Solids (TDS)
3) Chemical oxygen demand (COD)
4) Zinc
5) Floride
6) Chloride
7) Sulphate
8) Iron

Total Suspended Solids (TSS) is an important characteristic of sewage. The volume of sludge produced in a treatment plant is directly related to the total suspended solids present in the sewage. Industrial and storm sewage may contain higher concentrations of suspended solids than domestic sewage.

Total Dissolved Solids (often abbreviated TDS) is a measure of the combined content of all inorganic and organic substances contained in a liquid in: molecular, ionized or micro-granular (colloidal sol) suspended form. Generally the operational definition is that the solids must be small enough to survive filtration through a sieve the size of two micrometer. TDS is not generally considered a primary pollutant (e.g. it is not deemed to be associated with health effects) it is used as an indication of aesthetic characteristics of drinking water and as an aggregate indicator of the presence of a broad array of chemical contaminants [6, 7, 8]. There is no reliable data available on the health effects of the TDS in drinking water (*WHO, Guidelines for Drinking Water Quality, third edition, 2004).*[9, 10]

The chemical oxygen demand (COD) is commonly used to indirectly measure the amount of organic-compound in water. Most applications of COD determine the amount of organic pollutants found in surface water (e.g. lakes and rivers), making COD a useful measure of water quality. It is expressed in milligrams per liter (mg/L), which indicates the mass of oxygen consumed per liter of solution. Older references may express the units as parts per million (ppm). [9, 10]

Zinc is naturally present in water. Zinc imparts an undesirable astringent taste to water. The levels of zinc in surface and ground water normally do not exceed 0.01mg/litre and0.05mg/litre, respectively. Concentration in tap water may increase due to dissolution from the pipes. The daily requirement for an adult man is 15-20mg/day. A value 5 mg/l may be appropriate for Pakistan although up to 3 mg/l is usually acceptable for consumption for consumers (WHO, Guidelines for Drinking Water Quality, third edition, 2004) [9, 10]

Fluoride compounds are salts that form when the element, fluorine, combines with minerals in soil or rocks. Exposure to excessive consumption of fluoride over a lifetime may lead to increased likelihood of bone fractures in adults, and may result in effects on bone leading to pain and tenderness. Epidemiological evidence shows that fluoride primarily affects the skeletal tissue (*WHO, Guidelines for Drinking Water Quality, third edition, 2004*).Children aged 8 years and younger exposed to excessive amounts of fluoride have an increased chance of developing pits in the tooth enamel, along with a range of cosmetic effects to teeth. [9, 11]

Chlorides are widely distributed in nature as salts of sodium (NaCl), potassium (KCl), and calcium (CaCl2). Chlorine is used to combat microbial contamination, but it can react with organic matter in the water and form dangerous, carcinogenic Trihalomethanes. According to Dr. Joseph M. Price, MD, in Moseby's Medical Dictionary, "Chlorine is the greatest crippler and killer of modern times. It is an insidious poison". Chloride in drinking water comes from natural sources, sewage and industrial effluents, urban runoff containing de-icing salt and saline intrusion. The main source for humans comes from the edible salt. The high dose of chloride may result in detectable taste at 250mg/l but no health-based guideline value is proposed (*WHO, Guidelines for Drinking Water Quality, third edition, 2004).* However, less that 250 mg/l would suffice as a Pakistani standard for Chloride. [9]

Sulfate is a constituent of TDS and may form salts with sodium, potassium, magnesium, and other cations. Almost all natural waters contain sulfate ions. Their concentrations vary considerably according to the mineral content of the earth in any given area. In large concentrations they present problems. Sulfates can be more troublesome because they generally occur in greater concentrations. Low to moderate concentrations of sulfate ions add palatability to water [9, 12].

Iron is normally found in spent pickle and etch baths from plating shops, steel mills, foundries, chemical milling, and wire drawing operations. It is also found in ground water. Iron in water is normally found in the ferrous state or iron 2. The ferric state or iron 3 is very insoluble at neutral PH's. Both the iron 2, ferrous, and iron 3, ferric, can be precipitated to low concentrations by pH adjustment, carbonate, and phosphate and sulfide precipitation. Iron 2 can easily be converted to iron 3 by aerating the water allowing the precipitation to take place at a neutral pH [13, 14, 15].

III. WASTEWATER STABILIZATION POND

Waste water stabilization pond technology is one of the most important natural methods for wastewater treatment. Waste stabilization ponds are mainly shallow man-made basins comprising a single or several series of anaerobic, facultative or maturation ponds the primary treatment takes place in the anaerobic pond, which is mainly designed for removing suspended solids, and some of the soluble element of organic matter (BOD5). During the secondary stage in the facultative pond most of the remaining BOD5 is removed through the coordinated activity of algae and heterotrophic bacteria. The main function of the tertiary treatment in the maturation pond is the removal of pathogens and nutrients (especially nitrogen). Waste stabilization pond technology is the most cost-effective wastewater treatment technology for the removal of pathogenic micro-organisms. The treatment is achieved through natural disinfection mechanisms. It is particularly well suited for tropical and subtropical countries because the intensity of the sunlight and temperature are key factors for the efficiency of the removal processes. [16, 17, 18, 19]

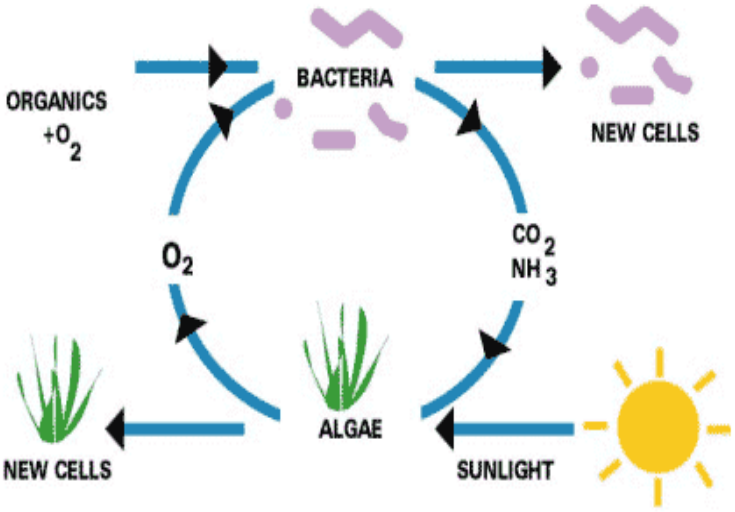


Fig 1: Algae-Bacteria-Simbiosis [Courtesy: *United Nations Environment Programme]*

IV. WATER HYACINTH

Water hyacinth (*Eichornia crassipes)* is a member of the pickerelweed family (*Pontederiaceae*). The plants vary in size from a few centimeters to over a meter in height. The glossy green, leathery leaf blades are up to 20 cm long and 5-15 cm wide and are attached to petioles that are often spongy-inflated. Numerous dark, branched, fibrous roots dangle in the water from the underside of the plant. The inflorescence is a loose terminal spike with showy light-blue to violet flowers (flowers occasionally white). Each flower has 6 bluish-purple petals joined at the base to form a short tube. One petal bears a yellow spot. The fruit is a three-celled capsule containing many minute, ribbed seeds. [10,12,20]

Water hyacinths grow over a wide variety of wetland types from lakes, streams, ponds, waterways, ditches, and backwater areas. Water hyacinths obtain their nutrients directly from the water and have been used in wastewater treatment facilities. They prefer and grow most prolifically in nutrient-enriched waters. New plant populations often form from rooted parent

plants and wind movements and currents help contribute to their wide distribution. Linked plants form dense rafts in the water and mud.[10]

In the Pacific Northwest, water hyacinth is planted outdoors in ponds and in aquaria, but it is not considered winter hardy, except under special conditions. The fibrous root system of water hyacinth provides nesting habitat for invertebrates and insects. Leaf blades and petioles are occasionally used by coots. However, whatever benefits this plant provides to wildlife are greatly overshadowed by the environmental invasiveness of this noxious species. [12]

Water hyacinth reproduces sexually by seeds and vegetatively by budding and stolen production. Daughter plants sprout from the stolons and doubling times have been reported of 6-18 days. The seeds can germinate in a few days or remain dormant for 15-20 years. They usually sink and remain dormant until periods of stress (droughts). Upon reflooding, the seeds often germinate and renew the growth cycle.[2]

V. MODEL CONSTRUCTION AND SAMPLING

For studying the efficiency of the macrophytes regarding the treatment of municipal wastewater, a bench scale model has been design and constructed at the hydraulic laboratory of UET Taxila. The municipal wastewater sample for the examination and study has been taken from the Gate # 02 of UET, Taxila. Water hyacinth has been used for treating wastewater. The model has been constructed with the tempered glass with wall thickness of 25mm. the outer surface of the model has been protected with the steel frame. Silicone sealant has been used to attach the tempered glasses with the frame structure. The detail of the model has been shown in the following figure.

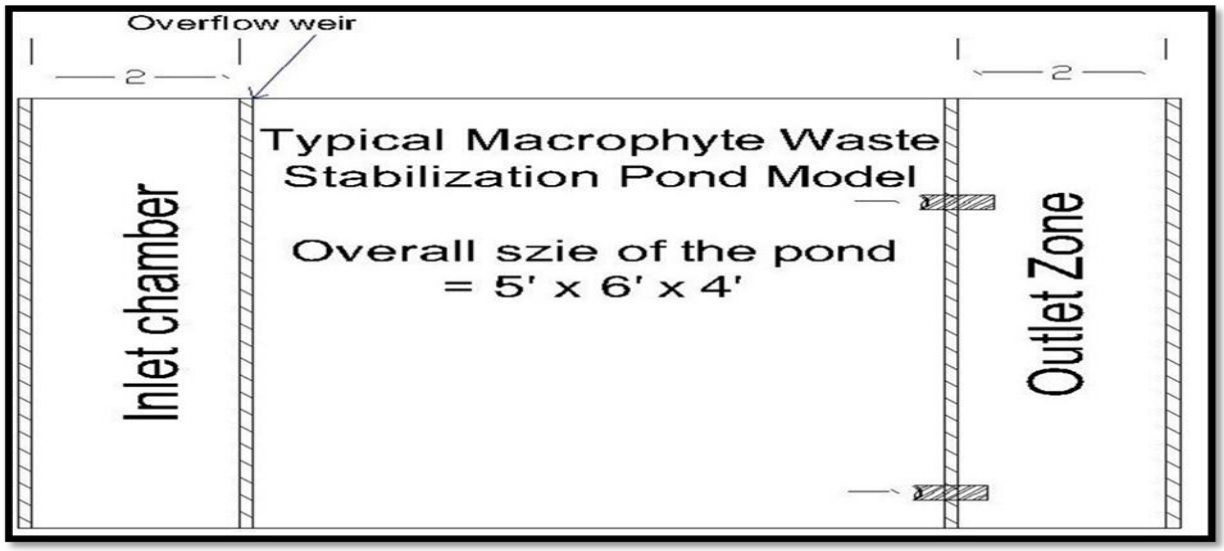


Fig-2: Macrophytes Stabilization Pond (Plan)

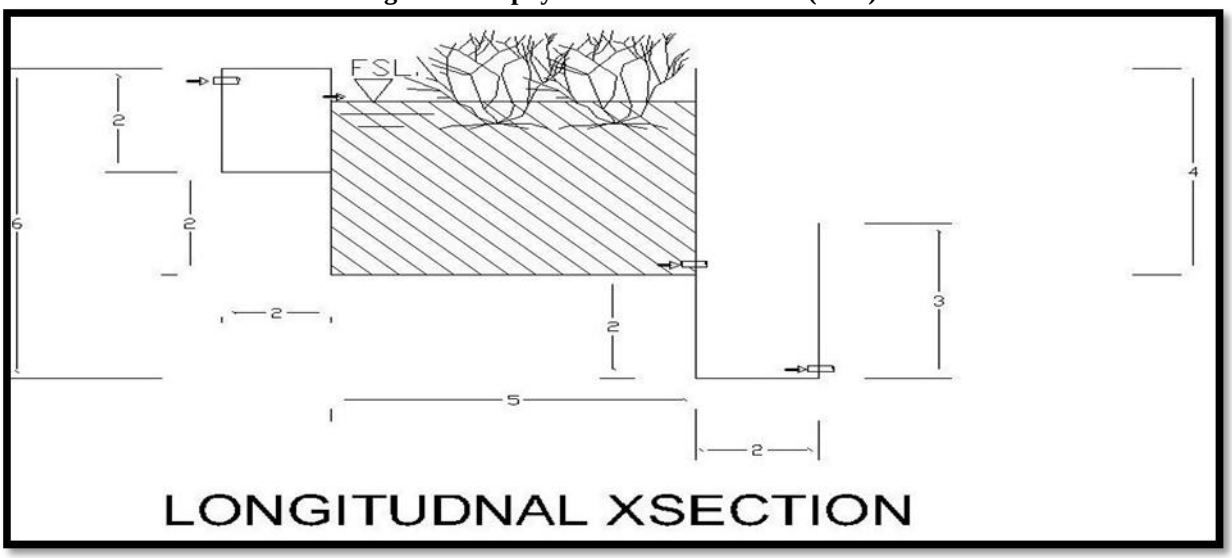


Fig-3: Macrophytes Stabilization Pond (Section)

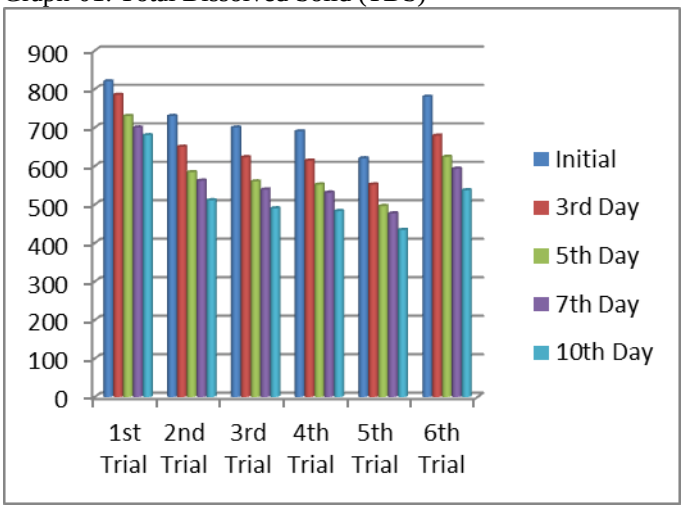
All the sampling and preservation procedures for water samples were performed according to Standard Methods for the Examination of Water and Wastewater, 1998 and Guidelines for drinking water quality (WHO). Sampling for bacteriological analysis was done aseptically with care, ensuring that there was no external contamination of the samples. For bacteriological analysis sampling, sterilized plastic Poly Ethylene (PET) bottles of 0.5 litre capacity were used, cleaned and rinsed carefully, given a final rinse with distilled water, and sterilized at 121°C for 15 minutes, as directed in section 9030 & 9040 of standard methods. For physicochemical analysis, samples were collected in Poly Ethylene (PET) bottles of 1.5 litre capacity, properly washed with the sampling water for three times. Sample bottles were marked with date and sample ID using indelible ink. During sample collection, ample air space was left in the bottle (at least 2.5 cm) to facilitate mixing by shaking, before examination. Sample bottles were kept closed until filled (without rinsing) and caps were replaced immediately. In case of water samples from distribution network, un-rusted taps supplying water from a service pipe, directly connected with the main and not served from a storage tank, were selected. Tap was opened fully, and water was let run to waste for 2 or 3 minutes, and then water flow was reduced to permit the filling of bottle without splashing

VI. RESULTS AND ANALYSIS

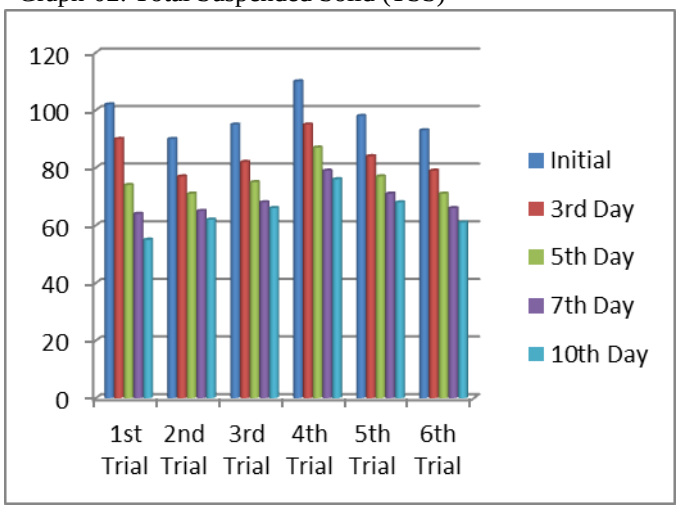
All parameters values reduced 60%-70% in 10th day from its initial values and also achieve WHO and NEQS (NATIONAL ENVIRONMENTAL QUALITY STANDARDS OF PAKISTAN). All result shown below in graph.

* All values are in mg/l

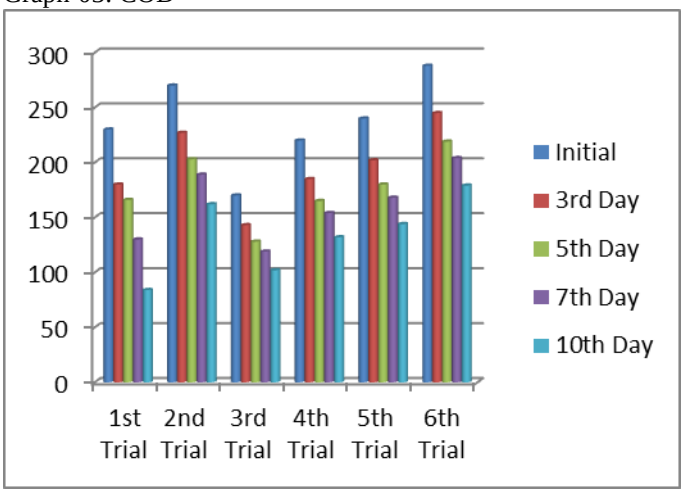
Graph-01: Total Dissolved Solid (TDS)



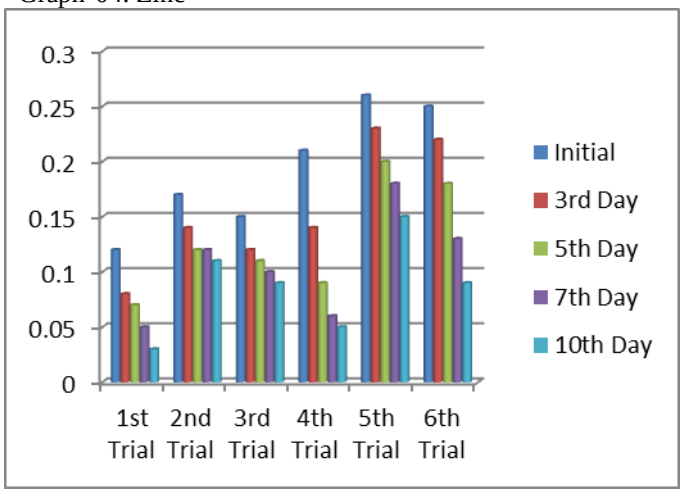
Graph-02: Total Suspended Solid (TSS)



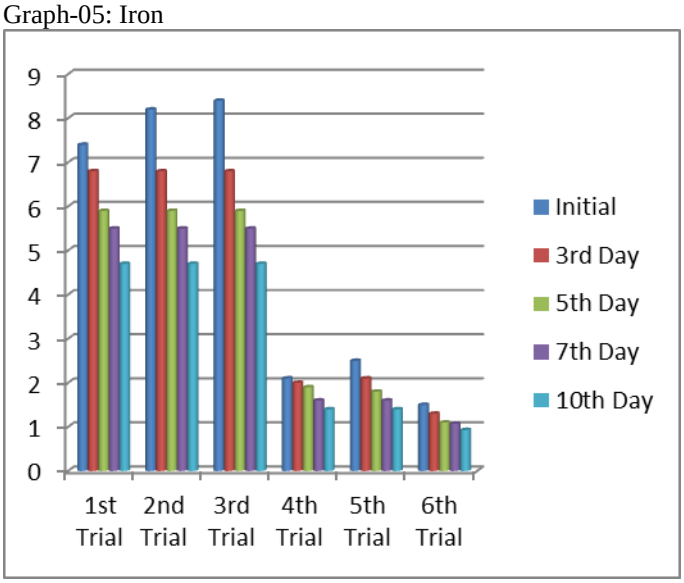
Graph-03: COD



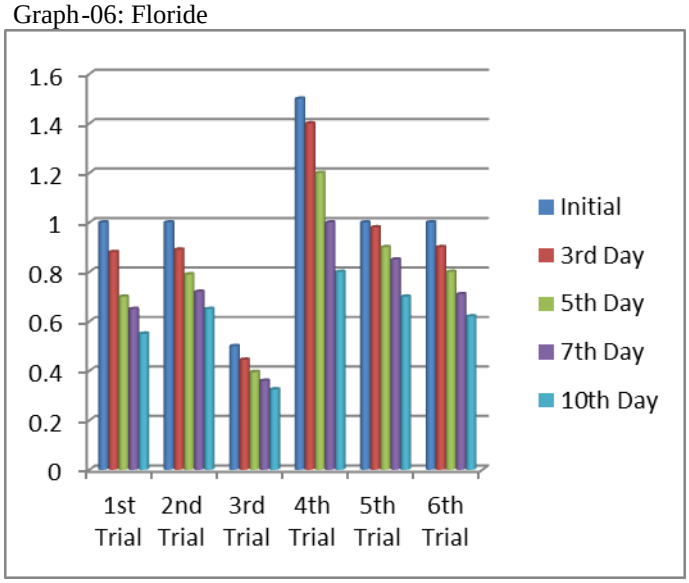
Graph-04: Zinc



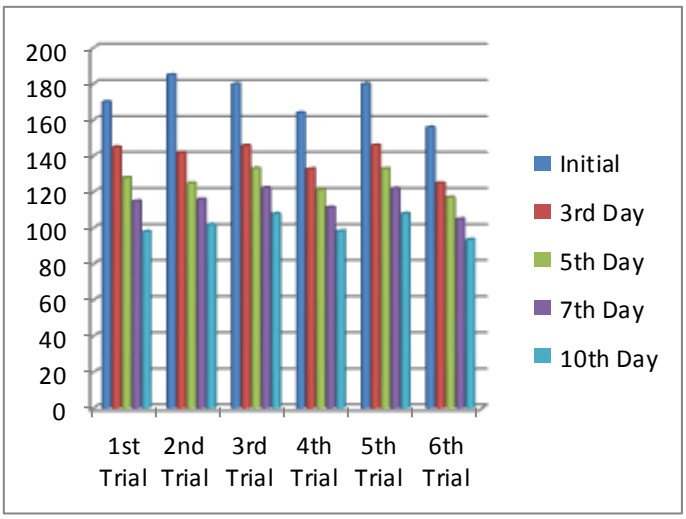
Graph-05: Iron



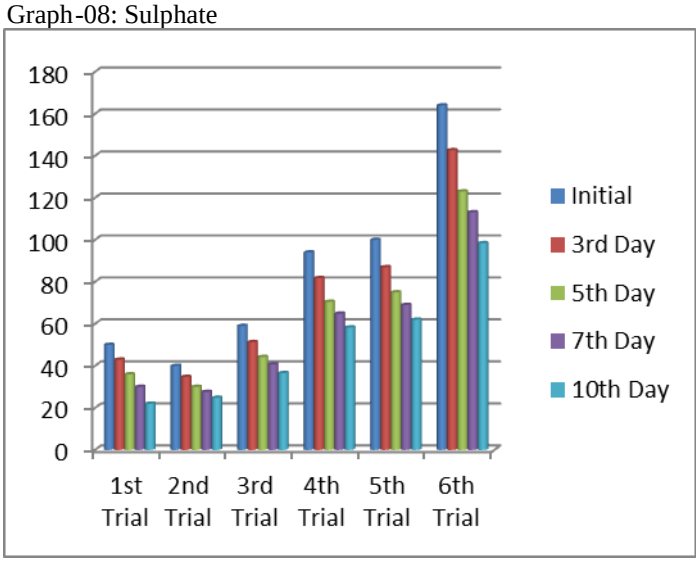
Graph-06: Floride



Graph-07: Chloride



Graph-08: Sulphate



VII. RECOMMENDATION

Wastewater treatment by water hyacinth is very much efficient to reduce water pollutant as this project result shows that pollutant concentration reduces 60%-70% of its initial and achieve WHO and NEQS standard. The result is satisfactory so it is recommended to be used in municipal wastewater treatment purposes. An important observation of this project, rate of growth of water hyacinth is very important. In the project trial session, it is noticed that temperature has a great influence on the growth of water hyacinth. Winter season at low temperature growth of water hyacinth is less as compare to summer season at high temperature. Extra water hyacinth should be removed to provide sufficient free space to penetrate sunlight. The technology is cost effective, maintenance free, self-sustained and Eco-friendly.

ACKNOWLEDGMENT

I would like to express my heart-felt gratitude to Dr.Hasim Nishar, Chairman of Civil Engineering Department of University of Engineering and Technology, Taxila for providing me a chance to work on wetland treatment. I would also like to express my heart-felt gratitude to Engr. Mumtaz Shah for his valuable guidance.

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Analysis by Panel Data Method Estimation of Car Fleet Models

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Abstract- The car fleet evolution in Algeria is due to the non-linear variation of the income represented by the national wealth (GDP) rather than other infrastructural factors such as car prices, fuel prices, the transport network, population density, and the extent of the country. This study predicts the future image of the Algerian car fleet, based on the technique of time-series cross-sectional data. The evolution of the car fleet is modeled using three utilities models provided by the literature namely the Gompertz function, the function Quasi-Logistics and Logistics function. In addition, these models were calibrated using panel data or pooled data. 46 countries (sections) were captured during 32 years from 1971 to 2002 (source: World Bank) to build four panels which include Algeria, China, India and the United States. For this choice, it was considered the international trend of the development of the park in terms of GDP and the countries with the same characteristics as ours. As a result of the work, a set of future Algerian car fleet scenarios were identified by the different models statistically significant.

Index Terms- car fleet, panel data, Gompertz function, Quasi-logistic and logistic functions, calibration of econometric models.

I. INTRODUCTION

Among the three Maghreb countries, Algeria owns the most important car fleet, it was stated that the car fleet rolling has 2 million tourism vehicles, 700,000 lightweight commercial vehicles, 536,000 heavyweight vehicles and 10,000 motorcycles.

However, the average age of the car fleet is high, 55% of the vehicles have more than 20 years and 80% more than 10 years. The Algerian motorization rate is 71 vehicles for 1,000 inhabitants. Among the brands present, French carmakers are dominant; Peugeot and Renault represent half of the rolling car fleet (900,000 Peugeot vehicles and more than 600,000 of Renault vehicles). The total of other carmakers' cars is below 200,000 vehicles throughout Algeria.

Recent years, le car market has seen the apparition of a growing number of new brands which constitutes new competitors, with the particularity of being aggressive on price segment, for French carmakers historically present in Algeria.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

The existing relationship between the vehicle ownership and the GDP per capita is represented by various non-linear models [1]:

- Logistic model : Tanner proposed a logistic model by adding more variables as the GDP per capita and the cost of vehicle. The utility form suggested commonly is :

$$Y=\frac{S}{1+e^{at+bln(i)+ln(p)}} \quad (1).$$

- The quasi-logistic mode (l) : The same principle of the first model is applied in addition to a set of socioeconomic factors Xi.

$$Y=\frac{S}{1+e^{-a}\,X_1^{-b1}\,X_2^{-b2}\,\ldots X_n^{-bn}} \quad (2)$$

- Gompertz Function: Theoretically, the Gompertz function is written as :

$$Y=Se^{\alpha e^{\beta PIB}} \quad (3)$$

i :represents the income per capita, S : saturation level, P : cost of the vehicle, b, c and d are parameters of the mode (l).
Yi : the vehicle ownership level per capita, over the long run,
GDP per capita income.

Concerning our application, the database is characterized by : The inclusion of two variables : the car fleet as a dependant variable and the GDP as an explanatory variable. It is a time series having 46 sections (countries) covering the period 1971-2002. This database is provided by the World Bank and the International Monetary Fund, gives us 1472 observations. In addition, the GDP is defined as the total of goods and services produced in the territory of any country during a given year, whichever the nationality of the producers; hence, it measures the wealth of a country.

The model in S curve «GOMPERTZ Quasi-logistic» allows establishing a unique trend based on one or many sections or countries with the goal to classify correctly the members of the population, they seek combinations between several countries. For each model, a saturation threshold, set in advance, is equal to the threshold of the country situated in the upper extreme of the S curve.

The utilities' models for the case of Algeria are written under the following linear form[1]:

- Logistic Model : $Yi=\frac{S}{1+\alpha e^{\beta\ PIB}}$ (4) ,Where the linear form is [3] : $\text{Log}\left(\frac{S-Y}{Y_i}\right)=\log(\alpha)+\beta*\log(PIB)$ (5)

– Quasi- Logistic Model Yi= $\frac{S}{1+\alpha PIB^{\beta}}$ (6) Where the linear form is[3] : Log $(\frac{S-Y}{Y_i})$= log(α) +β*log(PIB) (7)

– Gompertz Model: Yi= S $e^{\alpha e^{\beta PIB}}$ (8) , Where the linear form is [3] : Log [log(S/Yi)]= log (-α) + β*PIB (9)

i : is the index of the individual, in this case : the country (Algeria)

Then in this study, the calibration of these models permits to forecast the size of the Algerian car fleet according to the GDP evolution, Concerning our application, the database is characterized by the inclusion of two variables, where the car fleet as a dependant variable and the GDP as an explanatory variable. It is a time series having 46 sections (countries) covering the period 1971-2002. This database is provided by the World Bank and the International Monetary Fund, gives us 1472 observations. In addition, the GDP is defined as the total of goods and services produced in the territory of any country during a given year, whichever the nationality of the producers; hence, it measures the wealth of a country. The two variables do not have a visible probability distribution. Given the fact of having a 46-country database, we judged useful to constitute the following different panels [7] :

– P1: World panel having the 46 countries.
– P2: panel includes : Turkey, Algeria, India, China and the United States.
– P3: panel includes : Algeria, India, China, United States, Syria and Egypt.
– P4 : the following countries : United States, Italy, Mexico, Spain, Brazil, Egypt, Algeria, India, China and Syria.

III. Results

Now it is the time to articulate the research work with ideas gathered in above steps by adopting any of below suitable approaches:

The aim of the S curve model consists in the determination, for different GDP levels, the areas where the fleet evolution changes its path. Indeed, once the model calibrated [1], Algerian car fleet scenarios will be established as a function of the selected countries choice. The first proposed model was assessed for all the available countries in our database, meaning the 46 countries with a long-term saturation of 0,850. The parameters of the model are represented in the following figures :

a. Panel data estimation where all the coefficients are constant

This result was obtained by EViews software using panel data regression with 46 countries. The precedent model's parameters are [2] :

$$Car = S * e^{\alpha * e^{\beta * PIB}} \quad (10)$$

or $$\log\left(\log\left(\frac{S}{Car}\right)\right) = \log(\alpha) + \beta * PIB \quad (11)$$

This model is a linear equation of type [3]

$$y = c + a * x \quad (12) \text{ with}$$

$$y = \log\left(\log\left(\frac{S}{Car}\right)\right) et\ x = \text{PIB} \quad (13)$$

Finally, for all world countries, our model can be written as [3] :

$$\boldsymbol{log\left(log\left(\frac{0.850}{Car}\right)\right) = 1.539836 - 0.000103 * PIB} \quad (14)$$

The aim of this equation is to determine the level of car fleet in function of GDP. The empirical application consists of proposing future values of the Algerian GDP, for example by running a linear regression of the curve and to calculate the car fleet level by equation (14).

The statistical analysis of these parameters is : Student test is verified for the two parameters, the probability of each parameters equal zero is null, significatly inferior to 5%, commonly accepted as signification threshold. FISHER test has a probability equal to zero, ie the two parameters cannot equal zero simultaneously.

The Coefficient Of Determination Equals 0.86, considered as closer to the one of a linear relationship. In the contrary, The Durbin-Watson test confirms the existence of a positive correlation (its value equals 0.03, closer to zero) [2].

b. Panel data estimation where the common coefficient is constant

In this case, the model's equation is written as[2]:

$$Car_i = S * e^{\alpha * e^{\beta_i * PIB_i}} \quad (15) \text{ or}$$

$$\log\left(\log\left(\frac{S}{Car_i}\right)\right) = \log(\alpha) + \beta_i * PIB_i \quad (16)$$

With: The parameters *S* et α are common for all the countries, by contrast of the parameter β_i which is estimated for every country. The obtained results are represented in the following table :

For Algeria, the car fleet will be modeled by the equation :

$$car = \begin{cases} 0{,}850 * e^{\alpha * e^{-7.09*10^{-05}*PIB}} \\ \alpha = exp(1.587995) = 4.894 \end{cases} \quad (17)$$

Where the β_i estimated by the model are included in the interval : $-1{,}82*10^{-06}$ (Portugal) and $-1{,}63*10^{-04}$ (China).

The parameter of Algeria is closer to the Portugal one than China, which confirms the position of Algeria in the Gompertz curve. Moreover, the results of the model concerning Algeria with the two estimation methods are :

$$Car = \begin{cases} 0{,}850 * e^{4{,}894 * e^{-7.09*10^{-05}*PIB}} \\ 0{,}850 * e^{4{,}664 * e^{-10{,}3*10^{-05}*PIB}} \end{cases} \quad (18)$$

From this, we can draw the following remarks :

The estimated parameters have closer values and α et β

have opposite évolutions. In addition, the model selection, for these two equations, is based upon the statistical significance of the parameters and the quadratic error square sum. The STUDENT test is verified for the two parameters concerning Algeria, we notice the probability of each parameter equals zero, so we accept the hypothesis of the two parameters being significant. The FISHER test has a null probability, meaning all the parameters cannot be null at once. Determination Coefficient Equals 0.965, obviously better than the first model (0.86). We notice a diminution in the DURBIN-WATSON test coefficient. It increased from 0.03 in the first case to 0.12 in the second one. The Error Squared Sum improved (diminished by 162 to 40.41). So the second model provides better significance than the first, and consequently, the second one will be compared with the following models.

c. *Panel data estimation with all coefficients varying*

In this case, The model's equation is written as :

$$Car_i = S * e^{\alpha_i * e^{\beta_i * PIB_i}} \quad (19) \text{ or :}$$
$$\log\left(\log\left(\frac{S}{Car_i}\right)\right) = \log(\alpha_i) + \beta_i * PIB_i \quad (20)$$

With **S** is a common parameter for all the countries, however parameters α_i et β_i are estimated for each country. For Algeria, the car fleet will be modeled by the equation [2] :

$$Car = \begin{cases} 0{,}850 * e^{\alpha * e^{-10{,}1 * 10^{-05} * PIB}} \\ \alpha = exp(1.784764) = 5.958 \end{cases} \quad (21)$$

With parameters included in the following intervals : α_i: 1,3038 (Canada) et 3,75 (Greece). β_i: $-33{,}5*10^{-05}$ (India) et $-2{,}35*10^{-05}$ (Argentina). Algeria's parameter is closer to the Argentian one than the Indian, which confirms the position of Algeria in the Gompertz curve. Moreover, the results concerning Algeria with the two last estimation methods are [2] :

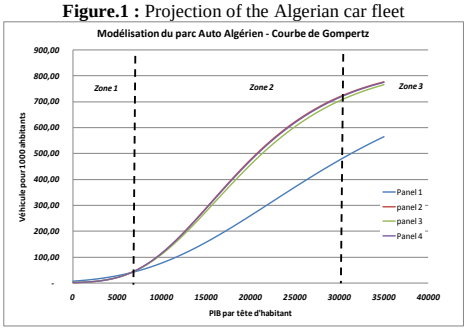
$$r = \begin{cases} 0{,}850 * e^{4.668 * e^{-10{,}3 * 10^{-05} * PIB}} \\ 0{,}850 * e^{5.958 * e^{-10{,}1 * 10^{-05} * PIB}} \end{cases} \quad (22)$$

Hence, we can conclude : The estimated parameters have closer values with a certain convergence of the parameter β toward a value of $-10{,}1*10^{-05}$. The parameter α has a value closer to 5 (5,958 et 4,664). Given the two equations having identical parameters, they will be used both to give two scenarios of the Algerian car fleet evolution in function of the GDP.

The highlighted results show that estimations are better for the second and third model as the precedent section [4] . In addition, we see evidence of R^2 closer to 1 when passing from the first model to the third one. The sum of squared errors decrease, in its turn, for the third model. To conclude, we can say that the use of panel data for which are not common provides the best fit. Moreover, these four Studied panels provides three evolutive scenarios of the Algerian car fleet. The graphical representation of these scenarios are illustrated in the (**Figure.1)**.

Panel 1 offers a slightly remote curve relatively to other panels. This is due mostly in the country choice of the studied panels. The ***P1*** panel comprises all the countries of the sample, by contrast of the other panels which have countries profile-similar to Algeria. The panel curves **P2, P3** and **P4** are almost identical [4] .

Figure.1 : Projection of the Algerian car fleet



The dashed lines delimit the three zones where the car fleet evolution changes its growth. That means when the GDP per capita exceeds 7,000 $, the car fleet increase quickly than when it exceeds 30,000 $, the car fleet will have a decreasing growth. Finnaly, the saturation is reached beyond 35,000 $. Given the fact that Algeria is situated in the upper limit of the the second zone.This figure is of a high importance for the national institutions which manage the transportation sector, because it gives a future image on the size of the fleet when the country becomes richer.

In order to establish a maximum scenarios, we opted to redo the same steps, but this time the curve not a Gompertz-type but a logistic and quasi-logistic ones defined by the equations[5] :

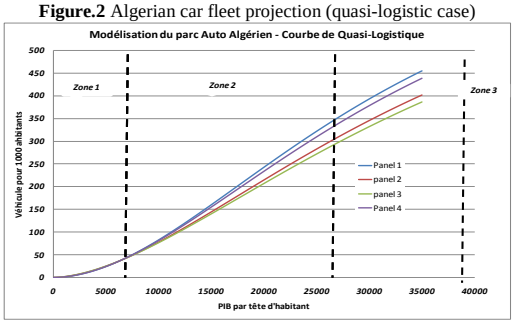
$$\begin{cases} Quasi - logitique & : Car = \frac{S}{1+\alpha * PIB^{\beta}} \\ Logitique & : Car = \frac{S}{1+\alpha * e^{\beta * PIB}} \end{cases} \quad (23)$$

$$\begin{cases} \text{Quasi} - \text{logitique} & : \log\left(\frac{S}{Car} - 1\right) = \log(\alpha) + \beta * \log PIB \\ \text{Logitique} & : \log\left(\frac{S}{Car} - 1\right) = \log(\alpha) + \beta * (PIB) \end{cases} \quad (24)$$

The results obtained by the application of these equations, depend on the other two cases, quasi-logistic and logistic respectively we chose the **P2** and **P4** for calibration. The same remarks made on the previous sections apply to the quasi-logistic model [4] . This application give the best statistical significance. Consequently they will be used for our car fleet forecasts.

The (**Figure.2**) represent the Algerian car fleet evolution scenarios. Whichever the panel chosen, we remark that all the curves are almost identical for GDP per capita level lower than 12,000 $. Then the difference between the curves becomes obvious for high GDP per capital levels. For the case of Algeria (actual GDP per capita is about 7,700 $), all the curves give the same future projection of the car fleet. We can assert that if our GDP doubles its value, the quasi-logistic model is insensitive in the choice of the panel.

Figure.2 Algerian car fleet projection (quasi-logistic case)

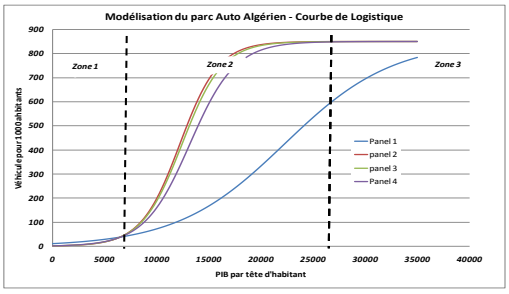


By contrast, the inconvenient of this model lies on his inability to give a S-curve, meaning the saturation will not be reached for GDP per capita higher than 40,000 $. Hence, the case of the United States is not well represented by the quasi-logistic model. the second and third models give the best statistical signification. Identically, they will be used in this study.

The following curve **(Figure.3)** illustrates the application of these models for different chosen panels. We notice that the **P1** curve (all the world) is far from the others. The **P2**, **P3** and **P4** have their curves increasing quickly between lower GDP and higher GDP curvatures.

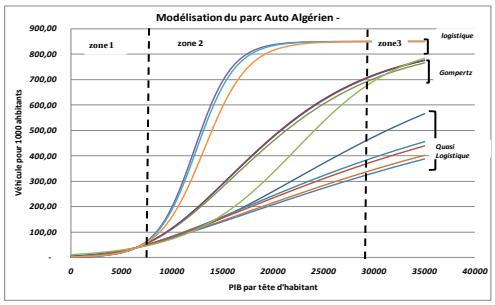
Thus, there is a trend which all the countries (comprising Algeria) will reach once their GDP per capita passes from 10,000 to 17,000 $. This trend is not verified for countries with high GDP levels and consequently these curves will be omitted in this study.

Figure.3 Algerian car fleet projection (Logistic case)



Finnaly, the three models (Gompertz, Quasi-logistic and logistic) are reported in the same graphic. We notice the Gompertz curve has a median curve for the three models where the lowest GDP peak is identical for the two other models [5]**.** For the case of Algeria and any other country in the first zone, the three models produce a spindle of curves that will be the next future possible scenarios for us (**Figure. 4**).

Figure. 4 Algerian car fleet projection by the three models**.**



The difference between the three models becomes more stressed once we reach high GDP values. The quasi-logistic and logistic models become considerable compared to the reality and not significant [6] . For this reason, we found that the literature advocates the use of the Gompertz model [6] .Given our interest in low GDP countries, we extended the first zone of the following figure. Beyond the actual GDP per capita (7,700$), the Algerian car fleet might evolve according to the different scenarios illustrated by the curve (**Figure.4**). We have two scenarios from the Gompertz curve representing the most porbable evolution. The three scenarios representing the most pessimistic cases are coming from the logistic curve. Finally, the other scenarios from the quasi-logistic curve present the most optimistic ones [2] .

IV. CONCLUSIONS

The models provided by the academic literature related to the evolution of car fleet in the countries permitted to identified, in an acceptable manner, the most important parameters that affect, significantly, the ownership of vehicles. It shows that the wealth generated by the country as measured by GDP remains an important determinant of modeling car fleet at the expense of other parameters involving the price of vehicles, fuel, size of the transport network ... etc. This finding is reinforced by the fact that at the international level, the evolution of the car fleet in terms of GDP following the curves more or less identical across countries [5] .

Excluding variables characterizing the behavior of individuals in car ownership, this study allowed us to highlight the influence of national wealth on the level of GDP over car fleet in Algeria. The objective is to analyze the distribution of vehicles according to GDP of different countries in which information is available on the World Bank and IMF databases. Thus, it will be possible to develop scenarios for the car fleet while considering the country as sections by panel data modeling.

We designed our calculation methodology by taking into account the available data from which this model was possible. We used the level of car parc per 1000 inhabitants as the independent variable and GDP per 1000 inhabitants as the dependent variable. However, given the long period of study

required by the modeling, we needed a 30 years history. Moreover, the theoretical models used in the study include the Gompertz equation, quasi-logistic and logistic. This choice is justified by the fact that the evolution of the car fleet in terms of GDP has a look of an S-curve with saturation at high GDP close to 1[6] . Since the panel data estimation is more appropriate in our case, the previous models were calibrated using the following assumptions: the parameters are constant for all panels, a certain number of parameters are constant for all countries and finally, all parameters are variable by country. The estimate of these last is by transforming the models used in the linear form, without introducing changes in the equations. Models with constant parameters were statistically less significant than those defined by the other two hypotheses. In addition, we varied the countries studied in the different panels with the maintenance of the United States, India and China in all panels to see their influence on the estimated parameters. The conclusion obtained from our study is that the Gompertz curve is the most suitable for this model. With this curve, we were able to generate Algerian car fleet scenarios, which is a result of particular importance for the planning of transport infrastructures and refining capacity.

These scenarios were developed to forecast beyond 2002 [8] . At that time the national wealth was estimated at $ 7,700 per capita and the fleet was 56 cars per thousand inhabitants. According to the current trend of GDP growth is 5%, we estimated the park in 2020 while admitting that Algeria's GDP would increase by 5% per year. In 2020, Algeria had a fleet size of 230 cars per thousand inhabitants and a GDP of $ 18,000 per capita. Finally, the recommendations of this study are as follows[8] :

- The models used could be improved by incorporating other variables affecting the car fleet.
- The results could be compared with models of non-aggregated ie estimating each car type separately. The latter method requires the availability of data.

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Molecular Docking Studies of anti-HIV drug BMS-488043 derivatives using HEX and GP120 Interaction Analysis using Pymol

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***Abstract*-** AIDS is one of the most devastating pandemic. All drugs designed have targeted the viral protein the GP120. The entry of Human Immuno Virus (HIV) into the human cells is initiated by a temporary interaction between the viral exterior glycoprotein GP120 and human CD4 receptor. The primary receptor CD4 glycoprotein present on the cell surface of T-helper cells interacts with GP120. The GP120-CD4 complex involves the D1-D2 domain of the human CD4 and conserved regions of the viral protein GP120. The interaction leads to a number of conformational changes in the inner domains and bridging sheets of glycoprotein GP120 due to translocations and deletions, which creates a binding site in the V3 loop of GP120 for chemokine receptors (CCR5/CXCR4) present on the cell surface. This interaction brings the outer membrane of HIV in contact with the cell membrane of the host cell and initiates the entry of the viral genome in the human T-cells. Many drugs are being developed to inhibit this complex formation and one such drug is BMS-488043, which binds near the CD4 binding region and prevents disulphide reduction in GP120 which triggers the conformational change. Several analogs were designed for BMS-488043 using ChemSketch and were docked with the GP120 protein (PDB ID: 3DNN) using HEX. The analogs generated showed improvement in binding affinity and other properties in comparison to drug BMS-488043. Analog 8 had better binding affinity but analog 7 showed improved physico-chemical properties. The drug-protein complex showed interacting amino acids recognized to be Glutamic acid, Aspartic acid, Methionine, Phenylalanine, Lysine and Threonine.

***Index Terms*-** GP120, BMS-488043, Hex Docking, Chemsketch.

I. INTRODUCTION

The Human Immunodeficiency Virus leads to the disease Acquired Immune Deficiency Syndrome. This disease was lately recognized in 1981, in the 30 years since HIV/AIDS was first discovered, the disease has become a devastating pandemic. As per National Institute of Health there are 2.5 million newly infected people with HIV in 2011 [1].Till date around 31 drugs have been licensed by the United States Food and Drug Administration saving antiretroviral treatment, still around 1.7 million AIDS related deaths have occurred in 2011.This global epidemic of infection by HIV has created an urgent need for vaccines or new classes of antiretroviral agents [2].

Numerous drugs have been designed to deactivate the HIV by administering the drugs which act as inhibitors at various levels as Mavaviroc and Enfuvirtide [16]. Mostly the drugs designed and licensed act as Nucleoside Reverse Transcriptase Inhibitors (NRTIs), Nonnucleoside Reverse Transcriptase Inhibitors (NNRTIs), Protease Inhibitors (PIs), Fusion Inhibitors, HIV integrase strand transfer inhibitors and Entry Inhibitors - CCR5 co-receptor antagonist. The drug targeting the CCR5 approved till date is only one and research is on, to target this area more as it is the prime receptor involved in binding to the HIV envelop protein (http://www.fda.gov/ForConsumers/byAudience/ForPatientAdvocates/HIVandAIDSActivities/ucm118915).

GP120: GP120 is a glycoprotein which forms the spikes sticking out of a HIV virus particle. Its main function is to bind to CD4 in human cells. The 120 in its name comes from its molecular weight of 120 KD. It exists on the surface of HIV in trimeric state along with GP41.This core gp120 comprises 25 beta-strands, 5 a-helices and 10 defined loop segments. The structure confirms the chemically determined disulphide-bridge. The polypeptide chain of gp120 is folded into two major domains, plus certain excursions that emanate from this body. The inner domain features a two-helix, two strand bundle with a small five-stranded beta-sandwich at its termini proximal end and a projection at the distal end from which the V1/ V2 stem spreads out.

The outer domain is a stacked double barrel that lies alongside the inner domain so that the outer barrel and inner bundle axes are approximately parallel. The proximal barrel of the outer-domain stack is composed from a six-stranded, mixed-directional b-sheet that is twisted to embrace helix a2 as a seventh barrel stave. The two barrels share one contiguous hydrophobic core, and the staves also continue from one barrel to the next except at the domain interface. One half of the molecular weight of gp120 is due to the carbohydrate side chains. This dome of carbohydrate prevents gp120 from being recognized by the human immune response. As the HIV virus and the human CD4 cell come together, the gp120 binding site snaps open. Because of the important role of the gp120 glycoprotein in receptor binding, information about the gp120 structure is important for understanding HIV infection and for the design of therapeutic strategies.[10]

Figure 1: 3 Dimensional structure of GP120

MODE OF ACTION: The entry of HIV into susceptible cells involves the interaction of CD4 molecules present on the host cell surface, with the HIV envelope the glycoproteins GP120 and GP41. Also it was found, that interaction of the virus with co-receptors on the cell surface is very important for the entry. The predominant are the chemokine receptors CCR5 and CXCR4 [4]. The HIV-1 envelope glycoprotein complex is a trimer consisting of three GP120 exterior envelope glycoprotein and three GP41 transmembrane glycoprotein's [9]. These are derived by cleavage of a GP160 precursor glycoprotein by host cell proteases. The mature envelope glycoprotein complex is expressed on the surface of infected cells and is incorporated into virion membranes [9].

HIV-1 infection is initiated by GP120 binding to CD4 on the target cell surface. CD4 also has a binding site for Protein Disulfide Isomerase (PDI) and forms a PDI–CD4–GP120 complex. In that complex, PDI can reach and reduce GP120 disulfide bonds (s-s bonds), causing major conformational changes in GP120, which allows it to interact efficiently with one of the chemokine receptors, CCR5 or CXCR4. The interaction of GP120 with its receptors is thought to promote conformational rearrangements in GP41 that drive the fusion of the viral and target cell membranes [6].

The binding of HIV to CD4 is an attractive drug target, both because the CD4 binding site is highly conserved and because it is known that neutralizing antibodies can effectively block this step. Preventing the virus from binding to its primary receptor is the most obvious and direct way to prevent infection. BMS-488043 is low-molecular-weight inhibitors of HIV-1 entry that were recently identified by using a viral infection-based screen.

Figure 2: GP120-CD4 complex

BMS-488043 works by binding to the HIV-1 envelope glycoprotein GP120, thereby interfering with its attachment to the CD4 receptor (http://www.aidsmap.com/Attachment-inhibitor-BMS-663068-potent-and-well-tolerated-in-early-study/page/1681506/) [12]. GP120-CD4 interaction is blocked but GP120 binds to different residues in the same binding pocket. BMS-488043 prevents the reduction of disulfide bonds of the protein GP120 which inhibits the conformational changes occurring in GP120 and prevents it from binding to chemokine co-receptors [6]. This further inhibiting the GP41 interaction with the target cell membrane and prevents the HIV infection mechanism. BMS-488043 binds to residues 112,113,121,375,422and 426 which are adjacent to the disulfide bonds in the GP120 protein [7].

BMS-488043 has recently been replaced with BMS-663068, a compound derived on the basis of structure-activity relationship studies. It is currently being studied in Phase II clinical trials [25].

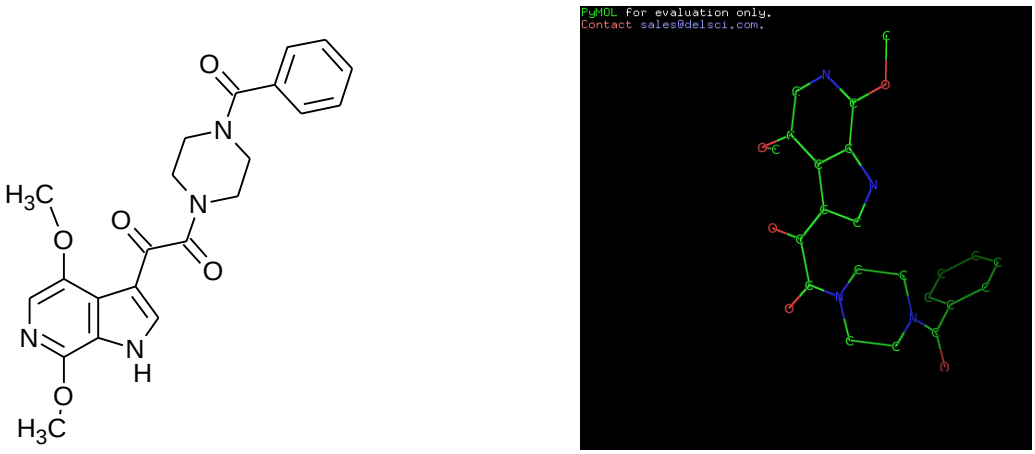

Figure 3: 2-Dimensional and 3-Dimensional structure of BMS-488043

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II. MATERIALS AND METHOD

The present study was performed using bioinformatics tools, biological databases like PubMed, ChemSpider, PDB (Protein Data Bank) and software's like Hex, ACD ChemSketch. From the literature review using PubMed it was recognized that GP120 interaction with BMS, and numerous of its analogues have been recognized of which BMS-488043 was selected to work upon.

ChemSpider, the chemical database that contains more than 26 million unique molecules from over 400 data sources resource that includes FDA, ZINC, Drug Bank etc, gave the chemical formula and structure of the BMS drug along with the used analogue [14]. ACD/ChemSketch which is a powerful all-purpose chemical drawing and graphics package from ACD/Labs developed to help chemists quickly and easily draw molecules, reactions, and schematic diagrams, calculate chemical properties, and design professional reports and presentations, was used to develop all the possible analogues of BMS-488043(Reference).Numerous analogues were created using the ACD/ChemSketch. When the properties were analyzed only 9 analogues were selected for docking with the protein acting as inhibitors [13].

The PDB (Protein Data Bank) is used to download the target protein the 3DNN is the PDB ID of the GP120 protein. The structure is visualized using the molecular graphics program PyMol intended for the structural visualization of proteins, nucleic acids and small biomolecules [25].

The docking analysis of BMS-488043 and its analog with glycoprotein GP120 was carried out using HEX 6.3 docking software, which is an Interactive Molecular Graphics Program for calculating and displaying feasible docking modes of pairs of protein and DNA molecules Docking allows predicting the ligand with best scores and identifying the drug-receptor complex with lowest free energy [26].

The parameters used for the docking process were:

1. Correlation type – Shape + Electrostatics
2. FFT Mode - 3D
3. Post Processing- MM Energies
4. Grid Dimension - 0.6
5. Receptor range – 180
6. Ligand range – 180
7. Twist range – 360
8. Distance Range – 40

The drug and analogs generated were docked with the receptor using the above parameters.

After docking the analogues of BMS-488043, the various analogue's which gave the best affinity results were evaluated using chemical properties viewer of ChemAxon available at www.chemicalize.org.[13]

- Generate the canonical SMILES notation of the analogs.
- Submit the SMILES as query in the query box of the Chemicalize (ChemAxon) server.
- Click on the required property to observe the value.

III. RESULTS AND DISCUSSION

Docking results of the HIV membrane glycoprotein GP120 and the drug BMS-488043 (1-(4-Benzoyl-1-piperazinyl)-2-(4, 7-dimethoxy-1H-pyrrolo [2, 3-c] pyridin-3-yl)-1, 2-ethanedione) as well as the analogs generated are shown in the table.

Table 1: Hex docking results of GP120 with BMS-488043 and generated analogs.

COMPOUND	E-VALUE
BMS-488043	-256.27
Analog 1	-221.01
Analog 2	-241.67
Analog 3	-247.09
Analog 4	-222.80
Analog 5	-219.01
Analog 6	-233.59
Analog 7	-252.27
Analog 8	-263.29

The HEX docking results reveal that the e-value of Analog 8 (-263.29) is better as compared to that of original drug BMS-488043(-256.27). The analog showed an increase in the free energy of the complex with the receptor but bonded the receptor in the same binding pocket. This indicated that the functional group involved in the complex formation were same as that of the BMS drug and the difference was due to the increase in the steric compatibility and pharmacological properties of the analog. The analogue was created adding azole ring and a phosphate group.

The structure of the analogue of BMS-488043 is:

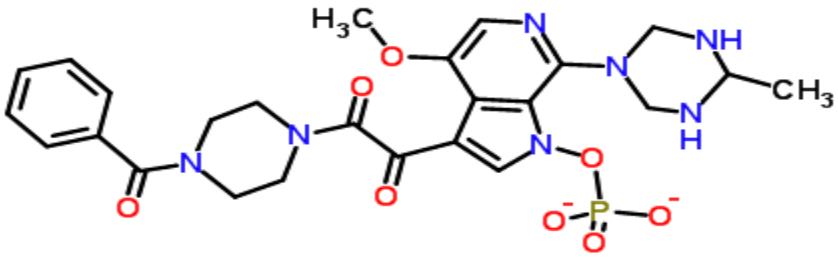

Figure 4: 2-methyl-1,3,5-triazinane and a phosphate group has been added to the basic BMS structure (1-(4-Benzoyl-1-piperazinyl)-2-(4, 7-dimethoxy-1H-pyrrolo [2, 3-c] pyridin-3-yl)-1, 2-ethanedione), to develop the analogue which gave the best result as inhibitor (Analog-7).

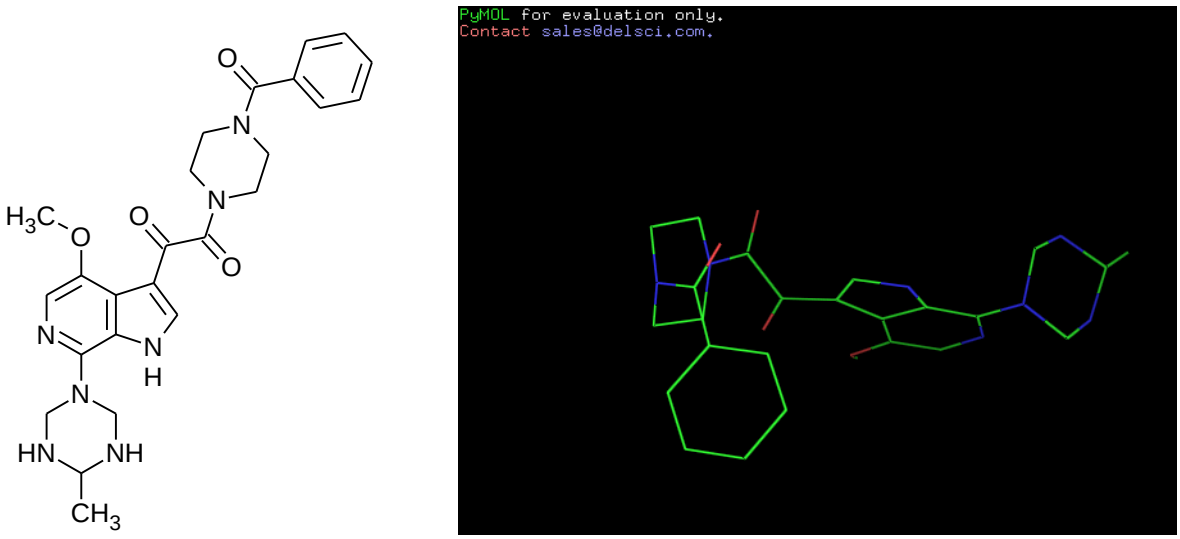

Figure 5: 2-Dimensional and 3-Dimensional structure of Analog-7.

The chemical structure of BMS-488043 was obtained from the Chemspider database [14] and can also be extracted from the Bristol Myers Squibb server available at www.bms.com .

The drug-likeness is necessary to be evaluated at the primary stage at in vitro level. This reduces the chances of selecting the false positive results. The various basic physico chemical properties calculated in vitro to evaluate a molecule to act as drug involve logP, logD, H-bond donor, polar surface area, molecular refractivity, no. of atoms, rotatable bonds etc. The value of logP should be ≤ 5, this is the distribution coefficient or partition coefficient important for finding the solubility of the drug that is lipophilicity. Molecular weight of the compound should not exceed 500 Da, as most of the drugs are small molecules.

The Chemicalize server was used for generating structure property prediction and calculations (ChemAxon product) to determine their ADME properties [13].

Table 2: Properties of BMS-488043, Analog-7 and Analog-8

Property	**BMS-488043**	**Analog-7**	**Analog-8**
Molecular weight	421.4259	490.5343	585.5067792
Log P	2.561	1.82	2.8
Log D	1.05	1.58	1.59
H-bond acceptor	9	9	10
H-bond donor	1	0	0
Polar surface area	101.93 A^2	120.00 A^2	184.46 A^2
Molecular refractivity	111.524 cm^3	132.24 cm^3	145.553 cm^3

No. of atoms	52	64	69
Rotatable Bonds	5	5	7

The various properties when analyzed and it were found that the Analog-8 though has very good binding affinity and has good complex formation ability but it has some properties which violate the drug likeliness rules. The Analog-8 has higher molecular weight of 585.506779 Da as acceptable to be a promising drug. Analog-7 follows the Lipinski's rule of five and also has oral-bioavailability, but has low complex formation possibility compared to analog-8.

When the docking results were analyzed in PyMol, the GP120 complex with the analogue 8, the interacting amino acids were recognized.

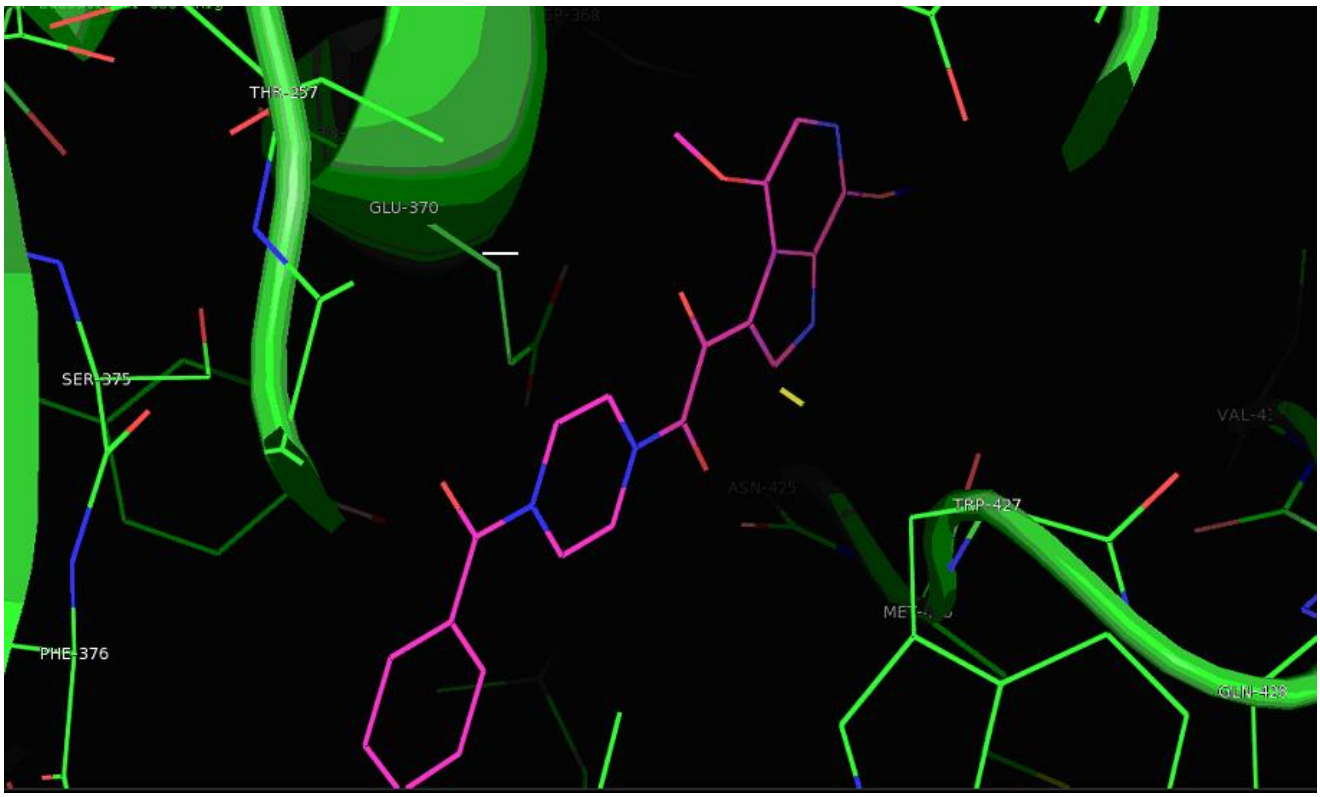

Figure 6: Snapshot of interacting amino acids in GP120 with the analog-8 of BMS-488043 as seen in PyMol.

As the GP120 is a homotrimer, with all the subunits of the complex it was found that the same amino acids are seen to interact with the drug like molecule. The interacting amino acids include the Glutamic acid, Aspartic acid, Methionine, Phenylalanine, Lysine and Threonine. All these amino acids are seen to interact with the GP120 disabling it to attach to the chemokine receptor.

IV. CONCLUSION

Since BMS-488043 is one of the most promising drug showing antiviral activities against HIV, it can be studied with further modifications to produce some useful analogue which can act as promising drug against the HIV. GP120 being the main interacting component for the virus to interact, the drug targeted for it are the most promising to look for. The binding of the drug inhibits the gp120 to bind to the chemokine receptor. Clinical Trials are proving to be good with few drawbacks which could be reduced once the effect of drug is studied under trial. In silico drug designing and interaction of the drug and the target protein provides a good understanding of the mechanism in which they bind and which residues are involved in the interaction. The drug like properties also give us a clue that the analogues designed with the BMS-488043 as the seed molecule are promising drug compounds. This provides us the understanding what and where to target the drug with enhanced activity of inhibiting the GP120-chemokine receptor complex formation.

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Rules Extraction in XML Using Correlation

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Abstract- As the amount of digital information on the internet grows it is more and more critical to retrieve information from semistructured documents. Also the data returned as answers to queries may not give interpretable knowledge. Therefore the concept of association rule mining is introduced in XML datastructure. Even if it is effective occasionally it give unexpected results. This paper propose a new method based on correlation which will more effectively return the rules. Correlation is used to find out relationship between different data items.

Index Terms- Approximate query answering, Association Rule Mining, correlation, XML

I. INTRODUCTION

Now a day's XML [1] is used in all areas of internet applications as a storage unit because of its flexibility and portability. Increasing semistructured[2] and unstructured[3] data in internet made the database research field to concentrate on XML since conventional database can only be used for storing structured data.

Despite of its popularity, XML still lack appropriate techniques to retrieve data effectively due to the semistructured or unstructured nature. Since query answering should be effective for only structured data there is a possibility to return unexpected results in the case of XML, because 50 percent of the documents in internet do not have a specific structure.

The man problems arise while querying the XML data are:

- Information Overload [4].
- Information Deprivation [5].

So it is appropriate to know about the structure and semantics characteristics of dataset. Thus researchers tried to incorporate a data mining technique called association rule mining [6] for XML data for this purpose. The idea of using association rules can be seen in many papers and here we are going to propose a new data mining technique which is more effective than association rule called correlation. Correlation is an alternative method to find the relationships between data in XML and it can be seen as a lift of an association rule.

This paper is structured as follows: In section II we give brief outline of the works done in XML mining. Section III contains the proposed method and section IV will conclude this paper.

II. RESEARCH

XML store data in a tree like structure. So mining data from the XML document is more difficult than in the case of traditional database.

Association rule mining was first proposed for conventional database and then it came to XML. Association rule mining is proposed in [6] and it has many applications such as Basket data analysis, cross-marketing, catalog design, loss-leader analysis, clustering, classification, etc.

The main steps in association rule mining are:

1. Find the frequent items greater than a minimum support from the data given.
2. Find the rules from the frequent items which satisfies a minimum confidence.

Before going on to the support and confidence we can see how the association rule look like. Consider supermarket in which lots of transactions taking place. The transaction Database is given in Table 1.

Table 1: Example for a Transaction Database

Transaction id	Items purchased
1	Shampoo, Conditioner
2	Hair Oil
3	Hair Oil, Shampoo ,Conditioner
4	Shampoo
5	Shampoo, Conditioner

From the analysis of Fig 1 we can conclude the result as follows:

Table 2: Analyzed Data from Table 1

Items	No. Of occurrences
Shampoo	4
Shampoo, Conditioner	3
Shampoo, Hair Oil	1
Shampoo, Hair Oil, Conditioner	1
Hair Oil	2

From Table 2 we can formulate the following association rules:

Rule 1: Buys(Shampoo) → Buys(Conditioner) [3/5,0.75]
Rule 2: Buys(Shampoo) → Buys(Hair Oil) [1/5,0.25]
Rule 3: Buys(Hair Oil) → Buys(Conditioner) [1/5,0.5]

We can generate many rules from Table 2 and the above rules are just some of them. In these rules we are given some

numerical values which are the calculated support and confidence of the given data.

Support corresponds to the occurrence of an element or set of elements and confidence corresponds to the conditional probability of finding an element having found another element.

For *Rule 1* the support is 4 which means that out of the 5 transactions, 4 of them contain Shampoo. Confidence for this rule is 0.6 indicates the probability of buying conditioner with shampoo.

So we can generalize the association rule as follows:

A ⇒ B (If A then B)

Support = P(AUB) = No. of tuples containing both A & B / total number of tuples.
Confidence = P(B/A) = P(AUB)/P(A).

These are the general concepts of finding association rules in transaction databases.

In order to find the frequent items and create association rules researchers developed many mining algoritms. The main basic algorithm in association rule mining is Apriori Algorithm [7]. This algoritm is based on the property that "any subset of frequent itemset must be frequent" called Apriori property. Other main algoritms used in association rule mining are FP tree algorithm [8], Predictive Apriori [9], Tertius [10], and GSP [11]. Above explanations are all based on the database concern. When it comes to XML all the basic concepts still remains same, but we have to work on a tree like structure ie we have to find out the frequent sub trees instead of frequent items, and the support or confidence are calculated in sub trees. Main algoritms used for mining in XML are TreeMiner [12], PathJoin [13], FREQT [14], DRYADE [15], DRYADEPARENT [16], CMTTreeMiner [17] and POTMiner [18]. These algorithms extract the frequent subtrees in the XML document. Experiments shows that DRYADEPARENT is currently the fastest algorithm and CMTTreeMiner the second with respect to efficiency.

In the case of XML the rule can be as follows:
A ⇒ B (If A then B), where A and B are trees.

This is called Tree Association Rule(TAR). TAR describes the co-occurrence of two trees A and B. Always A should be a subtree of B.

The support and confidence of TAR is:
Support = Count(B, T) / Cardinality(T).

Confidence = Count(B, T) / Count(A, T) where T is the tree representation of the corresponding XML document. Cardinality(T) represent the total no. of nodes in XML document, Count(B,T) denotes the no. of occurrence of subtree B in tree T.

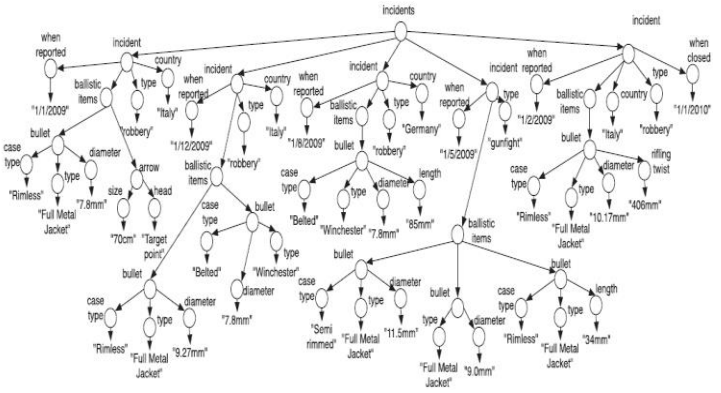

Figure 1: incidents.xml [19]

The rules extracted and stored should satisfy a minimum support and confidence. The minimum support and confidence can be given prior to rules extraction. Greater the minimum values of support and confidence greater the effectiveness of the rule.

Let us consider the example of "incidents.xml" in the odyssey dataset in Fig 1 [19]. It consists of crime scene information across Europe. Experts have used association rule mining in it.

Some of the rules mined from this xml document are given in Fig 2 [19].

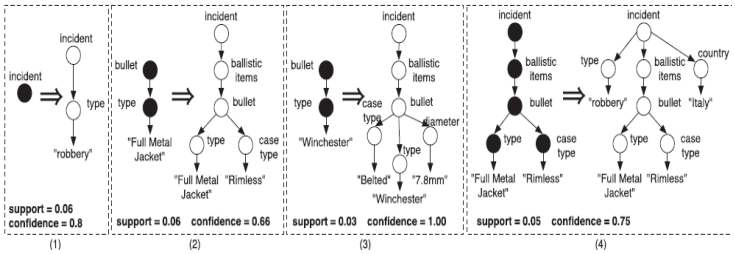

Figure 2: Some rules extracted from Fig 1 [19]

Rule 1 in Fig 2 says that 80 percent of the incidents are robberies. Rule 2 states that 66 percent of Full Metal Jacket Bullets have rimless cases. Rule 3 states that 100 percent of the Winchester bullets have 7.8mm diameter and a belted case. Finally rule 4 states that 75 percent of the incidents involving rimless Full Metal Jacket bullets are robberies happening in Italy. So by analysing these rules we can have a different view of an XML document that may give many useful information's to ordinary users.

The rules extracted are now stored in the XML format for the convenience of querying, ie the same language that we are using for querying XML document can also used with the rules for information retrieval.

III. PROPOSED METHOD

Support-confidence framework is not so efficient in rule mining. Because it identifies a rule (A=>B) as strong even if the occurrence A might not imply the occurrence of B. Correlation is an alternative to this framework which is more effective in rule mining.

A. Correlation Concepts

Let A and B are two subtrees. The occurrence of A is independent of the occurrence of B iff

$$P(A \cup B) = P(A) \cdot P(B)$$

Otherwise A and B are dependent and correlated. The measure of correlation, or correlation between A and B is given by the formula:

$$Corr(A,B) = P(A \cup B) / P(A) . P(B)$$

- corr(A,B) >1 means that A and B are positively correlated i.e. the occurrence of one implies the occurrence of the other.
- corr(A,B) < 1 means that the occurrence of A is negatively correlated with (or discourages) the occurrence of B.
- corr(A,B) =1 means that A and B are independent and there is no correlation between them.

B. Association and correlation

The correlation formula can be re-written as:

$$Corr(A,B) = P(B|A) / P(B)$$

We know that

$$Support(A \rightarrow B) = P(A \cup B)$$
$$Confidence(A \rightarrow B) = P(B|A)$$

Confidence can be rewritten as

$$Confidence(A \rightarrow B) = corr(A,B)\ P(B)$$

Correlation, support and confidence are all different. Correlation provides an extra information about the association rule (A →B).We can say that the correlation corr(A,B) provides the LIFT of the association rule (A=>B), i.e. A is said to increase (or LIFT) the likelihood of B by the factor of the value returned by the formula for corr(A,B).

C. Correlation rules

Correlation concepts & rules can be used to further support our derived association rules**.** Consider the rule 1 in Fig 2. The correlation values for this rule is

Rule 1: Corr(A,B)=P(B/A)/P(B)
P(B) = 4/62 = 0.06 (from Fig 1)

Corr(A,B) = 0.8/0.06 = 13.33 > 1, means that in rule 1 the two subtrees are positively correlated and this rule is strong.

Similarly we can find whether the rules extracted are strong or not. If the correlation value for a rule is found to be equal or less than 1 then it is discarded.

IV. CONCLUSION

Correlation Analysis provides an alternative framework for finding interesting relationships, or to improve understanding of meaning of some association rules ie it is a lift of an association rule. There has been many researches going on in the area of finding more effective mining algorithms for XML. The proposed method will effectively mine XML.

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The RoF based FSO link for next generation Communication

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Abstract- The shifting surfaces from past to present has evolved many changes and brought many challenges as well and the field of communications is the one which has witnessed this changing dynamics the most. Since the influence of the emerging technologies in yielding better performance than the existing , hence it calls for the newer infrastructure , installation to be made for its establishment and henceforth for its working. Such incorporation of the change in the entire layout is not always possible, especially in case at the network level. Thus in order to optimize the performance of the operating communication systems comprising of the enhanced features of the newer technologies , we need to go with the option of modification of the existing ones as well as from the latest ones so that they will be complementing and supplementing each other. The optical communication due to the advancement of the photonics and terahertz based schemes is providing excellent ground for the nourishment of the next generation communication systems .Now-a-days the optical fiber has proved out to be the most efficient means of communication channel medium, but it does have some limitations. The paper has focussed on getting the solution for these - last mile problems and overcoming the difficulty of getting a reliable link for the communication purpose in areas where installing the fibers is not easy and thereby the incorporation of FSO link.

Index Terms- Radio over fiber, Wavelength division multiplexing, Free space optical system, Erbium doped fiber amplifier.

I. INTRODUCTION

The optical fiber based communication channels has some performance declining factors which limits its efficiency . These are some last mile problem also that is the fiber laying in the places where authorities have issues regarding the frequent digging of the trenches for laying the fiber.As a rescue to these problems ,the concept of the working of the RoF along with the FSO is introduced . Till now optical fiber based communication system is found to be the most superior in class than the other means of the communication , the various types of the data services, high data rates as well as rendering the seamless communication needs to optimize its performance over wide range of application. In order to provide high capacity RoF amends the Central station and various Base stations configuration wherein the base station is given with the simple functionalities and hence is less expensive . But the central station has to perform the complex work like that of the modulation amplification etc. The RoF configuration of network typically lays an emphasis on its operation with the micro/ pico cellular sites because , the small yet effective antenna size located at the base station facilitates with the efficient coverage of the respective area of its concern which further on implies to the frequency reuse to be possible in its domain of working. Also in order to increase the capacity of the system RoF technique, have the provision of the WDM which is capable of providing large no. of channels working simultaneously.

Never the less the demand for high speed and high bandwidth communications channel is increasing in the new era of information age. FSO is being presented as a solution for next generation high-speed wireless communication technology, as it is free to implement, easy to install, secure and has very high bandwidth.

The FSO has emerged to be as the strong contender for providing the high speed transmission links when it comes to the issue of the last mile solution. bearing the similar characteristic as that of the RoF the FSO yields better performance features in comparision to the RoF , because it has the high bandwidth , and thereby provide high data rates , further the no. of the received signal level increases ,which gives the implication that now large no. of users can be accommodated in the network , incorporating large no. of base stations facilitating frequency reuse becomes feasible.

Earlier studies have revealed that the mesh topology is well suited for the FSO based configuration , wherein there is an opportunity of having either the relay assisted short multihops or the diversity technique which can be made functional .The WDM technique when implemented with the FSO is able to provide the customer with the large array of the communication service ,all because the system capacity is increased by it.

II. RESEARCH STATUS OF FSO

The last mile solution is the significant topic of extensive research among the telecommunication Engineers .As in most of the places the fiber cable installation has already been done to get better communication link performance over the co-axial cables or the satellite links , therefore replacing the same with the FSO to attain relatively upgraded results is not practically possible everywhere.Also the high speed communication links in remote locations by FSO communication link is still considered as a relatively new technology though fiber-optic communication has been widely used in worldwide telecommunication industry.The FSO technology facilitates large

bandwidth transmission capabilities where it uses optical transmitters and receivers and even enables WDM-like technologies to operate through free space. This fuels the reason for seeking the compliance between the two technologies, that is the integration of RoF and FSO instead of substituting one for another. The FSO links can provide fiber-like data rates over short distances with low probability of interference Besides, it also present the last mile solutions with static communication system that is by substituting wired or microwave system at base station level where the RoF will be working as the network backbone is not that much effective as its combination with the FSO is. FSO is an unexpectedly simple technology. The system is based on the connectivity between FSO-based optical wireless units where each of them consists of an optical transceiver to provide a full-duplex (bi-directional) ability.Optical source with a lens that transmit light through the atmosphere to another lens receiving information are used in each of the optical wireless unit. The receiving lens is connected to a high-sensitivity receiver through optical fiber at that specific point. There are a number of advantages using FSO technology approach where it required no RF spectrum licensing and also they are easily upgradable.Also it can be put to use in the areas of difficult physical channel access.With the FSO lies the great scope of performing the diversity techniques , be it the aperture diversity or the path diversity to recover the transmitted signal level at the receiver end.

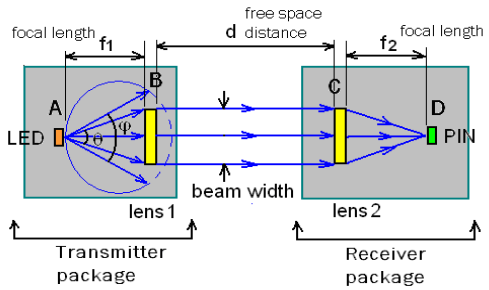

Fig. no. 1 FSO signal transmission and reception

The wavelength of 1550 nm is typically well suited for free-space transmission, and high quality transmitter and detector components are readily available. The combination of low attenuation and high component availability in this wavelength makes the development of wavelength-division multiplexing (WDM) FSO systems feasible. However, components are generally more expensive, and detectors are typically less sensitive and have a smaller receive surface area.The modulated light source, which is typically a laser or light-emitting diode (LED), provides the transmitted optical signal and determines all the transmitter capabilities of the system. Only the detector sensitivity plays an equally important role in total system . The small footprint and low power consumption (important for overall system design and maintenance), and ability to operate over a wide temperature range without major performance degradation (important for outdoor systems) are the strong points of merit for the FSO. There are numerous advantages of free space optics application with RoF, FSO provides a wireless solution to last mile connection or connection between two buildings. There is no hassle with digging and burying fiber cable. Also free space optics requires no RF license. Therefore FSO system could be deployed easily,(a FSO system quickly). It is easily upgradable, and its open interfaces support equipment from a variety of vendors, which helps enterprises and service providers protect their investment in embedded telecommunications infrastructures. It can be deployed behind windows, eliminating the need for costly rooftop rights. It is immune to radio frequency interference or saturation.It also provides up to 2.5 Gbps of data throughput. This provides ample bandwidth to transfer files between two sites. With the growing size of files, free space optics provides the necessary bandwidth to transfer these files efficiently.FSO is a very secure wireless solution. The laser beam cannot be detected with a spectrum analyzer or RF meter. The beam is invisible which makes it hard to find. The laser beam that is used to transmit and receive data is very narrow. This means that it is almost impossible to intercept the data being transmitted. One would have to be in the line of sight between receiver and transmitter to be able to accomplish this feat. Of course if that happens it would cause an alert due to the receiving site has lost connection. There are no security upgrades that are required for FSO .The above discussed points will be working as a complementary points for the RoF system.Whereas there are a number of weaknesses with FSO .The distance of FSO is very limited. Operating distance is usually within 2 km. Therefore although this is a powerful system with great throughput, the limitation of its distance is a big deterrent. Line of sight must be maintained at all times during transmission. Any obstacle, be it environmental or animals, can hinder the transmission. FSO technology must be designed to combat changes in the atmosphere, which can affect FSO system performance capacity. Among the issues to be considered when deploying FSO-based optical wireless systems.

III. LINK DESIGN

The designing of the link is the one intended to be implemented at the receiver section ,wherein the solution for the two problem is sought-

1. Last mile

2.Places where fiber installation for the communication channel is not possible.

The Central station of the RoF based FSO link model will be transmitting the signals considering it to be two in number , they upon being amplified is then sent for the wavelength division multiplexing at the transmitter end , the output of the WDM multiplexer is the single wave incorporating within itself two signals which is being carried at different frequencies, upon being launched into the the channel it is preamplified by the EDFA from where it goes to the SMF , and after that before reaching the receiver station , the signal when is given out of the SMF undergoes the post amplification ,after this the signal got demultiplexed and now from here they are sent to their respective base stations the corresponding signals are carried in two different manner , for the first section the array of the FSO antennas exhibiting the aperture diversity is used to recover the signal, whereas the second base station the signal is transmitted to its destination by a SMF assisted FSO link where the SMF will be providing the backup link to the FSO so that in case of any atmospheric fluctuations to which the FSO is less immune to ,

and hence will not be able to take up the signal, then immediately the SMF of the same range as that of the FSO will become operative.The second scheme is typically a solution to the last mile , whereas the first one is the solution for the last mile as well as for the places where fiber installation is difficult to be achieved. In both the cases , the possibility of signal to be lost or subjected to fading even if occurs then the system proves out to be the robust one to withstand all such performance degrading factors since because it has these mitigation schemes operational within it.

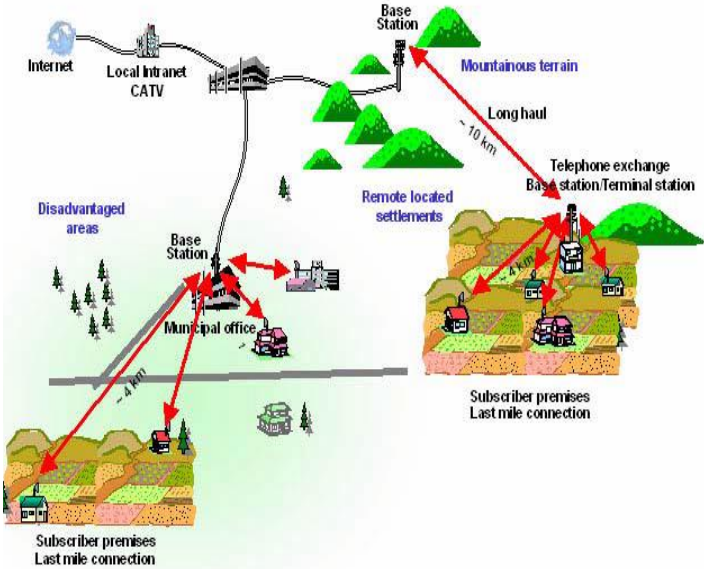

Fig.no.2 Places where FSO can be implemented

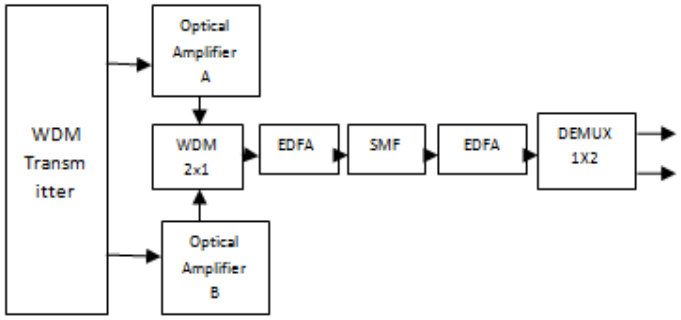

Fig.no.3 Transmitter section of the RoF based FSO link

The transmitter section is common for both the receiving station.

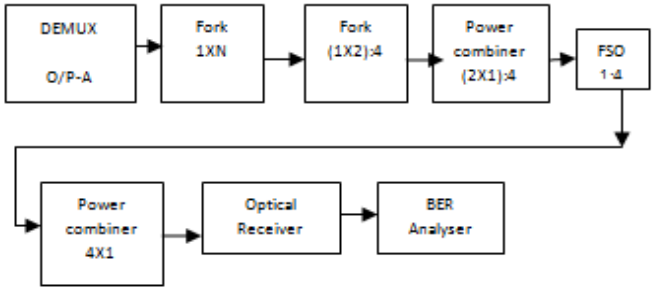

Fig.no.4 Receiver Section-A (Array of FSO exhibiting aperture diversity)

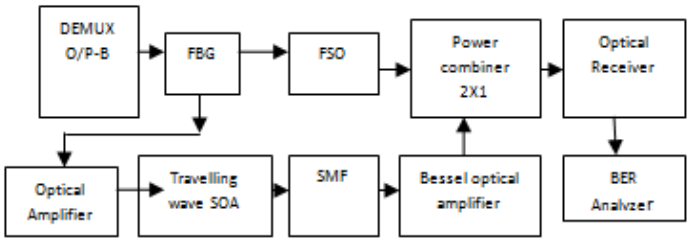

Fig.no.5 Receiver Section-B (FSO having SMF as backup link)

The simulation of the system has been carried out at different length of the SMF from 10 km to 65 km and the values from the BER analyzer has been noted down .The following graphs depicts the result for the length of SMF and Q factors obtained corresponding to it .The first

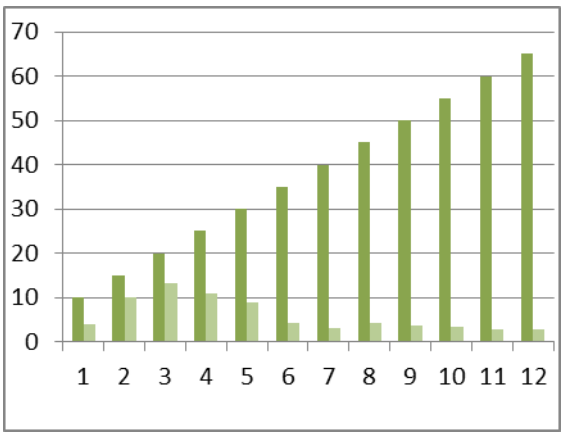

Fig. no. 6 Graph for receiver section-1
SMF length/Qfactor

Xaxis-Samples
Yaxis –SMF length in kms (dark green bars) and Q factor(light green bars)
graph is for the first receiver section where FSO with aperture diversity is operational , whereas the second receiver section shows the FSO with the SMF link backup.

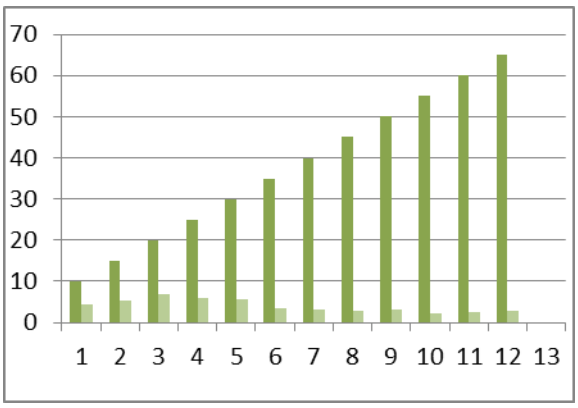

Fig. no. 7 Graph for receiver section-2

SMF length/Q factor
Yaxis –SMF length in kms (dark green bars) and Q factor(light green bars)

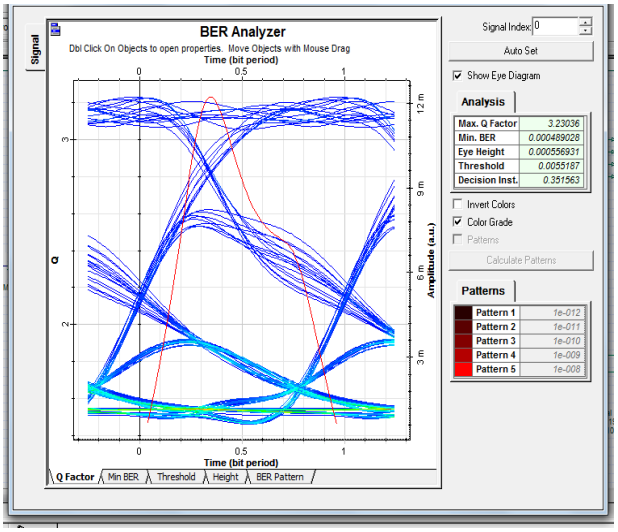

Fig.no.8 Eye diagram for 1st receiver section at SMF 40 Kms

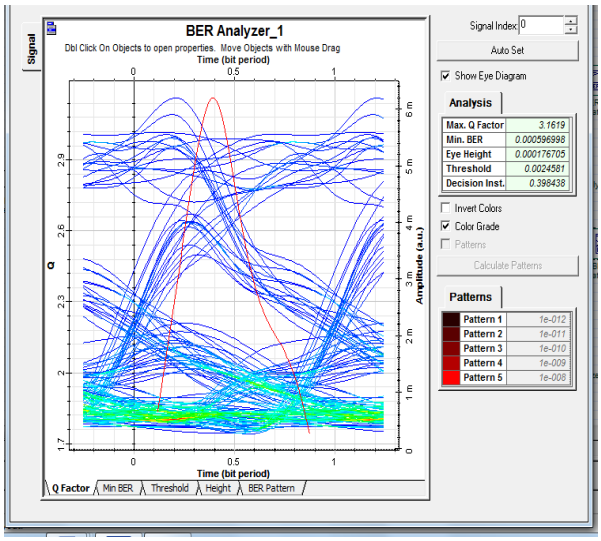

Fig.no.9 Eye diagram for 2nd receiver section at SMF 40Kms

IV. RESULT AND DISCUSSION

After carrying simulation in optisystem software the best Max. Q factor is achieved at the SMF length of 20km , with the Min BER and Eye opening height at their desired value , whereas at 60 km and above for section 1 , the results of all these parameters declines , likewise for the section 2 .It is also seen that the optimum value for working is also yielded by the system at SMF of 40 km length , therefore if we wish for better Q factor values while operating at shorter distances , 20km of SMF length will give out good results whereas if long distance communication is required then the SMF length between 40-50 km is also good to be used.

V. CONCLUSION

The implementation of the RoF with the FSO be it either in form of FSO aperture diversity or FSO with SMF backup , both yield improved result over the conventional RoF architecture of working.

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A Robust Heterogeneous Network Structure with ROF and ROFSO for Better Link Availability

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Abstract- There are variety of applications where optical fibers are not feasible, to provide ubiquitous wireless services quickly and more effectively , then in such cases RoFSO links can be used to transmit signals. But inspite of its potential, such links are highly vulnerable to fluctuating atmospheric conditions and also dependent on the deployment surrounding characteristics in particular the weather conditions, severity and duration of the atmospheric effects have direct impact on the availability of the links as well as on the quality of RF signal transmitted over it. Whereas the Radio over Fiber (RoF) technology, as a means of transferring radio signals using optical fibers without changing radio format, has become a candidate for the common platform for wireless access networks. This technology provides a simplified and cost-effective radio access network and supports high-speed multimedia to satisfy the increasing demand when the radio spectrum is limited. It also helps to increase transmission capacity and distance of wireless. However, the applicability of this solution greatly depends on the availability of fiber cable infrastructure and installation costs. Therefore to have communication systems which has low cost, simple, is easy to install, and can be increasingly deployed to offer high-speed, broadband communications links with an ease to provide high-speed communications without the difficulty and cost of deploying optical fiber cable . A heterogeneous structure made up of RoFSO and RoF can be an attractive means for RF signal transmission, providing a versatile role of both wire and wireless system for an optical communication. This suggests us that if a compliance between the two , RoFSO and RoF is made that is the places where there is difficulty in deployment of the RoFSO then the RoF can be used and vice-versa, then there becomes lesser possibility of link failure and hence an improved availability of link can be achieved.

Index terms- Radio over Fiber (RoF), Free Space Optics(FSO), Radio on Free Space Optics(RoFSO).

I. INTRODUCTION

The development in various technologies has paved the advancement in photonics. The band of microwave and terahertz is always been an area of inquisitiveness due to the improved communication features as is outyeilded by it and is therefore been credited as the future of the next generation communication systems foundation. The promising technologies presently operating is Radio-on-Free-Space Optics (RoFSO) system which is conceived by combining Radio-over-Fiber (RoF) technique and free-space optical (FSO) communication technology using seamless connection of free-space and optical fiber. With this system it is possible to transmit simultaneously multiple RF signals representing different wireless services through free-space using WDM technique.

RoFSO system is a suitable platform for provision of ubiquitous wireless services. Free-space optics (FSO) systems are increasingly being considered as suitable alternative for transmission of optical and RF signals in situation where optical fiber deployment is not feasible. This can be made possible by utilizing FSO links designed by taking advantage of the emerging new generation FSO systems and advanced microwave and photonics technologies. The FSO rendering the merits of low costs ,high bit rate (10 Mbps to 2.5 Gbps) , providing the ease to set up a link in a few days, usage of the lasers which is safe to eyes being under limits; has enabled us to achieve connectivity solutions and has given 'Last-Mile' Network solutions along with it the most remarkable feature of establishing temporary network provision has been impulsive for the quick links setup in case of the difficult areas through which the communication is sought especially in military operative zones. Its GSM microcell connectivity is the topic of research for this paper since because cable digging, has increasingly becoming unpopular in cities, which is regulated by the local authority who may restrict re-digging frequency of roads and the cost may be prohibitive in some case, especially if a river or railway is in the way. The RF 2.4 GHz systems were typically running at 2-4 Mbps due to interference issues in the unlicensed frequency ranges but with the FSO providing 10 Mbps of throughput for less than unlicensed RF has introduced it as a strong contender in the heavily congested areas to be employed as a means of the communication. The interpretation of the technological advancement in wireless communication is best realized in terms of Radio over fiber(RoF) technology, since this technology lays an emphasis on the functionality which is simple and cost effective. Wireless network on the ROF technology has been proposed as the promising cost effective solution to meet ever increasing user bandwidth and wireless demand. As convergence of wired &wireless services ROF systems offers low attenuation loss large bandwidth immunity to radio frequency interference, easy installation ,maintenance and, reduced power consumption , Radio-over-fiber (RoF) systems are used to enhance the radio coverage of wireless applications and provide broadband services which makes RoF transport systems suitable for the long-haul microwave optical link.

II.RESEARCH

Among the different communication technologies, optical communications generally has the edge over baseband electronic or RF transmission systems whenever high aggregate bit rates and/or long transmission distances are involved. Both advantages are deeply rooted in physics: First, the high optical carrier frequencies allow for high-capacity systems at small relative bandwidths.Second, transmission losses at optical frequencies are usually very small compared to baseband electronic or RF technologies. Today's optical telecommunication fibers exhibit losses of less than 0.2 dB/km, Path loss,for typical RF attenuation (e.g. 2 GHz, 15 dBi antenna gains)Avg path loss in free space - > 68 dB for 1km , 118 dB for 10 km,Avg path loss in mobile radio (n=3.4, d_0=100 m) - > 82 dB/km, 146 dB for 10 km.

$$\overline{PL}_{\text{mobile-radio}} = \left(\frac{4\pi d_0}{\lambda}\right)^2 \left(\frac{d}{d_0}\right)^n$$

In free-space systems optical beams have much smaller divergence angles than in the microwave regime, at the expense of significantly exacerbated antenna pointing requirements. The narrow beam width favourably translates into the system's link budget, in particular in space-based systems where atmospheric absorption is less of a problem.
Therefore for a typical FSO , Typical optical attenuation (e.g. 1550 nm or 194 THz)clear atmospheric conditions -> 0.2 dB/km urban (because of dust) -> 10 dB/km,Rain -> 2-35 dB/km,Snow -> 10-100 dB/km,light fog -> 120 dB/km,dense fog -> 300 dB/km,maritime fog -> 480 dB/km.

III.LINK DESIGN

The RoFSO is broadband RF optical wireless communication link with fiber-optic technologies. It can provide universal platform for heterogeneous radio entrance network, in especially rural area with no fiber infrastructure. The developed RoFSO transceiver can directly connect multiple radio-on-fiber (RoF) signals from an optical fiber to the air, and can receive an optical signal from the air into a fiber core and the designing is supported by the FSO link .

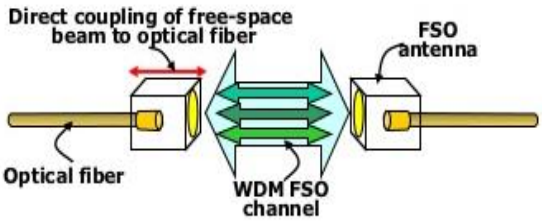

Fig. no.1 RoF and FSO operating together

At the network level a CS is connected to the numerous functionally, simple BSs via an optical fiber .The main function is to convert optical signal to the wireless one and viceversa ,almost all of

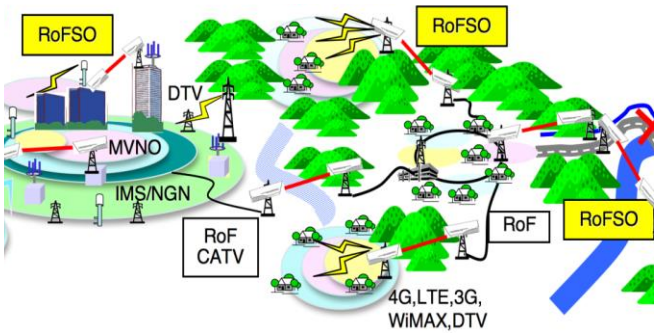

Fig. no. 2 Network of RoF with RoFSO

the processing including modulation ,demodulation coding , routing is performed at the CS that means RoF networks use highly linear optic fiber link to distribute RF signals between BS and CS. At the minimum the RoF consists of all the hardware required to impose an RF signal on an optical carrier , the fiber optic link and the hardware required to recover the RF signal from carrier.

The topic of research is the micro cellular system where each microcell radio port is to consist of a simple and compact optoelectronic repeater connected by an radio frequency fiber optic link to centralized radio and control equipment,which is located at a pre-existing macrocell site with much lower power level thereby the need for the expensive frequency multiplexes or high-power amplifiers which are currently employed at base stations gets eliminated. The limited coverage due to low antenna height greatly reduces the co-channel interference from other cells, hence RoF systems are proposed to be used extensively for enhanced cellular coverage inside buildings .A microcellular network can be implemented by using fiber-fed distributed antenna networks. The received Radio Frequency signals at each remote antenna are transmitted over an analog optical fiber link to a central base station where all the de-multiplexing and signal processing are done. Thus the overall network backbone is supported with the RoF, now as RF links complements FSO to achieve carrier class availability (99.999%) therefore at ranges less than 1 km, most FSO systems due to being having enough dynamic range or margin to compensate for scintillation effect is employed. Current estimates suggest that approximately 95 percent of corporate buildings are within 1.5km of a telephone or Internet Service Provider's fiber-optic infrastructure. But few of these companies are implementing a high-speed data solution. Connecting the last-mile usually involves laying new fiber-optic or copper cable which can be cost prohibitive thus here the Free Space Optic installations is required, which demands line-of-sight availability between the laser/receiver units which are called link heads.Dealing with simply the FSO may not completely solve the problem of last mile connectivity , therefore instead of installing the FSO alone we will be focussing on the deployment of the RoFSO , which is able to give the combined feature of the FSO and the RoF which assures the network infrastructure ,at the places where the coupling between the RoFSO and RoF to take place smoothly and along with that the enhanced link connectivity and improved speed which is gifted to it by the FSO part which is operational with the RoF ,in the RoFSO, will also be there.

A thorough pre-installation site evaluation must be done to ensure that the paths between the Free-Space Optic units are clear and will remain so for a number of years. The units can be mounted on building tops, sides and even behind windows.The units are full-duplex, meaning that data can flow in both directions simultaneously.It is due to the lasers which are of low power and do not constitute a risk to the naked eye or any bird or animal that might get in the laser's path which supports the RoFSO deployment within RoF infrastructure as safe and supporting for the links establishment. The various vendors offer multiple ways to connect the Free-Space Optics equipment to the LAN or WAN equipment including standard fiber based optical connectors, 10BaseT, 100BaseT, 1000BaseT and other connectors. The frequencies used by the lasers are between 750 and 1550 GHz that is a typical FSO transceiver transmits one or more beams of light, each of which is 5–8 cm in diameter at the transmitter and typically spreads to roughly 1–5 m in diameter at a range of 1 km, in addition, FSO installations capable of 99.9% or better availability typically have enough margin to compensate for large amounts of atmospheric attenuation and thus have more than enough margin to compensate for scintillation. For longer, lower-availability links,transceiver design features such as the use of multiple laser transmitters can substantially reduce the effects of scintillation. The systems including network layer operability also use routers to segment the Free-Space Optic links. Many solutions incorporate a partial mesh design so that if one link fails for any reason, a redundant path is almost immediately available.

IV. FUTURE SCOPES

As the free space optical communications offer broadband highly secure communication system in which a single wavelength can be used to cover a large area within the same room, taking advantage of the fact that optical signals cannot pass through opaque obstacle.Taking this most attractive feature into consideration , we envisage the proposed heterogeneous RoF based RoFSO system to achieve the rank of providing the secure cpommunication.This makes the way to non-LOS non-directed configuration, also known as diffuse,connectivity is possible even when obstacles are placed between the transmitter and receiver, because of the high reflectivity of walls.As an alternative design to wide angle transmitters often used in diffuse communications,quasi-diffuse transmitters create multiple narrow beams targeted in different directions.Thus the diffuse link (for connectivity) system can be applied at the end of the RoFSO link to be terminated by the FSO link which further gets converted to the Indoor diffused based FSO , when launched within the boundaries, instead of RoF. Although indoor diffuse or quasi-diffuse model is interesting; but the Inter-Symbol Interference(ISI) impairment and high path loss, resulting in relatively low bit rates (155 Mb/s), offers little advantage over RF approaches. Thus there still exists suitability of indoor diffuse or quasi-diffuse transmissions to provide connectivity to mobile users.

In order to further enhance the radio coverage and getting on making further improvement on the RoF based RoFSO network , we need to work on the having the non line of sight communication through the RoFSO part of this heterogeneous structure with the compliance of the indoor diffuse optical wireless to be made operational within the confined boundaries. This feature will bring on acceleration towards the better connectivity even if unlike what is desired for the FSO part of RoFSO to work , that is the line of sight availability, is not there , if this scheme is effectively deployed then the communication be made secure. Since because the interception of the data through the RoF part is hard to crack , whereas there is still a possibility of having the intruder to tap the signals down from the FSO section of the RoFSO , hence the indoor diffusion facilitates us with the opportunity to relay the signals in the area having higher possibility of intended interferences to counter with the transceiving of signals in the closed environments only.

Diffuse Links uses multiple reflections of the
optical beam on surrounding surfaces such as ceilings, walls, and furniture.Therefore transmitter and receiver does not require to be directed one towards the other.It is robust to blocking and shadowing. However, even with these potential advantages over RF

systems, current academic and commercial diffuse optical LAN networks still provide lower data rates than RF LAN, due to the optical power decreasing greatly as the signal diffuses from a medium. Any change in the position and/or orientation of transmitter and/or receiver changes the channel characteristic. Blockage and shadowing also will vary the properties of channel. There will be wide variation in the observed properties if the transmitter or receiver rotates. Effective design of an infrared wireless communication system is required Effective design of an infrared wireless communication system requires channel measurements under different conditions and optical configurations. These measurements give an idea about the distortions that are encountered in the actual application of these systems that is the experimental setup employed for conducting the FSO channel measurements and modelling needs to be worked upon.

V.CONCLUSIONS

Advanced radio access network architectures supporting heterogeneous configurations are attractive from RoFSO perspective. Heterogeneous configurations generally provide shorter link distances between network elements, but also provide features which enhances link reliability in face of inclement weather and temporary obstructions.The working together of the two technologies ,RoF and RoFSO with their supplementing and complementing features has a potential to bring about the momentum in the next generation communication system which tends to clear the hinderance of the last mile problem and provides a secure commununication.

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Combing ability, Gene Action and Heterosis Estimation in Quality Protein Maize

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Abstract- Maize is a major cereal for human nutrition in Ethiopia. For communities that rely heavily on maize as the main staple, development of maize cultivars with enhanced levels of two essential amino acids such as lysine and tryptophan are a must. The objectives of the study were to find out the combining ability, the nature and magnitude of gene action and heterosis of quality protein maize inbred lines. Six inbred lines and two testers were crossed to produce 12 F_1 hybrids. Twelve F_1 hybrids and two standard checks viz., BHQP542 and a normal maize hybrid, Jibat, were evaluated in a randomized complete block design with two replications in 2011 at Adet. Although it was a one season trial, LN1, LN2 and LN5 were good general combiners for grain yield and yield component characters and can be used for development of hybrids. Hybrid HN7 (81.1%), HN8 (107.3%) and HN11 (88.3%) had higher magnitude of heterosis over the quality protein maize check but these hybrids were not superior over the normal maize check. From this result hybrid HN7, HN8 and HN11 can be exploited for future use and additional effort is required for the development of competent quality protein maize.

Index Terms- general combining ability, line by tester and specific combining ability

I. INTRODUCTION

Maize (Zea mays L.) is one of the important cereal crop grown in Ethiopia. In 2011/12 cropping season, maize is the first in total production over 6 million tonnes, and with yield per unit area 2.9 tonnes per hectare and second in area coverage among all the cereal crops (CSA, 2011/12). It is an essential food source in Ethiopia. All maize produced used for food. But almost all maize varieties cultivated in the country are normal maize varieties which are devoid of essential amino acids such as lysine and tryptophan. Million of smallholder farmers in the major maize producing regions of Ethiopia depend on maize for their daily food throughout the year and they have almost no access to protein sources like meat, eggs and milk for their daily consumption (Dereje *et al.*, 2001). One of the main nutritional limitations of normal maize is its poor nutritional profile because of a deficiency in essential amino acids such as lysine, tryptophan and methionine and an undesirable ratio of leucine and isoleucine (Bajaj *et al.*, 2007). Therefore, maize is a poor source of protein for both humans and monogastric animals. Thus, for communities that rely heavily on maize as the main staple, maize cultivars with an improved amino acid profile are a must.

Identification of opaque-2 gene (o2) can help the development of Quality protein maize (QPM) which solves the nutritional problem of normal maize. The mutant gene (o2) alters amino acid profile and composition of maize endosperm protein and result in two-fold increase in the levels of lysine and tryptophan compared to what is encountered in normal maize genotypes (Mertz, 1992; Villegas *et al.*, 1992). Because of the increase in concentration of these two essential amino acids, increased digestibility and increased nitrogen uptake relative to normal-endosperm maize (Mertz, 1992).

Heterosis is the phenomenon in which the cross of two inbreed lines produce hybrid that is superior in growth, size yield, or vigor of the F1 over the better parent (Lippman and Zamir, 2007). Krivanek *et al.* (2007) declared that heterosis and combining ability is prerequisite for developing a good economically viable hybrid maize variety. Information on heterosis and combining ability among maize germplasm is essential in maximizing the effectiveness of hybrid development. Combining ability analysis is one of the powerful tools in identifying the best combiners that may be used in crosses either to exploit heterosis or to accumulate

productive genes. The objective of this study was to find out the combining ability, the nature and magnitude of gene action and heterosis of quality protein maize inbred lines.

II. MATERIALS AND METHODS

The experiment was conducted at Adet Agricultural Research Center in 2011 cropping season. The experimental area at Adet is located within 11°17 'N latitude and 37° 43' longitude E at an altitude of 2240 masl. The soil type of the centre is Nitosol with pH 5.43. The long term total annual rainfall is 1091 mm, with an average minimum and maximum temperature of 18.2°C and 25.3°C, respectively. A total of 14 maize germplasms were used in this study. These germplasms were obtained from the Ambo National Maize Research centre. The lines were developed through selfing from a QPM synthetic variety originally developed from highland inbred lines converted to QPM by crossing to QPM donor lines developed CIMMYT by diallel mating system. The lines were S4 generation stage and test crossed with QPM tester lines, CML144 and CML159. The resultant twelve crosses (AMB06BSYN8Q6-2-4-1-2/CML144, AMB06BSYN8Q11-6-7-1-2/CML144, AMB06BSYN8Q15-4-3-1-1/CML144, AMB06BSYN8Q15-10-3-1-2/CML144, AMB06BSYN8Q18-7-3-1-2/CML144, AMB06BSYN8Q19-12-1-2-2/CML144, AMB06BSYN8Q6-2-4-1-2/CML159, AMB06BSYN8Q11-6-7-1-2/CML159, AMB06BSYN8Q15-4-3-1-1/CML159, AMB06BSYN8Q15-10-3-1-2/CML159, AMB06BSYN8Q18-7-3-1-2/CML159, AMB06BSYN8Q19-12-1-2-2/CML159) were evaluated with two standard checks viz., BHQP542 and a normal maize hybrid, Jibat (AMH851) in a randomized complete block design with two replications in 2011 at Adet. Each plot had one row each 5.1 m long. The standard of agronomic practices was adopted in order to ensure good crop stand. The recommended fertilizers rate 100kg/ha DAP and 75kg/ha UREA were applied. All of P_2O_5 and half of Nitrogen were applied at the time of planting. The remaining half of Nitrogen was applied 45 days after planting. Observations were recorded on days to 50 per cent tasseling, days to 50 percent of silking, date of maturity, plant height, ear height, number of ears per plant, ear length, ear diameter, number of kernel rows per cob, number of kernels per row, 100-grain weight, grain yield per plant, grain yield per hectare, moisture content (%), protein (%), carbohydrate (%) and oil content (%).Observations for days to 50% tasselling and silking and grain yield were recorded on whole plot basis whereas for remaining characters data were taken on ten randomly selected competitive plants/ears from a plot and average values for each character were taken as the mean of the treatment. And the treatment mean was used for statistical analysis. Protein (%), carbohydrate (%) and oil content (%) were determined at Amara Regional Agricultural Research institute (ARARI).

III. RESULTS

The analysis of variance revealed that mean squares for entries were significant for all traits except ear length, ear diameter, number of kernels per row and yield per plant, signifying the presence of genetic variability among genotypes (Table 3.1). Analysis of variance for hybrids revealed that the mean sum of squares were highly significant for plant height, number of cobs per plot, 100-grain weight, protein content (%), starch content (%) and oil content (%), and significant for ear height, days to maturity, grain yield per ha and number of kernel rows per cob (Table 3.3) indicating that the tested hybrids varied from each other.

1.1. Mean performance

The mean value of plant height for hybrids varied from 150 cm for HN3 to 235 cm for HN11. Eleven hybrids showed significant plant height over check BHQP542 and all hybrids were shorter than check hybrid Jibat. Five hybrids were longer in ear height over the check BHQP542 and all hybrids produced shorter ear height than Jibat with range of 95cm to120cm. All hybrids were late in silking and tasseling as compared to check Jibat. But four and three hybrids were early in silking and tasseling with a range of 100 days to 107 days and 96.5 days to 105 days over check BHQP542, respectively.

The number of kernel rows per cob ranged from 12.7 (HN12) to 14.8 (HN1). All hybrids had higher number of kernel rows per cob than check BHQP542 whereas none of the hybrids exhibited higher number of kernel rows per cob than check Jibat. The

number of cobs per plot varied from 8.5 (HN1 and HN9) to 19(HN8). Seven hybrids showed higher number of cobs per plot than check BHQP542 and one hybrid (HN8) disclosed more number of cobs per plot than both checks.

Hundred grain weight ranged from 18.8g (HN6) to 57.6g (HN10) and all hybrids were not superior to the two checks. Grain yield (Qha^{-1}) varied 15.8(HN3) to 63.9 (HN8) and six hybrids had better grain yield (Qha^{-1}) performance than BHQP542.

Six and four hybrids had higher protein content (%) over the check Jibat and BHQP542, respectively with range of 7.7% (HN9) to 10.3% (HN3). The range of starch content (%) was from 68.1(HN3) to 73.1(HN6). Two hybrids had higher starch content (%) over Jibat and one hybrid over the two checks. The oil content (%) of twelve hybrids varied from 3.35 to 5.25 and ten hybrids had higher oil content than only check Jibat.

Table 1. Analysis of variance of 14 entries for 16 traits

Source variation	*Df*	PH	EH	DSS	DST	DSM	EL	ED	NKR	NK	GW	NCP	GYH
Replication	1	1032.1	0.32	0.89	0.89	36.6	12.1	0.092	0.87*	10.8	124.32	15.2	318.6
Entries	13	1959**	435.8*	20.9**	20.96**	60.7*	13.6	0.127	1.64**	65.7	2376009.6**	31.2**	387.3**
Error	13	249.4	149.6	3.35	3.4	16	6.45	0.065	0.18	26.2	962.9	7.1	92.1
R		0.89	0.74	0.86	0.86	0.79	0.69	0.67	0.90	0.71	0.99	0.81	0.81
CV		7.6	11.5	1.77	1.77	2.58	17.99	7.36	3.1	16.14	3.89	22	23.1
F		7.85	2.91	6.25	6.25	3.78	2.1	1.94	8.87	2.51	2467.64	4.38	4.2

*, **significant at 0.05, 0.01 levels of probability, respectively.

Table 1. *Continued*

SOURCE VARIATION	*Df*	GYP	PC	SC	OC
Replication	1	664.9	0.09	1.75	0.006
Entries	13	1804.9	1.61**	4.19**	0.790**
Error	13	882.7	0.10	0.21	0.035
R		0.67	0.94	0.95	0.95
CV (%)		26.10	3.60	0.65	4.05
F		2.04	15.71	19.48	22.3

*, **significant at 0.05, 0.01 levels of probability, respectively

Where PH= plant height(cm) , EH= ear height(cm), DSS= days to 50%silking, DSM=days to maturity, DST=days to tasseling, EL=ear length (cm), ED= ear diameter (cm), NKR= number of kernel rows per cob, NK= number of kernels per row, NCP= number of cobs per plot, GYH=grain yield per hectare, GYP= grain yield per plant, GW= 100 grain weight (g), PC= protein content (%), SC= starch content (%) and OC=oil content (%), for all tables

Table 2. Mean performances of 14 entries (12 hybrids and 2 check hybrids) for twelve traits.

Hybrid No	PH	EH	DSS	DST	DSM	NKR	NCP	GW	GYH	PC	SC	OC
HN1	227.5	115.0	101.0	100.0	156.5	14.8	8.5	51.9	33.7	9.20	70.25	4.35
HN2	212.5	107.5	104.0	101.5	152.5	14.6	14.0	38.8	35.8	8.50	71.80	4.45
HN3	150.0	95.0	105.5	105.0	145.0	13.9	14.0	36.9	15.8	10.30	68.10	5.25
HN4	212.5	107.5	107.0	102.0	151.0	13.9	13.0	20.7	35.4	10.25	69.20	5.25
HN5	230.0	107.5	104.0	102.0	160.0	12.9	13.0	30.5	47.6	9.95	69.50	4.85
HN6	217.5	110.0	102.0	101.0	150.0	13.1	17.0	18.8	49.4	8.25	73.10	3.70
HN7	220.0	115.0	102.5	100.0	163.5	14.6	12.0	41.5	55.9	8.10	70.20	4.90
HN8	215.0	120.0	100.0	96.5	157.5	14.0	19.0	60.5	63.9	9.05	70.25	4.85
HN9	220.0	112.5	104.0	100.5	161.0	13.3	8.5	33.7	36.1	7.70	72.15	3.35
HN10	217.5	107.5	107.0	101.0	146.0	13.8	9.5	57.6	21.9	10.25	68.55	5.25
HN11	235.0	122.5	102.5	99.5	156.5	14.0	16.5	34.7	58.1	8.55	68.95	5.25
HN12	222.5	106.0	100.5	98.5	159.0	12.7	11.5	30.9	46.9	8.05	70.55	4.90
HN13	235.0	117.5	95.5	93.5	157.5	12.0	14.0	33.8	50.7	8.45	71.00	3.85
HN14	185.0	92.5	106.0	102.5	155.0	14.8	7.5	21.5	30.8	9.15	71.60	5.00
LSD (0.05)	24.65	18.93	2.86	2.86	6.16	0.92	4.18	46.2	14.96	0.48	0.70	0.28
LSD (0.01)	34.79	26.70	4.00	4.00	8.69	1.28	5.9	68	18.6	0.68	0.99	0.40

Where, HN1= AMB06BSYN8Q6-2-4-1-2/CML144, HN2= AMB06BSYN8Q11-6-7-1-2/CML144, HN3= AMB06BSYN8Q15-4-3-1-1/CML144,HN4= AMB06BSYN8Q15-10-3-1-2/CML144, HN5= AMB06BSYN8Q18-7-3-1-2/CML144, HN6= AMB06BSYN8Q19-12-1-2-2/CML144 , HN7= AMB06BSYN8Q6-2-4-1-2/CML159, HN8= AMB06BSYN8Q11-6-7-1-2/CML159 , HN9= AMB06BSYN8Q15-4-3-1-1/CML159, HN10= AMB06BSYN8Q15-10-3-1-2/CML159, HN11= AMB06BSYN8Q18-7-3-1-2/CML159 , HN12= AMB06BSYN8Q19-12-1-2-2/CML159, HN13= Jibat check and HN14= BHQP542 check, for all tables.

1.2. Analysis of Variance for combining ability

Lines significantly differed for all traits except for days to 50% tasseling, ear length, ear diameter, grain yield per plant and number of kernels per row. Testers significantly varied in days to 50% tasseling, plant height, days to maturity, yield per plant, grain yield per ha, protein content (%), starch content (%) and oil content (%).The line x tester interaction was significant for plant height, ear height, days to maturity, number of kernels per row, protein content (%), starch content (%) and oil content (%)(Table 3.3).

Specific Combining Ability (SCA) variance was higher than General Combining Ability (GCA) variance for all traits indicating predominance of dominance variance in controlling studied characters. The SCA variance to GCA variance ratio was lower than unity, which again confirms the predominance of non-additive gene action for the inheritance of the characters (Table 3.4). The ratio of additive to dominance variance was greater than unity for days to 50% silking, days to 50% tasselling, 100-grain weight and grain yield per plant indicative of equal importance of additive and non-additive gene action for these traits. It was less than unity for the remaining characters indicating the role of dominant genetic components than the additive component of variation.

1.2.1. General combining ability (GCA) effect

Estimates of GCA effects for sixteen characters are presented in Table 3.5. Line LN1 and LN2 were good general combiner for number of kernel rows per cob, number of cobs per plot and 100-grain weight. For grain yield (Qha^{-1}) trait significant and highest GCA effect was recorded in parental line LN5 and it showed significant GCA effects for plant height, protein content (%) and oil content (%). Line LN6 revealed significant positive GCA effect for starch content (%). Tester CML 159 had revealed significant positive GCA effects for 100-grain weight and oil content (%) but it had significant negative GCA effect for protein content (%).Tester CML144 had significant positive GCA effect for protein content.

1.2.2. Specific combining ability (SCA) effects

A critical evaluation of the results with respect to SCA effects showed that none of the hybrid revealed desirable significant SCA effects for all the characters (Table 3.6). However; hybrid HN3, HN8 and HN10 were good specific combiners for protein content (%). Likewise, for starch content (%) hybrid HN2 and HN9 were good specific combiners. Hybrid HN3, HN7 and HN12 disclosed significant SCA effect for oil content (%).

Table 3. Line x Tester analysis of 12 hybrids for sixteen traits

Source of variation	*Df*	PH	EH	DSS	DST	DSM	EL	ED	GYH	NKR	NK	NCP
Hybrids(H)	11	1505.6**	457.5*	11	8.6	70.55*	15.4	0.14	2000.4	1.1*	73.5	32.3**
Lines(L)	5	1798.5**	482*	19.3*	7.28	65.6*	10.38	0.18	1866.4	1.7**	53.8	50.6**
Testers(T)	1	301**	12	8.2	40*	135.4*	24.6	0.001	7395.9*	0.23	30	7.7
L X T	5	1453.6**	522*	3.4	3.7	62.3*	18.6	0.12	1055.3	0.7	102*	18.9
Error	11	52.6	131	4.9	4.3	18.4	7.1	0.06	1453	0.3	28.6	6.14

*, ** significant at 0.05, 0.01 levels of probability, respectively

Table 3. *continued.*

Source of variation	*Df*	GW	GYH	PC	SC	OC
Hybrids(H)	11	310.9**	421.5*	1.85**	4.56**	0.61**
Lines(L)	5	526.4**	527*	2.02**	4.83**	0.6**
Testers(T)	1	214.2	703.9*	3.8**	0.28*	0.07*
L X T	5	114.9	259.6	1.3**	5.15**	0.72**
Error	11	45.3	102	0.04	0.07	0.01

*, ** significant at 0.05, 0.01 levels of probability, respectively

Table 4. Estimates of the variance due to GCA, SCA, dominance variance and additive variance for 16 traits.

Genetic parameters	PH	EH	DSS	DST	DSM	EL	ED	NKR	NK	NCP	GW	GYH
□□□GCA	48.4	12.6	0.54	0.39	2.4	0.39	0.005	0.04	1.56	1.36	14.82	17.4
□□□SCA	700.5	195.5	-0.75	-0.3	22.1	5.75	0.03	0.2	36.7	6.38	34.8	78.8
□□□GCA/□□□□SCA	0.07	0.06	0.72	-1.3	0.11	0.07	0.2	0.25	0.04	0.2	0.4	0.22
□□□□	193.6	50.4	2.16	1.56	9.6	1.56	0.02	0.16	6.24	5.44	59.28	69.6
□□□D	700.5	195.5	-0.75	-0.3	22.1	5.75	0.03	0.2	36.7	6.38	34.8	78.8
□□□□□□□□D	0.28	0.26	-2.88	-5.2	0.43	0.27	0.67	0.8	0.17	0.85	1.7	0.88

Table 4. *Continued*

Genetic parameters	GYP	PC	SC	OC
□□□GCA	87.7	0.07	0.13	0.02
□□□SCA	-198.8	0.63	2.54	0.35
□□□GCA/□□□□SCA	-0.44	0.11	0.05	0.06
□□□□	348.4	0.28	0.52	0.08
□□□D	-198.8	0.63	2.54	0.35
□□□□□□□□D	-1.7	0.44	0.2	0.22

Table 5. General combining ability (GCA) effects of parents in respect of thirteen characters at Adet

Line No	PH	EH	DSS	DST	DM	NKR	NCP	GW	GYH	GYP	PC	**SC**	**OC**
LN1	4.20	4.50	-1.58	0.62	5.12*	0.82*	2.79*	8.67*	3.04	32.21	-0.36**	0.01	-0.07
LN2	-5.80	3.25	-1.33	-1.62	0.12	1.17**	3.45*	11.62**	8.14	3.85	-0.23**	0.81**	-0.04
LN3	-7.08	-6.75	1.41	2.12	-1.87	-0.53	-1.79	-2.72	-15.74**	-24.73	-0.01	-0.09	0.39**
LN4	-4.58	-3.00	3.70**	0.87	-6.37*	0.72	-1.79	1.10	-13.07*	-24.20	1.23**	-1.34**	0.55**
LN5	12.90**	4.50	-0.08	0.12	3.37	-0.43	1.70	-5.47	11.11*	6.68	0.23*	-0.99**	0.35**
LN6	0.42	-2.50	-2.08	-0.87	-0.37	-1.76**	1.20	-13.20**	6.50	6.18	-0.86	1.61**	-0.39**
SEm±	3.60	5.70	1.10	1.03	2.14	0.39	1.23	3.36	5.04	19.18	0.10	0.13	0.05
LSD (0.05)	7.92	12.54	2.42	2.26	4.71	0.81	2.70	7.39	11.09	42.20	0.22	0.28	0.11
LSD (0.01)	11.18	17.70	3.41	3.19	6.64	1.09	3.82	10.43	15.65	59.57	0.31	0.40	0.15
Testers													
CML144	-2.08	-3.40	-0.58	1.29	-2.37	0.39	0.20	-5.10*	-5.40	-17.55	0.39**	0.10	-0.05*
CML159	2.08	3.40	0.58	-1.29	2.37	-0.39	-0.20	5.10*	5.40	17.55	-0.39**	-0.10	0.05*
SEm±	2.09	3.30	0.63	0.59	1.23	0.23	0.71	1.94	2.91	19.18	0.10	0.13	0.05
LSD (0.05)	4.60	7.26	1.26	1.29	2.70	0.47	1.56	4.26	6.40	42.20	0.22	0.28	0.11
LSD (0.01)	6.49	10.24	1.95	1.83	3.82	0.63	2.20	6.02	9.03	59.57	0.31	0.40	0.15

**, **; significant at 0.05 and 0.01 levels of probability, respectively*

Where, LN1= AMB06BSYN8Q6-2-4-1-2, LN2= AMB06BSYN8Q11-6-7-1-2, LN3= AMB06BSYN8Q15-4-3-1-1, LN4= AMB06BSYN8Q15-10-3-1-2, LN5= AMB06BSYN8Q18-7-3-1-2 and LN6= AMB06BSYN8Q19-12-1-2-2.

2. Magnitude of Heterosis over the two Checks

The outcomes of standard heterosis for different characters that had significant mean squares are presented in Table 4.1. Eleven hybrids showed significant positive standard heterosis for plant height over BHQP542 and one hybrid (HN3) had expressed significant negative standard heterosis over Jibat. The highest significant positive standard heterosis was manifested by HN11 (27%) followed by HN5 (24.5%). For ear height, five hybrids (HN1, HN7, HN8, HN9 and HN11) revealed significant positive standard heterosis over BHQP542 and one hybrid (HN3) divulged significant negative standard heterosis over Jibat. The largest magnitude of significant positive standard heterosis was manifested by HN8 (29.7%) followed by HN1 and HN7 (24.5%).

All and nine hybrids disclosed significant positive and negative standard heterosis for number of kernel rows per cob over Jibat and BHQP542 respectively. HN1 (23.3%) recorded the highest standard heterosis followed by HN2 (21.7%) and HN7 (21.7%). No hybrid that had revealed significant positive standard heterosis for number of kernels per row.

The extent of standard heterosis was mostly in the negative direction for days to 50% silking and tasseling over BHQP542. The maximum negative heterosis for days to 50% siking and tasselling was recorded for hybrid HN8 followed by hybrid HN12. But significant standard heterosis for all hybrids was in positive direction for days to 50% tasselling and silking over Jibat.

Eight hybrids showed high magnitude of significant positive standard heterosis over the check BHQP54 for cob numbers per plot. The largest magnitude of significant standard heterosis was manifested by hybrid HN8 (153.3%) followed by hybrid HN6 (126.7%). Only one hybrid HN8 (35.7%) revealed significant positive standard heterosis over the check Jibat.

For grain yield in quintal per hectare, six hybrids disclosed significant positive standard heterosis relative to check BHQP54 and hybrid HN7, HN8 and HN11 had expressed higher magnitude of significant positive standard heterosis (107.3% for HN8, 88.3 % for HN11 and 81.1% for HN7).

Hybrids HN3, HN4, HN5 and HN10 had higher positive standard heterosis for protein content (%) over check BHQP54 and Jibat.

Table 6. Specific combining ability (SCA) effects of test cross hybrids of maize in respect of thirteen characters at Adet

Hybrid No	PH	EH	DSS	DST	DSM	NKR	NCP	GYP	GW	GYH	PC	SC	OC
HN1	5.83	3.41	-1.33	-1.29	-1.12	0.03	-1.95	-8.99	10.30	-5.67	0.15	-0.08	-0.22**
HN2	0.83	-2.83	1.41	1.20	-0.12	0.23	-2.71	-5.08	-5.70	-8.65	-0.67**	0.66**	-0.14
HN3	-5.41	-5.33	0.16	0.95	-5.62	0.23	2.54	-24.10	6.70	-4.70	0.90**	-2.13**	1.00**
HN4	-0.41	3.41	-0.58	-0.79	4.87	-0.01	1.54	-21.99	-13.30*	12.20	-0.39*	0.21	0.05
HN5	-0.41	-4.08	0.16	-0.04	4.12	-0.61	-1.95	10.93	3.00	0.17	0.30	0.16	-0.14
HN6	-0.41	5.41	0.16	-0.04	-2.12	0.11	2.54	5.24	-0.96	6.65	-0.29	1.16	-0.54**
HN7	-5.83	-3.41	1.33	1.29	1.12	-0.03	1.95	8.99	-10.30	5.67	-0.15	0.08	0.22**
HN8	-0.83	2.83	-1.41	-1.20	0.12	-0.23	2.71	5.08	5.70	8.65	0.67**	-0.66**	0.14
HN9	5.41	5.33	-0.16	-0.95	5.62	-0.23	-2.54	24.10	-6.70	4.70	-0.90**	2.13**	-1.00**
HN10	0.41	-3.41	0.58	0.79	-4.87	0.01	-1.54	-21.99	13.30*	-12.20	0.39*	-0.21	-0.05
HN11	0.41	4.08	-0.16	0.04	-4.12	0.61	1.95	-10.93	-3.00	-0.17	-0.30	-0.16	0.14
HN12	0.41	-5.41	-0.16	0.04	2.12	-0.11	-2.54	-5.24	0.96	-6.65	0.29	-1.16	0.54**
SEm±	5.10	8.09	1.56	1.46	3.03	0.38	1.75	26.95	4.75	7.14	0.14	0.18	0.07
LSD (0.05)	11.22	17.8	3.43	3.21	6.66	0.83	3.85	59.31	10.75	15.71	0.3	0.39	0.15
LSD (0.01)	15.84	25.12	4.84	4.53	9.41	1.18	5.60	85.11	14.75	22.17	0.43	0.55	0.21

and; Significant at 0.05 and 0.01levels of probability*

For starch content three hybrids (HN2, HN6 and HN9) and seven hybrids exhibited positive and negative standard heterosis over check Jibat respectively. And hybrid HN6 and nine hybrids exhibited significant positive and negative standard heterosis for the same trait over check BHQP54. Ten and one hybrids had disclosed significant positive and negative standard heterosis for oil content (%) over check Jibat respectively and four hybrids showed significant negative standard heterosis for this character over check BHQP54.

IV. DISCUSSION

Hybrids showed significant differences for most traits under study indicate the presence of high amount of differences for various traits that makes isolation possible for improvement of grain yield and yield component traits.

General combining ability (GCA) is the average performance of a strain in a serious of crosses which is associated with additive genetic effects while specific combining ability (SCA) is the deviation of individual crosses from the average performance of the parents involved that is associated with non- additive genetic effects (Falconer and Mackay, 1996; Kempthorne, 1957). High proportion of SCA variance than GCA variance for all traits under investigation indicated the greater role of non- additive genetic effects for controlling these characters. The ratio of GCA to SCA variance was lower than one, which again confirms the preponderance of non-additive gene action for the inheritance of the characters. These results are in the same trend with what obtained by Alamnie *et al* (2003), Wali *et al* (2010) and Sofi and Rather (2006).

The estimate of GCA effect of a parent is an important indicator of its potential for generating superior breeding genotypes. SCA effect used to determine the deviation of the performance individual crosses from the average performance of the parents involved (Falconer and Mackay, 1996). Parents (lines and testers) showed GCA effects with different magnitudes and directions indicating the presence of adequate diversity in the genetic constitution of parents. Inbred line LN5 was good general combiner for grain yield (Qha^{-1}). Line LN1 and LN2 were good general combiner for number of kernel rows per cob, number of cobs per plot and 100-grain weight.

Table 7. The nature and magnitude of heterosis for candidate hybrids relative to two checks

Hybrid No	PH		EH		DSM		NKR		GW		DST	
	Jibat	BHQP542	Jibat	BHQP542	Jibat	BHQP542	Jibat	BHQP542	Jibat	BHQP542	Jibat	BHQP542
HN1	-3.20	22.90	-2.10	24.50	-0.60	0.90	23.30**	0.00	53.60**	141.40**	6.90**	-2.40
HN2	-9.60	14.90	-8.50	16.20	-3.20	-1.60	21.70**	-1.40**	14.80**	80.50**	8.60**	-0.90
HN3	-36.20**	-18.90	-19.10	2.70	-7.90	-6.50	15.80**	-6.10**	9.20**	71.60**	12.30**	2.40
HN4	-9.60	14.90	-8.50	16.20	-4.10	-2.60	15.80**	-6.10**	-38.80**	-3.70	9.10**	-0.50
HN5	-2.10	24.30	-8.50	16.20	1.60	3.20	7.50**	-12.80**	-9.90**	41.60**	9.10**	-0.50
HN6	-7.40	17.60	-6.40	18.90	-4.80	-3.20	8.80**	-11.80**	-44.50**	-12.80**	8.00**	-1.50
HN7	-6.40	18.90	-2.10	24.50	3.80	5.50	21.70**	-1.40**	22.90**	93.00**	6.90**	-2.40
HN8	-8.50	16.20	2.10	29.70*	0.00	1.60	16.70**	-5.40**	78.90**	181.40**	3.20	-5.80**
HN9	-6.40	18.90	-4.30	21.60	2.20	3.90	10.80**	-10.10**	-0.30	56.70**	7.50**	-1.90
HN10	-7.40	17.60	-8.50	16.20	-7.30	-5.80	15.00**	-6.80**	70.30**	167.70**	8.00**	-1.50
HN11	0.00	270	4.30	32.40*	-0.60	0.90	16.70**	-5.40**	2.50	61.20**	6.40**	-2.90
HN12	-5.30	20.30	-9.80	14.60	0.90	2.60	5.80**	-14.20**	-8.60**	43.70**	5.30**	-3.90
SEm±	15.79		12.22		3.98		0.42		1.44		1.81	
CD at 5%	34.10		26.40		8.60		0.90		3.70		3.90	
CD at 1%	45.30		36.40		12.00		1.30		5.70		5.50	

**and **; significant at 0.05 and 0.01 levels of probability, respectively*

Table 7. *Continued*

Hybrid No	DSS		NCP		GYH		PC		SC		OC	
	Jibat	BHQP542	Jibat	BHQP542	Jibat	BHQP542	Jibat	BHQP542	Jibat	BHQP542	Jibat	BHQP542
HN1	5.80**	-4.70*	-39.30*	13.30**	-33.70**	9.10	8.87**	0.55*	-1.06*	-1.89**	12.99**	-13.00**

HN2	8.90**	-1.90	0.00	86.70**	-29.50**	16.00	0.59*	-7.10**	1.13**	0.28	15.58**	-11.00**
HN3	10.50**	-0.50	0.00	86.70**	-68.80**	-48.70**	21.89**	12.57**	-4.08**	-4.89**	36.36**	5.00**
HN4	12.00**	0.90	-7.10*	73.30**	-30.20**	14.80	21.30**	12.02**	-2.54**	-3.35**	36.36**	5.00**
HN5	8.90**	-1.90	-7.10*	73.30**	-6.30	54.20**	17.75**	8.74**	-2.11**	-2.93**	25.97**	-3.00**
HN6	6.80**	-3.80	21.40**	126.70**	-2.60	60.30**	-2.40**	-9.84**	2.96**	2.09**	-3.89**	-26.00**
HN7	7.30**	-3.30	-14.30**	60.00**	10.10	81.10**	-4.10**	-11.48**	-1.13**	-1.96**	27.27**	-2.00**
HN8	4.70*	-5.70*	35.70**	153.30**	26.00*	107.30**	7.10**	-1.09**	-1.06**	-1.89**	25.97**	-3.00**
HN9	8.90**	-1.90	-39.30**	13.30**	-28.80*	17.10	-8.87**	-15.85**	1.62**	0.77*	-12.99**	-33.00**
HN10	12.00**	0.90	-32.10**	26.70**	-56.90**	-29.10**	21.30**	12.02**	-3.45**	-4.26**	36.36**	5.00**
HN11	7.30**	-3.30	17.90**	120.00**	14.50	88.30**	1.20**	-6.56**	-2.89**	-3.70**	36.36**	5.00**
HN12	5.20*	-5.20*	-17.90**	53.30**	-7.40	52.30**	-4.73**	-12.02**	-0.63	-1.47**	27.27**	-2.00**
SEm±	1.81		2.68		9.58		0.22		0.32		0.13	
CD at 5%	3.90		5.80		20.70		0.48		0.70		0.28	
CD at 1%	5.50		8.00		28.90		0.68		0.99		0.40	

**and **; significant at 0.05 and 0.01 levels of probability, respectively*

Tester CML 159 had revealed significant positive GCA effects for 100-grain weight and oil content (%) and tester CML144 had significant positive GCA effect for protein content (%).These result indicated that LN5, LN1 and LN2 contributed to increased grain yield in their crosses. And tester CML144 and CML 159 can be used for quality improvement. Alamnie *et al* (2003) reported that four lines, namely, HYD.SEL 13, HYD.SEL 10, HYD.SEL 14, and HYD.SEL 6 among females and CI-5 among males were good general combiners for increase in grain yield.

SCA effects for yield and yield contributing traits show that the hybrids had better or poorer performance than the expected GCA effects of their respective parents. No hybrid that was best specific combiner for grain yield. However; hybrid HN3, HN8 and HN10 were good specific combiners for protein content (%).

Hybrids showed superiority over standard checks for various traits indicating the presence of substantial heterosis in the hybrids and the potential of inbred lines for hybrid development. Five hybrids (HN5, HN6, HN7, HN8 and HN11) showed superiority for grain yield (Qha^{-1}) over the standard check BHQP54 but all hybrids were not superior compared to the normal maize hybrid check for the same trait proposes the need for additional effort for the development of competent quality protein maize germplasm. These results are in line with Dagne Wegary (2008). Almost all hybrids had expressed negative standard heterosis over BHQP54 and positive standard heterosis over Jibat indicating earliness and lateness compared to BHQP54 and Jibat respectively. Hybrid HN3, HN4, HN5 and HN10 revealed high amount of protein over checks. Heterosis responses of hybrids largely depend on genetic diversity of parents and environmental conditions (Hallauer and Miranda, 1988). Heterosis response increases with increased genetic diversity.

V. Conclusion

Combining ability analysis and estimation of heterosis are important breeding methods to develop high yielding hybrid in maize. High amount of differences were observed among hybrids for most traits which indicate the possibility of selection for improvement of yield and yield related traits. Non- additive gene action is more important for controlling most traits under study.

Since this exploration is a one year and location trial, it is suggested to evaluate in multilocation trial on large scale basis before their commercial cultivation of identified promising hybrids for grain yield and their stability over locations and seasons.

Even if it is a one year trial, LN1, LN2 and LN5 showed desirable GCA effects for grain yield and yield contributing traits and can be used for development of hybrids. Moreover; there were hybrids (HN5 (54.2%), HN6 (60.3%), HN7 (81.1%), HN8 (107.3%) and HN11 (88.3%)) that had higher magnitude of heterosis over the quality protein maize check but these hybrids were not superior over the normal maize check. From this result hybrid HN8 and HN11can be exploited for future use and additional effort is required for the development of competent quality protein maize.

ACKNOWLEDGMENTS

First of all, I would like to convey my exceptional thanks and appreciation to my advisor Dr. Tadesse Dessalegn for his close supervision, assistance, constructive criticism, support and generosity during the whole period of my study. I would also like to thank my co-advisor Dr. Yigzaw Dessalegn for his guidance, encouragement, all-rounded support and valuable comments. I would like to thank Mr. Kassa Yihun (Ambo Agricultural Research Center) who provided me the planting materials and valuable information used for the study. I am indebted to Adet Agricultural Research Center for providing technical and financial assistance during my study. I also thank the Amhara Regional Agricultural Research Institute (ARARI) for the training opportunity given to me.

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Reduction of THD in Diode Clamped Multilevel Inverter employing SPWM technique

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***Abstract*—** Conventional two-level pulse width modulation (PWM) inverters generate high dv/dt, high frequency common mode voltages and introduces harmonics which is very harmful in electric drives applications. It may damage motor bearings, conducted electromagnetic interferences, and malfunctioning of electronic equipments. Multilevel inverter (MLI) technology has emerged recently as a very important alternative in the area of high-power medium-voltage energy control. Neutral-point-clamped (NPC) inverters are the most widely used topology of multilevel inverters in high-power applications (several megawatts). This paper presents the most relevant control and modulation method developed for inverters to reduce total harmonic distortion (THD): multilevel sinusoidal pulse width modulation (SPWM). More relevant applications of these converters are laminators, conveyor belts, and unified power-flow controllers. Simulation results obtained in Matlab/Simulink confirms the effectiveness with negligible THD.

Index Terms- PWM, Multilevel Inverter, Neutral Point Clamped Inverter, Total Harmonic Distortion, SPWM.

I. INTRODUCTION

Multilevel Inverters have gained much attention in the field of the medium voltage and high power applications because of their many advantages, such as their low voltage stress on power switches, low harmonic and EMI output. At present, there are three basic multilevel inverter topologies: diode-clamped multilevel inverter (DCMI), flying capacitor multilevel inverter (FCMI) and multi-module cascaded inverter (MMCI). These are shown below in Fig. 1[1].

For research on multi level inverter topologies, a preferred multilevel inverter topology shall have the following characteristics:

1) The level is easy to extend.
2) When the number of levels is high enough, the harmonic content is low.
3) There is no need for filters.
4) Inverter efficiency is high because all devices are switched at the fundamental frequency.
5) The control method is simple.

Performance of multilevel inverters depends on the PWM converter topology. In two-level or

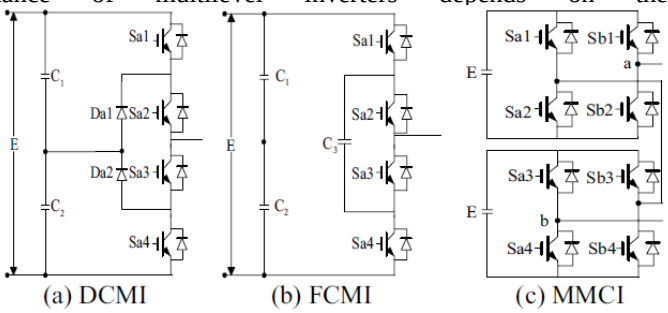

Fig. 1. Multilevel inverter topologies

multilevel

inverters, there is only one turn-on, turn-off per device per cycle. With these converters, the ac output voltage can be controlled, by varying the width of the voltage pulses, and/or the amplitude of the dc bus voltage. Another approach is to have multiple pulses per half-cycle, and then vary the width of the pulses to vary the amplitude of the ac voltage. The principle reason for doing so is to be able to vary the ac output voltage and to reduce the low-order harmonics.

PWM switching strategies not only addresses the primary issues viz, less THD, effective dc bus utilization etc but also take care of secondary issues like EMI reduction, switching loss, better spreading of harmonics over the spectrum.

Among various modulation techniques [1] for a multilevel inverter, sin-triangle pulse width modulation (SPWM) is an attractive candidate due to the following merits. It proportionally varies the width of each pulse to the amplitude of a sine wave evaluated at the center of the same pulse [2]. It is suitable for MATLAB/SIMULINK implementation.

In sin-triangle PWM, three phase reference modulating signals are compared against a common triangular carrier to generate PWM pulses for the three phases. Reduction of total harmonics distortion (THD) of inverter output voltage and the distortion seamless when level of diode-clamped inverter has got increased is the main advantage of the proposed control method.

II. VOLTAGE SOURCE INVERTERS

A voltage source inverter consists of a turn-off device connected in anti-parallel with a diode which has lowest reverse leakage current with the anode of turn-off device connected to the positive side of DC side. In inverter action, turn-off device will conduct and current / power flows from DC side to AC side. In rectifier action, the diode will conduct and current / power flows from AC to DC side. Under inverter operation, current and voltage will be of opposite polarity and under rectifier operation they will be of same polarity. The compensation is applied at mid-point to improve the voltage regulation. For radial lines, shunt compensation is applied at the end of line to prevent voltage instability, for dynamic voltage control, to increase transient stability and for damping of power oscillations. Mid-point of transmission line is the best location for compensator because the voltage sag for uncompensated line is maximum at the mid-point. Also, the compensation at mid-point breaks the line into equal segments, for each of which, the maximum transmittable power is the same.

III. INVERTER TOPOLOGY

Neutral Point-Clamped Inverter:

A three-level diode-clamped inverter is shown in Fig. 2(a). In this circuit, the dc-bus voltage is split into three levels by two series-connected bulk capacitors, C_1 and C_2. The middle point of the two capacitors n can be defined as the neutral point. The output voltage v_{an} has three states: $V_{dc}/2$, 0, and $-V_{dc}/2$. For voltage level $V_{dc}/2$, switches S_1 and S_2 need to be turned on; for $-V_{dc}/2$, switches S_1' and S_2' need to be turned on; and for the 0 level, S_2 and S_1' need to be turned on.

The key components that distinguish this circuit from a conventional two-level inverter are D_1 and D_1'. These two diodes clamp the switch voltage to half the level of the dc-bus voltage. When both S_1 and S_2 turn on, the voltage across a and 0 is V_{dc} i.e., $v_{a0} = V_{dc}$. In this case, D_1' balances out the voltage sharing between S_1' and S_2' with S_1' blocking the voltage across C_1 and S_2' blocking the voltage across C_2. Notice that output voltage v_{an} is ac, and v_{a0} is dc. The difference between v_{an} and v_{a0} is the voltage across C_2, which is $V_{dc}/2$. If the output is removed out between a and 0, then the circuit becomes a dc/dc converter, which has three output voltage levels: V_{dc} , $V_{dc}/2$, and 0.

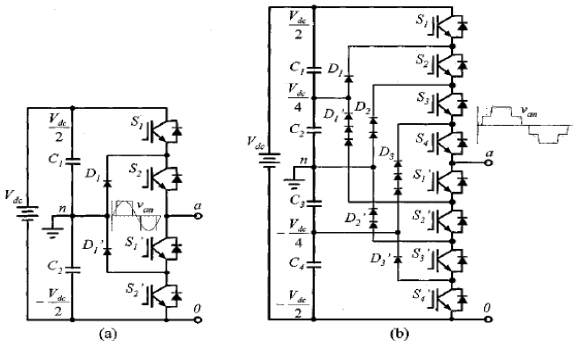

Fig. 2. Diode-clamped multilevel inverter circuit topologies.
(a) Three-level. (b) Five-level.

Considering that m is the number of steps of the phase voltage with respect to the negative terminal of the inverter, then the number of steps in the voltage between two phases of the load k is

$$k = 2m+1 \quad (1)$$

and the number of steps p in the phase voltage of a three-phase load in wye connection is

$$p = 2k - 1. \quad (2)$$

The term multilevel starts with the three-level inverter introduced by Nabae *et al.* [3]. By increasing the number of levels in the inverter, the output voltages have more steps generating a staircase waveform, which has a reduced harmonic distortion. However, a high number of levels increases the control complexity and introduces voltage imbalance problems.

Fig. 2(b) shows a five-level diode-clamped converter in which the dc bus consists of four capacitors, C_1, C_2, C_3, and C_4. For dc-bus voltage V_{dc}, the voltage across each capacitor is $V_{dc}/4$, and each device voltage stress will be limited to one capacitor voltage level $V_{dc}/4$ through clamping diodes.

To explain how the staircase voltage is synthesized, the neutral point n is considered as the output phase voltage reference point. There are five switch combinations to synthesize five level voltages across a and n.

1) For voltage level $V_{an} = V_{dc}/2$, turn on all upper switches $S_1 – S_4$.
2) For voltage level $V_{an} = V_{dc}/4$, turn on three upper switches $S_2 – S_4$ and one lower switch S_1'.

3) For voltage level $V_{an} = 0$, turn on two upper switches S_3 and S_4 and two lower switches S_1' and S_2'.

4) For voltage level $V_{an} = -V_{dc}/4$, turn on one upper switch and three lower switches S_1'– S_3'.

5) For voltage level $V_{an} = -V_{dc}/2$, turn on all lower switches S_1'– S_4'.

Four complementary switch pairs exist in each phase. The complementary switch pair is defined such that turning on one of the switches will exclude the other from being turned on. In this example, the four complementary pairs are (S_1, S_1'), (S_2, S_2'), (S_3, S_3'), and (S_4, S_4').

TABLE I. SWITHCING STATES OF THE FIVE LEVEL INVERTER

Output	*Switch States*							
v_{a0}	S_1	S_2	S_3	S_4	S_1'	S_2'	S_3'	S_4'
$V_5=V_{dc}$	1	1	1	1	0	0	0	0
$V_4=3V_{dc}/4$	0	1	1	1	1	0	0	0
$V_3=V_{dc}/2$	0	0	1	1	1	1	0	0
$V_2=V_{dc}/4$	0	0	0	1	1	1	1	0
$V_1= 0$	0	0	0	0	1	1	1	1

Although each active switching device is only required to block a voltage level of $V_{dc}/(m-1)$, the clamping diodes must have different voltage ratings for reverse voltage blocking. Using D_1'of Fig. 2(b) as an example, when lower devices S_2' ~ S_4' are turned on, D_1' needs to block three capacitor voltages, or $3V_{dc}/4$. Similarly, D_2 and D_2' need to block $2V_{dc}/4$, and D_3 needs to block $3V_{dc}/4$. Assuming that each blocking diode voltage rating is the same as the active device voltage rating, the number of diodes required for each phase will be $(m-1) \times (m-2)$. This number represents a quadratic increase in m. When m is sufficiently high, the number of diodes required will make the system impractical to implement. If the inverter runs under PWM, the diode reverse recovery of these clamping diodes becomes the major design challenge in high-voltage high-power applications.

IV. CONTROL STRATEGY

In many industrial applications, to control of the output voltage of inverters is often necessary to cope with the variations of dc input voltage, to regulate of inverters and to satisfy the constant volts and frequency control requirement. There are various techniques to vary the inverter gain. The most efficient method of controlling the gain and output voltage is to incorporate PWM control within the inverters.

The modulation methods used in multilevel inverters can be classified according to switching frequency [4], [5]. Methods that work with low switching frequencies generally perform one or two commutations of the power semiconductors during one cycle of the output voltages, generating a staircase waveform.

Methods that work with high switching frequencies have many commutations for the power semiconductors in one period of the fundamental output voltage. A very popular method in industrial applications is the classic carrier-based sinusoidal PWM (SPWM) that uses the phase-shifting technique to reduce the harmonics in the load voltage [6].

V. PROPOSED TECHNIQUE

SPWM:

Several multicarrier techniques have been developed to reduce the distortion in multilevel inverters, based on the classical SPWM with triangular carriers. Some methods use carrier disposition and others use phase shifting of multiple carrier signals [7], [8], [9].

The sinusoidal PWM compares a high frequency triangular carrier with three sinusoidal reference signals, known as the modulating signals to generate the gating signals for the inverter switches. This is basically an analog domain technique and is commonly used in power conversion with both analog and digital implementation.

The smallest distortion is obtained when the carriers are shifted by an angle of $\theta = 360°/Nc = 120°$. A very common practice in industrial applications for the multilevel inverter is the injection of a third harmonic in each cell to increase the output voltage [6], [10]. Another advantageous feature of multilevel SPWM is that the effective switching frequency of the load voltage is three (N_C=3) times the switching frequency of each cell, as determined by its carrier signal. This property allows a reduction in the switching frequency of each cell, thus reducing the switching losses.

Proposed SPWM for NPC Multilevel Inverter:

In the SPWM scheme for two-level inverters, each reference phase voltage is compared with the triangular carrier and the individual pole voltages are generated, independent of each other. The SPWM technique, for multilevel inverters, involves comparing

the reference phase voltage signals with a number of symmetrical level-shifted carrier waves for PWM generation [11]. It has been shown that for an n-level inverter, n-1 level-shifted carrier waves are required for comparison with the sinusoidal references [11].

When used for an NPCMLI with *n* number of voltage levels, *n-1* number of triangular carrier waves is used. These carrier waves have the same frequency and are arranged on top of each other, so that they together span from maximum output voltage to minimum output voltage [12]. When one carrier wave is crossed by the reference the output wave steps one level up or down with a switch transaction.

VI. SIMULATION RESULTS

To verify the proposed scheme, MATLAB/SIMULINK software is implemented. The experimental results are presented for different levels of NPCI using sinusoidal PWM technique. In SPWM control the pulse widths are generated by comparing a triangular reference signal with carrier sinusoidal signal. And these generated pulses are given for all switching devices of proposed inverter. DC voltage of the inverter for three level is *E=100V* and for five level *E=440V*. Fig 5.1 shows the reference signal is compared with two *(3-1)* carrier signals to generate three level output. Similarly Fig 5.4 shows the comparison with four *(5-1)* carrier signals to generate five level output. Fig. 5.2 illustrates the line voltage of NPC three level inverter with SPWM and Fig. 5.3 illustrates the THD spectrum of NPC three level inverter with SPWM. In this modulation technique the THD is *34.51%*. Fig. 5.5 illustrates the line voltage of NPC five level inverter with SPWM and Fig. 5.6 illustrates the THD spectrum of NPC five level inverter with SPWM. In this modulation technique the THD is *16.82%*.

The output voltage is closer to sinusoid and the THD values of line voltages also seamless as the level increases.

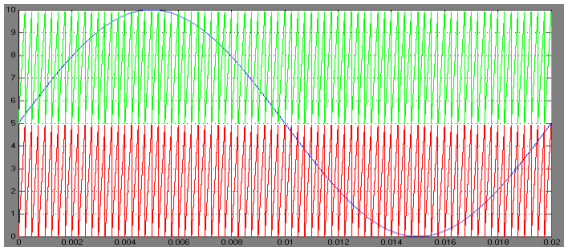

Fig. 5.1 The reference (cosine) and carrier waves (triangular) for a three-level NPCMLI with SPWM.

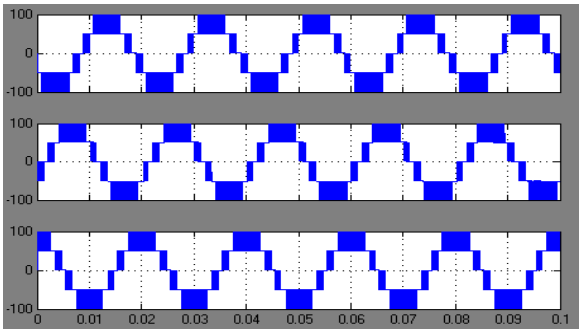

Fig. 5.2 The output voltage for a Three-level NPCMLI with SPWM.

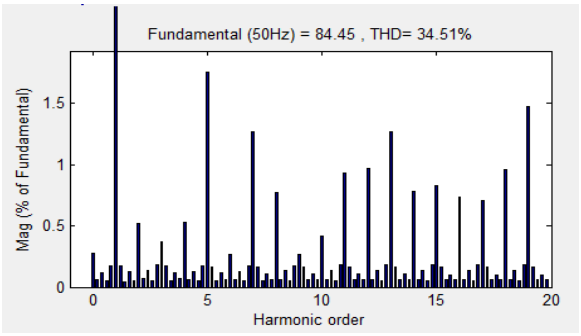

Fig. 5.3 THD spectrum for a three-level NPCMLI with SPWM

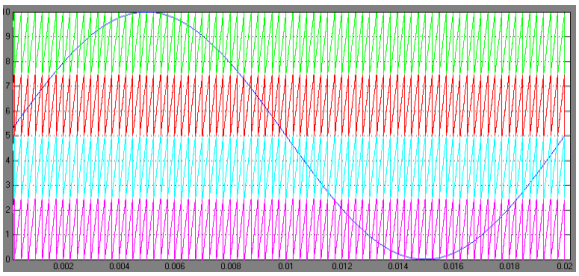

Fig. 5.4 The reference (cosine) and carrier waves (triangular) for a five-level NPCMLI with SPWM.

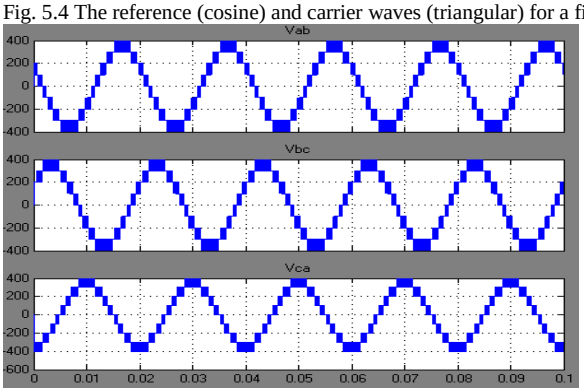

Fig. 5.5 The reference (cosine) and carrier waves (triangular) for a five-level NPCMLI with SPWM.

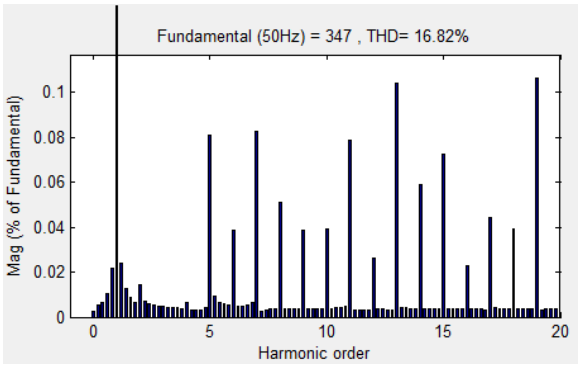

Fig. 5.6 THD spectrum for a three-level NPCMLI with SPWM

TABLE II. REDUCTION OF THD BY VARYING INVERTER LEVEL

Output Voltage level of NPCI	*THD*	*Fundamental Component*
Three Level	34.51%	84.45
Five Level	16.82%	347

VII. CONCLUSION

A classical SPWM technique is proposed for three-level and five-level NPC inverter. The main feature of the modulation scheme lies in its ability to eliminate the harmonics in the inverter output voltages. To assist the analysis and design of the classical scheme, the mechanism of the THD reduction with increase in level of inverter employing SPWM technique is discussed.

The harmonic content and THD of the inverter output voltage produced by the three and five levels are compared and it seamless for five level neutral point clamped inverter compared to three level NPCI. The proposed technique can be applied to any multilevel inverter configurations and we can generalize this method to any higher order inverters.

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Study of Photoconductivity in Mixed Composite of $MgTiO_3$ and ZnO

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Abstract- The photoconductivity of mixed composite of magnesium titanate ($MgTiO_3$) and zinc oxide ZnO has been reported with respect to the number of parameters. The sample is prepared by heating the homogeneous mixture of $MgTiO_3$ and ZnO in a cylindrical furnace at 600 - 800^0 C for 45 minute. For the measurement purpose, the cell is fabricated in the form of sandwich. In this type of cell the electrodes are in direct contact with the material. The effect of voltage, temperature and field intensity on photoconductivity have been investigated.

Index Terms **-** ZnO, Photocurrent, Temperature, Sub-linear, Super-linear, Intensity, Voltage

I. INTRODUCTION

The photoconductivity study provides us the substantial information about the electronic transition in semiconductor [1, 2]. Photoconductivity of material is considered to be an important tool for providing information, regarding the nature of the photo-excitations. In last few years most of the researchers have shown their great interest in the study of photoconductive properties of inorganic nanoparticles. A number of markers have investigated photo conducting properties of various materials [3]. Recently the optical and electrical characteristics of Al doped zinc oxide thin film prepared by solgel technique, property of gallium doped zinc oxide deposited on glass by spray analysis and applications of inorganic nano crystal in polymer-network have also been studied. It has been observed that zinc oxide (ZnO) exhibits good photoconductivity and high transparency in the visible region. Therefore zinc oxide may be used as transparent electrodes for solar cells [4]. A number of researchers have reported the measurement of photoconductivity in ZnO thin films [5]. It has been observed that in many materials the electrical conductivity is increases by absorption of radiation. If we consider the case of homogeneous material, the density of holes and electrons are uniform throughout the materials.

We know that the rise and decay curves of photocurrent are governed by the trapping states or recombination centers which lie in the forbidden energy zone of a photoconductor. So that using these curves we can understand the nature and distribution of traps and recombination centre. In case of semiconductor materials, the photoconductivity is caused due to photo−generation of electron−hole pairs in the material after absorption of photons which further increases the carrier density, resulting increase in conductivity of material. The response time is also an important tool of photoconducting materials. A good photosensitive material exhibits large change in conductivity and shows fast response. If the trapping centres are destroyed then response time becomes slow. The trapping centers may also increase the decay time if they slowly release the trapped carriers after the removal of excitation source. The number of electron and holes in insulators may be much larger than the corresponding free charge carrier density in the dark. In the steady state, generation rate of electrons and holes must be equal to the rate of recombination of charge carriers and the rate of trapping must be equal to the rate of de-trapping (or re-excitation). To analyze carrier transport problems involving these processes, it is important to set a quantitative criterion to separate trapping and recombination centers. To separate trapping and recombination centers Rose [6] has used demarcation. The demarcation level for electron traps is EDn, may be considered as the level at which a captured electron has an equal probability of being excited into the conduction band and of recombining with a hole from the valence band. Similarly, the demarcation level for hole traps is EDp, may be considered as the level at which a captured hole has an equal probability of being excited into the valence band and of recombining with an electron from the conduction band. But in the case of semiconductor the inverse is often true and the influence of radiation may be understood as a small perturbation on a large dark carrier density. The discussion of photoconductivity is mainly base on two assumptions:

(1) The conductivity is dominated by one of the carriers so that the contribution of the other may be effectively neglected.
(2) During the photoconductivity process, the crystal remains neutral without a build-up of appreciable space charge in the crystal.

There are a number of possible processes for the generation of intrinsic electron–hole pairs, such as singlet exciton–singlet exciton collision ionization and singlet exciton–triplet exiton collision ionization.

Two-photon carrier generation processes are directly related with the generation of two photo-excited states (excitons), which interacts and resulting in a direct transition of an electron from the valence band to the conduction band or to an auto ionization state above Ec [7,8]. The conductivity is mainly dominated by one of the carriers therefore the contribution of the other carrier may be neglected. A number of investigators have also observed the dependence of light intensity on photoconductivity which is primarily based on the charge neutrality condition with the gap states assumed to be distributed in energy but not necessary exponentially or based on the assumption that each localized gap state has three possible charge values such as neutral, negative, or positive[9,10]. Kao and Schellenberg [11] have generalized the Rose's original expression and explained in two ways:

(1) By extending the contribution of gap states to recombination from those above the mid gap states to any states between electron and hole quasi–Fermi levels.

(2) By including the effect of the asymmetry of gap state distributions and the charge neutrality condition.

This analysis showed that the odd values of the exponent may occur in solids with gap states distributed discretely or continually. Investigation of photocurrent with respect to number of parameters such as voltage, light intensity, energy of illumination temperature provides us substantial information about the material. The variation of photocurrent with light intensity provides information regarding the charge trapping and recombination process inside the material. The temperature dependence of photocurrent gives substantial information about the energy depth of Fermi-level and the localized defect states at a given temperatures.

II. MATERIALS AND METHODS

For the preparation of the mixed system, high purity Mg, TiO_3 and ZnO are taken in different proportions by weight. The three base material pure magnesium (Mg), pure titanium oxide (TiO_3) and pure zinc oxide (ZnO) are taken in the powder form. These proportions are ground properly in order to get homogeneous mixture. The homogeneous mixture is then fired in a ceramic tube in cylindrical furnace at 600^0C to 800^0C in controlled atmosphere for about 45 minutes. The heated material is then suddenly quenched at room temperature and again ground in order to get microcrystalline form. The sample is preserved in desiccators in order to avoid moisture. For firing process Muffle furnace or a high temperature wire bounded tubular furnace was used. The cell is fabricated in the form of parallel plate capacitors by embedding the sensitive material in polystyrene binder and sandwiching it between the two conducting glass plates. All the measurements are taken with the help of parallel plate capacitor having thickness varying from 0.3 cm to 0.5 cm with the electrode area 1.5 cm to 2.5 cm. For the measurement purpose of photoconductivity, the cell is placed in complete dark chamber and the radiations from a 2500 Watt mercury lamp is allowed to fall through a

window over the upper surface of the cell. The intensity of light over the upper surface of cell can be varied by changing the slit width or changing the distance between the lamp and hole. In our experiment, we have prepared two samples having different proportions. The first sample is made by taking 40% Mg, 40% TiO_3 and 20% ZnO named as MTZ1 and second sample is made by taking 46% Mg, 46% TiO_3 and 8% ZnO named as MTZ2.

III. RESULT & DISCUSSION

A. Effect of Voltage

The figure (1.1 and 1.2) shows variation between photocurrent (I_p) and voltage (V). The variation of photocurrent (I_{pc}) and applied voltage (V) is plotted on ln-ln scale which can be expressed by power law ($I_{pc} \alpha V^s$) , where s represents slope of the line[14]. The behavior of graph can be explained on the basis of value of slope. For $s < 1$, the variation of photocurrent versus voltage is sub-linear. For $s = 1$, the variation of photocurrent versus voltage shows linear (ohmic) behavior, and for $s > 1$, the behavior of photocurrent with voltage is super-linear.

Sample MTZ1

In the presence of light, the photocurrent increases slowly with applied voltage upto 4.5 volt and with further increase in voltage, the photocurrent increases rapidly and shows a nonlinear (I – V) characteristic. A non linear curve normally exhibits the existence of different kind of conduction mechanism. For lower value of applied voltage, the value of slope is smaller than that at higher voltage. Thus the slope changes its behavior with the variations of applied voltage. With the help of graph, we can conclude that photocurrent-voltage (I-V) curve shows two regions of conduction:

(1) Shows sub-linear behavior upto 4.5 volt
(2) Shows super-linear behavior after 4.5 volt

The above conduction processes can be explained in such a way that for low voltages the density of injected charge carrier is lower than the density of thermally generated charge carriers which in turn leads to the ohmic behavior. For high voltages, the value of slope is greater than that of at low voltages, which suggests that at higher voltage the conduction is primarily dominated by the trap

limited space charge limited conduction (SCLC) mechanism [12]. The trap limited space charge limited current varies with voltage. The voltage at which the curves changes its slope i.e. from sub-linear to super-linear is known as transition voltage (V_t = 4.5 Volt). The transition of sub-linear to super-linear variation is ascribed to flow of trap limited as well as space charge limited current inside the material. The super-linear behavior of the photocurrent shows that some of the charge carriers are being injected into the material from the electrode [13, 14].

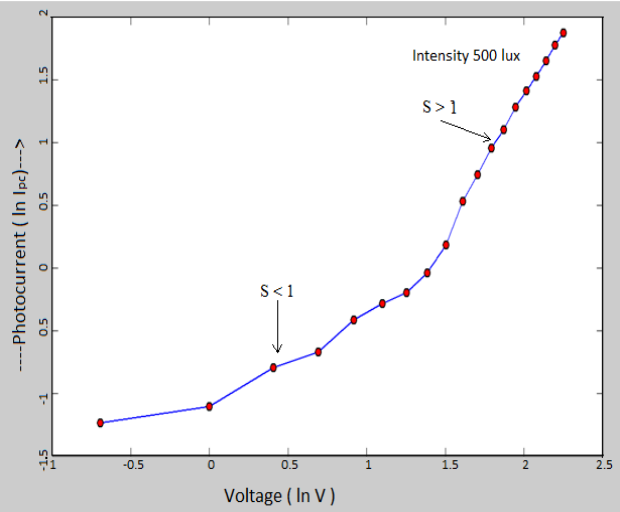

Figure 1.1: Variation of Photocurrent with Voltage on ln-ln scale for sample MTZ1

Sample MTZ2

From the figure, it can be observed that sample MTZ2 shows approximately similar behavior as observed for MTZ1. This shows that voltage- current characteristics are in good agreement for both the samples having different compositions of material.

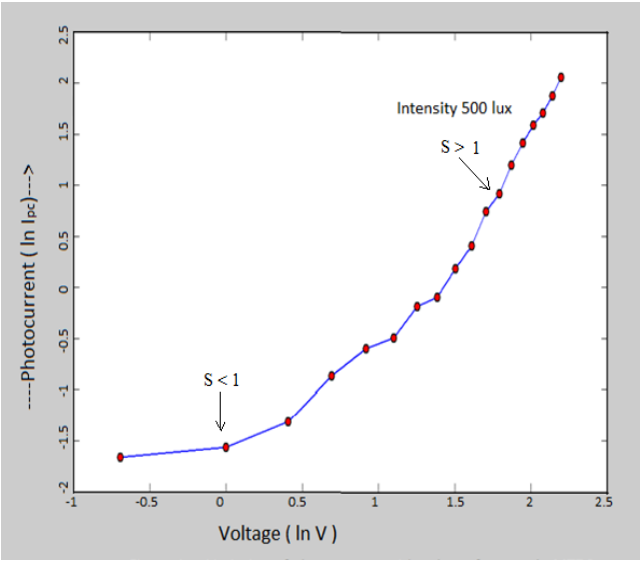

Figure 1.2: Variation of Photocurrent with Voltage on ln-ln scale for sample MTZ2

B. Effect of Temperature

The figure (2.1 and 2.2) shows the variation of photocurrent with temperature for sample MTZ1 and MTZ2. These curves are plotted for three discrete values of voltage i.e. 2V, 4V and 6V. The graphs plotted are non linear in nature.

Sample MTZ1

From the graph it is clear that, at low voltage (nearly 2 volt), the photocurrent increases sub-linearly with the increase in temperature. It is observed that with the increase in temperature there is rapid and incremental change in photocurrent. At 4 volt photocurrent first increases rapidly with increasing temperature and shows a hump in the curve. Further increase in temperature shows decrement in the photocurrent which further increases sub-linearly with increasing temperature. Similar variation of temperature versus photocurrent is observed at 6 volt. The points at which photocurrent increased rapidly, thermal quenching of photocurrent occurs. Thermal quenching of photocurrent can be explained on the basis of Rose Model.
According to Rose model, the steady state Fermi levels are shifted towards their respective band edge with an increase in the intensity of illumination. During this shift of Fermi levels, a large number of traps are converted into recombination centers. Thus, life time of the electron increases and the photoconductivity is sensitized. Fermi levels are shifted towards the middle of the gap with an increase in temperature.

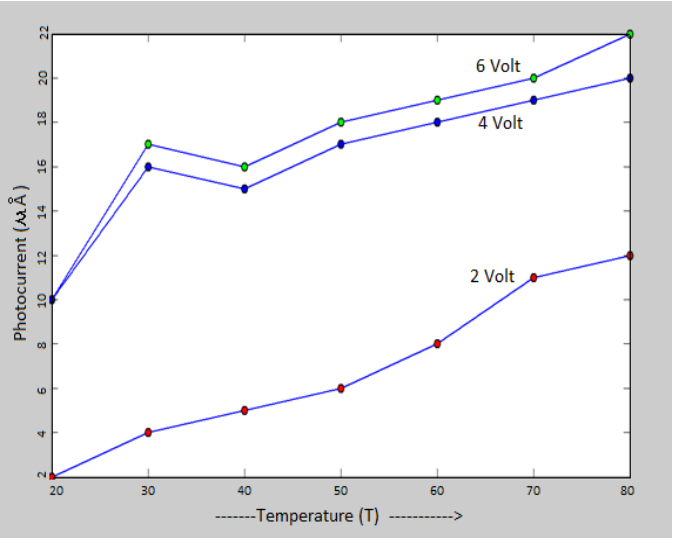

Figure 2.1: Variation of Photocurrent with Temperature for sample MTZ1

Sample MTZ2

It has been observed from the curve that photocurrent increases sub-linearly with increasing temperature at 2 volt. For 4 volt and 6 volts graph depicts approximately similar pattern. It is observed from the curve that it has small value of slope. It is observed that at 2 volt there is minimal impact of temperature on photocurrent. Similar patent is observed at 4 and 6 volt. On comparing MTZ1 and MTZ2, it is concluded that higher the concentration of ZnO, larger will be the photocurrent. Hence MTZ1 demonstrate great impact on photocurrent.

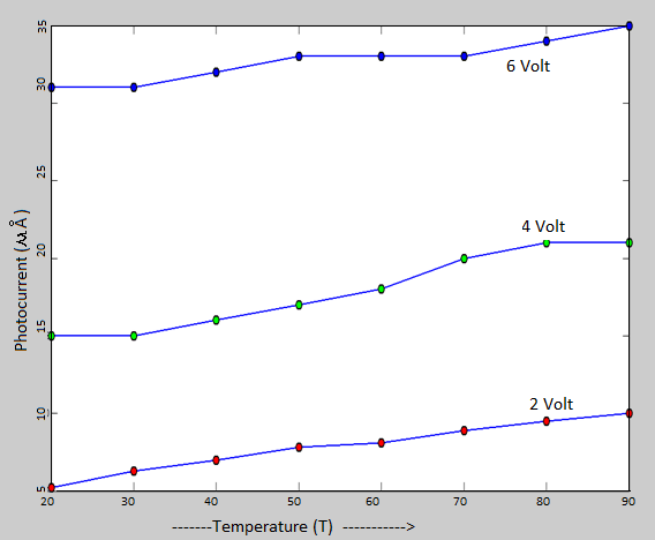

Figure 2.2: Variation of Photocurrent with Temperature for sample MTZ2

C. Effect of Intensity

The figure (3.1 and 3.2) shows the variation of photocurrent with intensity at fixed voltage (5 Volt) for the sample MTZ1 and MTZ2. The variation of photocurrent (I_{pc}) and applied intensity of illumination (L) is plotted on ln-ln scale which can be expressed by power law (I_{pc} α L^s), where s represents slope of the curve. The variation of intensity is measured in Lux and photocurrent is measured in micro-ampere. The curves plotted between photocurrent (I_p) and intensity (L) for sample MTZ1 and MTZ2 are non-linear in nature having different slopes in different regions of lower and higher intensity of illumination.

Sample MTZ1

For lower intensity region curve shows sub-linear nature of photocurrent whereas for higher intensity region, it depicts super-linear nature of photocurrent. The sub-linear (s < 1) and super-linear (s >2) nature of photocurrent can be explained on the basis of class I and class II states. Class I consist of states which have roughly similar cross section for electron and holes while the class II states have a higher capture cross section for holes than for electrons and lie close to the valence band. The sub-linear behavior of photocurrent illustrates that the class I centres are distributed continuously between the conduction band and Fermi level [15]. On further increasing the intensity of illumination, it has been observed that separation between conduction band and electron Fermi levels is highly increased, due to which large number of class I centres are converted into recombination centres. Thus the life time of electron decreases gradually. This decrement in life time of electron reduces the rate of increase of photocurrent which in turn, is responsible for sub-linearity in the photocurrent. On further increasing the intensity of illumination, the holes Fermi level are shifted towards valence bands and electron Fermi levels are shifted towards conduction bands. Due to this class II states are converted in recombination centres, which characterize the super-linear behavior of photocurrent.

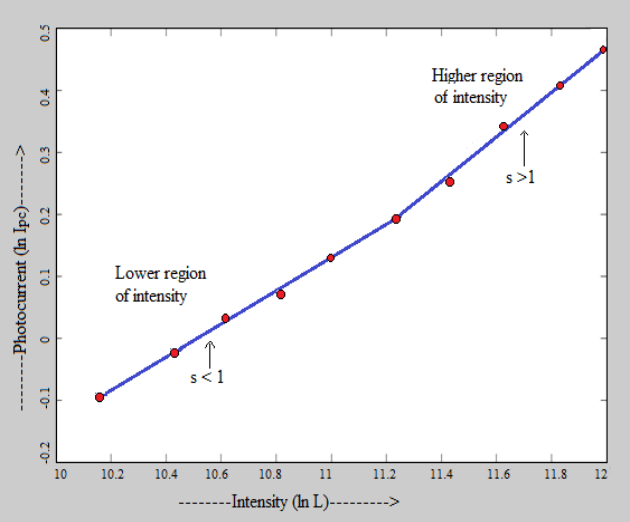

Figure 3.1: Variation of Photocurrent with intensity on ln-ln scale for sample MTZ1

Sample MTZ2

In lower intensity region, the photocurrent increases sub-linearly with increased intensity of illumination whereas in higher intensity region, increase in intensity of illumination further increases the photocurrent but it has been observed that slope of the curve is reduced to a lower value as compared to the lower intensity region.

On comparing both the samples it has been observed that both the curve depicts overall increase in photocurrent with increase in intensity of illumination. MTZ1 shows sub-linear to super-linear increment in photocurrent with enhancing slope of the curve whereas MTZ2 portrays the approximate similar behavior but with reduced slope. The comparative study of both the samples MTZ1 and MTZ2 concluded that variation of photocurrent with intensity of illumination depends on the compositions of the material. We can also confer that higher will be concentration of ZnO, higher will be the photocurrent produced.

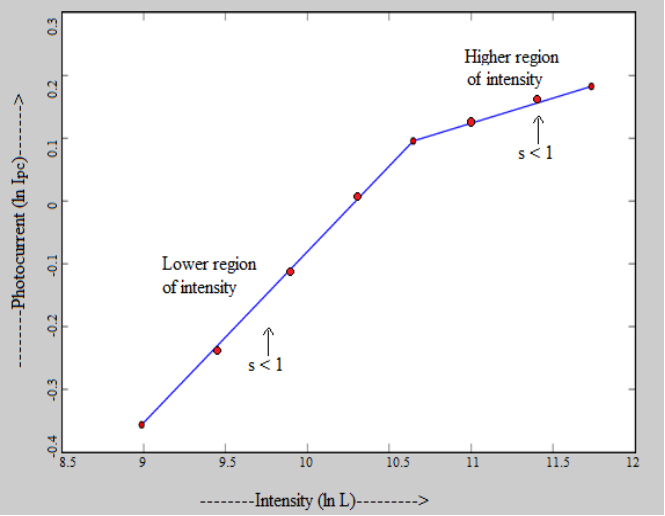

Figure 3.2: Variation of Photocurrent with intensity on ln-ln scale for sample MTZ2

IV. CONCLUSION:

We have studied effect of voltage, intensity of illumination and temperature on the photoconductivity of mixed composite of $MgTiO_3$ and ZnO in different compositions. The photocurrent-voltage (I-V) curve shows two regions of conduction: for s<1, photocurrent shows sub-linear behavior and for s>1, the photocurrent shows super-linear behavior. The transition of sub-linear to super-linear variation is ascribed to flow of trap limited as well as space charge limited current inside the material. The voltage-current characteristics are in good agreement for both the samples having different compositions of material. On increasing the temperature, the Fermi levels are shifted towards the middle of the gap. Due to this shift of Fermi levels, a large number of traps are converted into recombination centers. Thus, life time of the electron increases and the photoconductivity is sensitized. The curves

plotted between photocurrent (I_p) and intensity (L) for both sample MTZ1 and MTZ2 are non-linear in nature having different slopes in different regions of lower and higher intensity of illumination. The comparative study of both the samples MTZ1 and MTZ2 concluded that variation of photocurrent with intensity of illumination depends on the compositions of the material. We can also confer that higher will be concentration of ZnO, higher will be the photocurrent produced.

ACKNOWLEDGMENT

The authors Sumit Ruhela & S. K. Srivastava are thankful to Institute Instrumentation Center, IIT, Roorkee, India for providing the laboratory facility and also thankful to Prof. M.S. Murali, Director, Dronacharya college of engineering & technology, Greater Noida, and Dr. Tripti Johri, Asst. Professor, JPIET, Meerut, India for their assistance.

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Channel Coding Using LFSR Based Symmetric Cryptography

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Abstract—Advances in communication technology have seen strong interest in digital data transmission. However, illegal data access has become more easy and prevalent in wireless and general communication networks. In order to protect the valuable data from illegal access, different kinds of cryptographic systems have been proposed. In this paper, a new integrating channel coding and cryptography design communication systems is proposed. In order to preserve the advantages of encryption, improve its disadvantages, and combine the channel coding and cryptography, we place the encryptor before the hamming encoder to select the generator matrix to be used for block code to form the new system.

The analysis indicates the proposed design possesses the following feature. Its security is higher than the conventional one with the channel encoder only. Privacy is more due to unknown random codes. As the applied codes are unknown to a hostile user, this means that it is hardly possible to detect the message of another user. Anti-jam performance is good. It overcomes the disadvantage of Chaos based cryptography system as input data is not extended and hence bandwidth is not wasted. Moreover, the computer simulation shows that the proposed system has a good ability in error detection especially when the SNR per bit is moderate high, and the detection ability is enhanced when the increased length of Hamming code is employed

Index Terms- cryptography, LFSR, Pseudorandom codes, Hamming codes.

I. INTRODUCTION

Cryptography is the study of secret (crypto) writing (graph). Attempt to retrieve plain text or key is called Cryptanalysis. Cryptanalysis and Cryptography together are called Cryptology. Cryptanalysis to the science and art of breaking them with the knowledge of the sender; while cryptology, often shortened to just crypto, is the study of both. More generally, it is about constructing and analysing protocols that overcome the influence of adversaries. The input to an encryption process is commonly called the plaintext, and the output the cipher-text. Within the context of any application-to-application communication, there are some specific security requirements, including:

- Authentication: The process of proving one's identity.
- Privacy/confidentiality: Ensuring that no one can read the message except the intended receiver.
- Integrity: Assuring the receiver that the received message has not been altered in any way from the original

The communication services not only need to be provided but rather provided in a secure and reliable manner. For reliable transmission of data over the imperfect channel, channel coding is done. Linear block codes and convolutional codes are mainly used for channel coding. The basic linear block codes used are hamming codes. Cryptography is the practice and study of techniques for secure communication in the presence of third parties (called adversaries). More generally, it is system presented in this thesis is designed to merge channel coding with the cryptography to provide more security to the data signal to be transmitted over the channel. To reduce the computational and communication cost of two major cryptographic operations say channel coding and cryptography has been combined. The block diagram of the proposed communication system is shown in fig. 1.

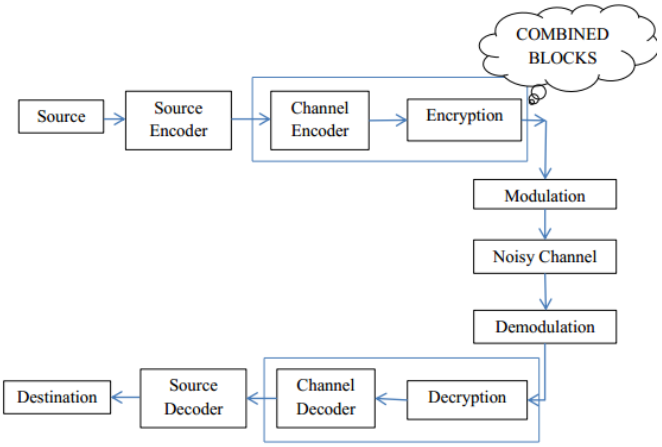

Fig.1: Proposed Block Diagram of Communication System

I. Proposed Channel Coding using Cryptography System.

Various steps have been followed for merging channel coding and encryption block in communication system, so that more secure transmission of data without the increase in bandwidth can be achieved than the conventional one with channel encoder only, and are explained step by step. Fig.1 shows the block diagram of proposed Channel Coding using Cryptography.

A. Using Symmetric Secret Key

Each encryption system requires a key (or cryptovariable) to function and all of the secrecy in the encryption process is maintained in the key. The keys may be identical or there may be a simple transformation to go between the two keys. The key represents a shared secret between two parties to communicate that can be used to maintain a private information link.

B. Generating Pseudo Random Sequence Using LFSR

A linear feedback shift register (LFSR) is a shift register whose input bit is a linear function of its previous state. The most commonly used linear function of single bit is XOR. Thus, an LFSR is most often a shift register whose input bit is driven by the exclusive-or (XOR) of some bits of the overall shift register value.
For a 4-bit key, tapping is defined by the polynomial,
Polynomial: x4+x3+1
The initial value of the LFSR is called the seed, and because the operation of the register is deterministic, the stream of values produced by the register is completely determined by its current (or previous) state. Likewise, because the register has a finite number of possible states, it must eventually enter a repeating cycle. A 4 bit key is given as input to the filter then this will generate a long p-n sequence.

C. Encoding and Encrypting

Error control coding is a method to detect and possibly correct errors by introducing redundancy to the stream of bits to be sent to the channel. The Channel Encoder will add bits to the message bits to be transmitted systematically.

D. Decoding and Decrypting

Decoding Hamming codes is almost as simple as encoding. The parity check matrix is used to decode linear block codes with generator matrix G. The parity check matrix H corresponding to a generator matrix G = [Ik|P] is defined as:

$$H = [PT| In-k]$$

It is easily verified that GHT= 0k, n−k, where 0k,n−k, denotes an all zero k ×(n−k) matrix. A given code word C in the code is obtained by multiplication of the information bit sequence i by the generator matrix, G: C = i*G.

II. RESULTS

The proposed system is tested for BER at different SNR values using Matlab software version 7.0.

BER comparison is shown for the transmitted signal over the noisy channel with and without channel coding.

Since a secret key is used to generate the p-n sequence which is further used to select the G-matrix, it is impossible for intruder to decrypt the data and crack the channel code.

CASE1: When the data is transmitted over a channel without any channel coding. Fig.2 shows the results that BER is very high even for the moderate SNR.

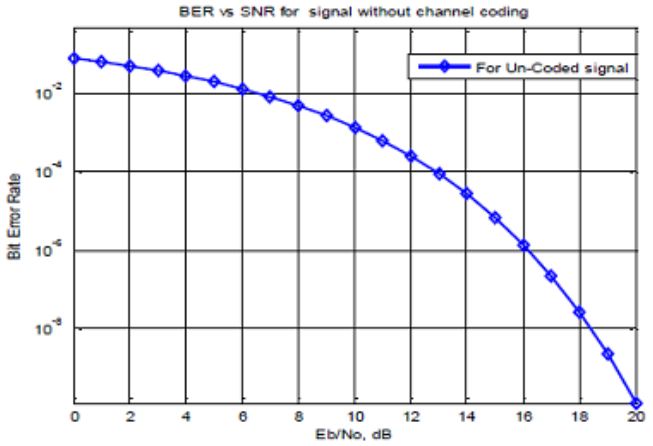

Fig. 2 SNR vs. BER Graph for Case 1

CASE 2: When data is transmitted over the channel without channel coding and with channel coding using cryptography. At the receiver side, the received word is decoded using the same key used at transmitter end and fig. 4.2 shows the comparison for SNR and BER for data with and without channel coding.

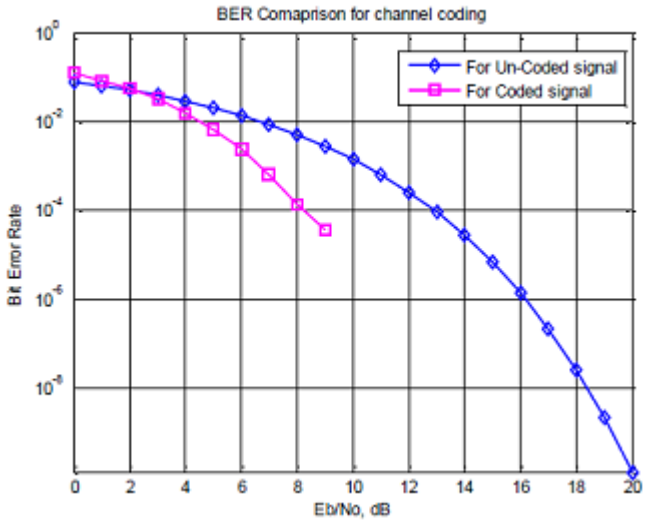

Fig. 3 SNR vs. BER Graph for Case 2

Fig. 2 SNR vs. BER Graph for Case 1

CASE 3: When data is transmitted using „L" bit key and it is intercepted unauthenticated receiver who tries to crack the channel coding using random key. Fig.3 shows SNR vs BER graph for the various signals

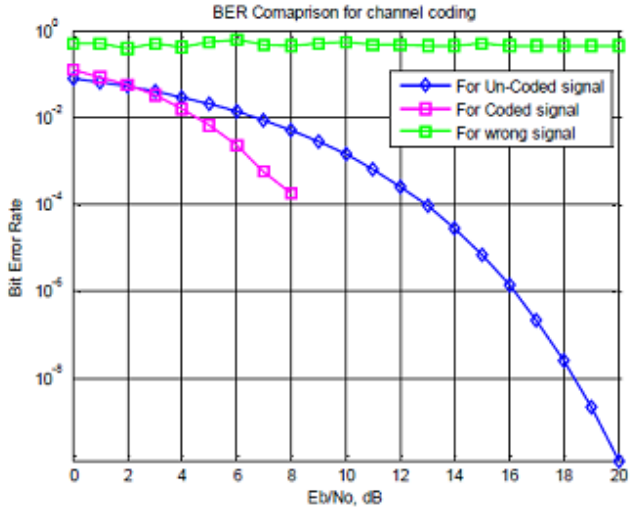

Fig. 4 SNR vs. BER Graph for Case 3

CASE 4: Considering the worst case if intruder knows the key length and is able to calculate the LFSR sequence but still not knowing the number of bits of LFSR sequence used to select G-matrix. Fig.4.4 shows SNR vs BER graph for the various signals

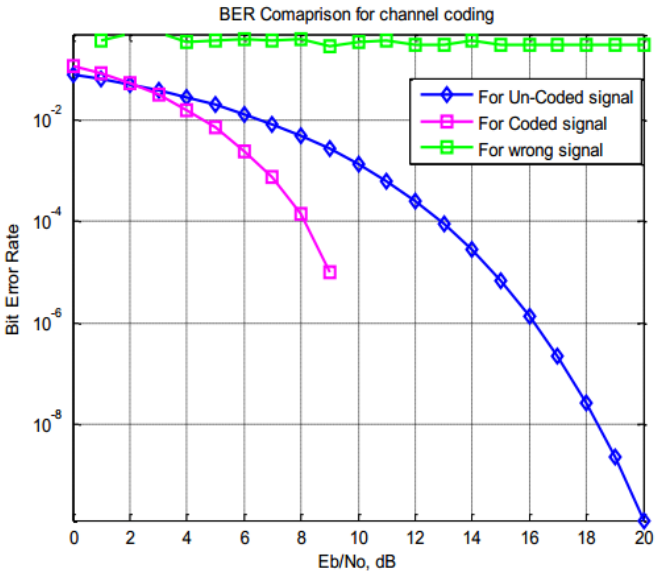

Fig.5 SNR vs. BER Graph for Case 4

The output of the system is in decimal notation and powers of 10 are represented in scientific „E" notation.

When data is transmitted using L" bit key and it is intercepted unauthenticated receiver who tries to crack the channel coding using random key. Fig.4.3 shows SNR vs BER graph for the various values of SNR i.e 0 to 20 db. If intruder knows the key length and is able to calculate the LFSR sequence but still not knowing the number of bits of LFSR sequence used to select G-matrix

So, for the coded data, the probability of error is nearly 0 for moderate SNR but BER for the signal decoded by the intruder using unknown key is quite high.

III. CONCLUSION

Channel Coding using Cryptography is an efficient system for correction of channel decoding results of messages which are protected by security mechanisms. It would be very hard for intruder to guess the right G matrix and to interpret the right information as different G-matrix is used for each data block. Hence, this system provides better security than the conventional one with the channel encoder only. Anti-jam performance is also good. It overcomes the disadvantage of cryptography system as no additional redundancy, in the form of additional bits that are added to data, is used and hence bit rate reduces and lower bandwidth is needed for transmission. Thus, the system becomes more efficient. Moreover, the computer simulation shows that the proposed system has a good ability in error detection and correction especially when the SNR per bit is moderately high.

IV. FUTURE SCOPE

Future work should include analysis of the influence of Channel Coding using Cryptography to different channel encoders with implementation, proof and comparison. For the intruder, the probability of error should be increased to maximum. Also, the improvement in the current security level, fast speed and reliable message recovery at receiver end with respect to key generation, encryption, decryption, signing and verification with small key length for data

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Providing Security for the Building Using Ant Colony Optimization Technique

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***Abstract*-** To describe the approach of real-world activities we have proposed an idea by using ACO technique for providing security to the building and building can be bank, parliament house, prime minister's house, ambani's house etc. In this paper we are providing the security to the building and if any security-guard feels weakness than he can be replaced by other. And if there is the need of increase in the number of security-guards, they can do so on their own without interrupting the simulation and changing the input parameters.

Index Terms- Swarm Intelligence (SI), Ant Colony Optimization (ACO), Particle Swarm Optimization (PSO)

I. INTRODUCTION

Swarm Intelligence focuses on the collective behaviors that result from the local interactions of the individuals with each other and with their environment. SI is an innovative computational and behavioral metaphor for solving distributed problems that takes its inspiration from the behavior of social insects and the swarming, flocking, herding, and shoaling phenomena of vertebrates[1]. Examples: colonies of ants, flocks of birds, herds of animals and schools of fish.

Ants perform cooperative transport which has inspired the scientists to design the controllers of robots so that they can do coordinated work. Sorting behavior of ants like clustering of dead bodies and eggs have motivated the sorting and clustering algorithms. The path-finding and orientation skills of Cataglyphis ant one of the desert ant were used for building a robot orientation unit. Models that ants queen used for the division of labor between the members of an ant colony to perform various tasks were used to carry out the joint work of robots. Among many successful bio-inspired swarm intelligence computational paradigms, two well-known approaches are Ant Colony Optimization (ACO) [2] and Particle Swarm Optimization (PSO) [3].

Based on these ideas, in this paper we have proposed the method for providing the security to the building of any important person. We will have some security guards and building of any vip person. The paper is organized as follows. Section II gives the introduction about ACO techniques and PSO technique of Swarm Intelligence. Method for providing the security is introduced in section III. Finally conclusion is given in the section IV.

II. ACO AND PSO TECHNIQUES

ACO is a technique for solving combinatorial optimization problems that can be viewed in the form of path finding problem. ACO technique is inspired by the way how real ants find shortest paths from their nest to food i.e. from source to the food destination. An essential part from which we get the idea is the indirect communication of the ants with the help of pheromone. Pheromone is a chemical substance that is released by an ant on the pathway while moving from nest to the food source and that shows the behavior of other individuals of the same species. So, Ants lay the pheromone on the way to mark the paths to their food sources. The pheromone traces are then smelled by other ants and which lead them to the food source.

A biological experiment called the double bridge experiment was the inspiring source for the first ACO algorithm[2]. In the experiment a double bridge with two branches of different lengths are connected to the nest of the ant and to the food source[2]. The Long Branch is twice in length than the shorter branch. When the experiment was run, after watching for few minutes it was noticed that after a few minutes almost all ants move to the shorter branch. This behavior was interesting because this experiment was carried out on the Argentine ants and these ants cannot see very well.

The behavior of ants shows that the ants lay pheromone along their path.

In figure 1.1, we have taken three branches of different lengths. The ant moves out of the nest and initially they randomly choose the path in search of the food.

Initially, there was no pheromone on the paths means white colored path according to the figure. Ants release pheromone on each path they visit. In figure we can see that darker the color on the path means more the intensity level of pheromone on that path. This increases the probability of choosing that path by the ants. So, the probability of the ants which chooses the shortest path arrives earlier at the food source than other ants.

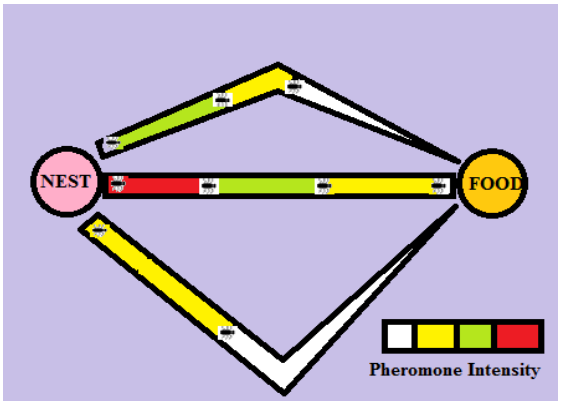

Figure 1.1: ant searching for the food, laying pheromone on the path. Pheromone intensity shows them which path to choose.

They follow same thing when they go back to their nest. When they go back, they smell pheromone on the path. The pheromone deposit on the shortest path will accumulate faster than the other branches which are longer branches. So, the concentration of pheromone on the shortest branch is much higher and nearly all ants move to the shorter branch. The color of the shortest path can be seen in figure 1.2, it is red in color means the high intensity of pheromone. And the pheromone deposit on the other paths evaporates.

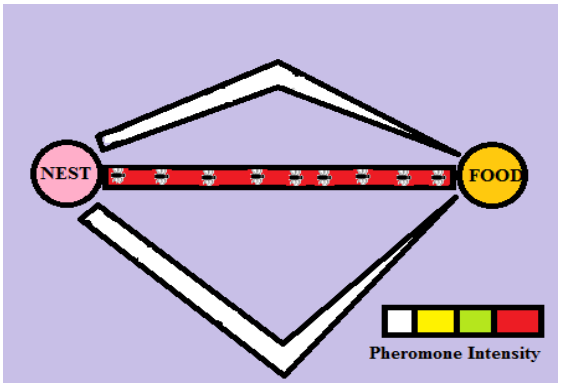

Figure 1.1: all ants will move to the shortest path ,red color shows the high intensity of pheromone deposit. The pheromone on other paths evaporates.

PSO is a technique that is used for finding maximum or minimum values of a function[3]. PSO is also inspired by the behavior of insects like swarms of fishes or flocks of birds to find the food source. They coordinate their movements with their neighbors. This coordination of movements of the individuals in the swarm is the essential aspect that inspires PSO.

III. PROVIDING SECURITY FOR THE BUILDING USING ACO TECHNIQUE

Using ACO technique, we have proposed the method to provide the security for the building. We have implemented this scenario in the NetLogo. NetLogo is used to simulate this scenario. NetLogo is a programmable modeling environment to simulate complex multi-agent systems. Instructions are given to hundreds and thousands of independent agents can be given concurrently.

First step is to find the building to which we have to provide the security. So, we security-guards will sense the building first like ants does with the help of pheromone. Here we can sense it by smell, light etc. For this scenario we have used the light. With the help of light security-guards can visualize the building and climb-up the light gradient. The light of a building will diffuse evenly over the neighbor environment. It is assumed that the security-guards will only react to a light intensity greater than a threshold value. If the light intensity is less than the Threshold value, security-guards can't visualize anything, and therefore they are unable to find where a building could be. Hence they keep on searching means that they keep on moving randomly until they sense the light of a building. If they sense the light of a building, they climb up the light gradient, which leads them directly to the building.

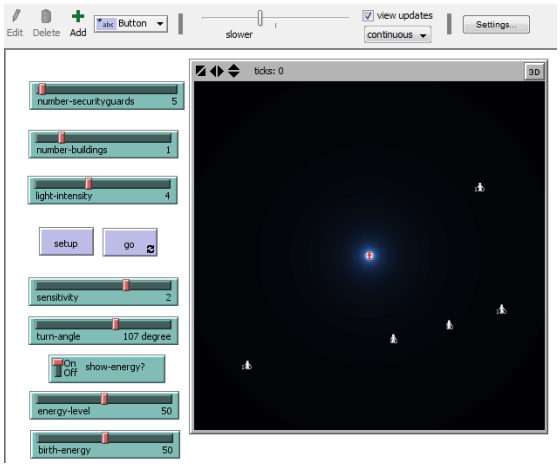

Figure 1.3: Screenshot of providing a security to the building in NetLogo Simulation. Initially security-guards will randomly take their positions.

Second step is to provide security. Security-guards will scatter around the building randomly which is shown in figure 1.3. They will sense the building through light and move towards that. This will be same like as ant smell the pheromone and move towards that. They will use the intensity of light. This is how we are using the ACO technique. We can increase or decrease the number of security-guards and buildings.

All agents will use their local information and no global information is there. Same as the ant does, they use their local information to search the food. In this scenario we have assumed that there is no obstacle and no collision. There is no direct communication between the agents. Each security-guard has some energy associated with them. In this figure we have assumed that there are 5 security-guards and 1 building.

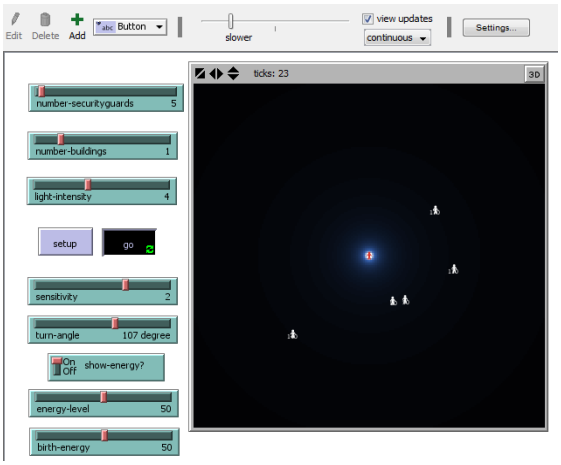

Figure 1.4: Screenshot showing the movements of security-guards towards the building.

This figure clearly shows that security-guards have start approaching towards the building. They will sense the light and according to the intensity they will take their positions. If the intensity of light is greater than the threshold value then the security guard will step back. Else, he will keep on moving towards the building. The result is shown in the figure 1.4.

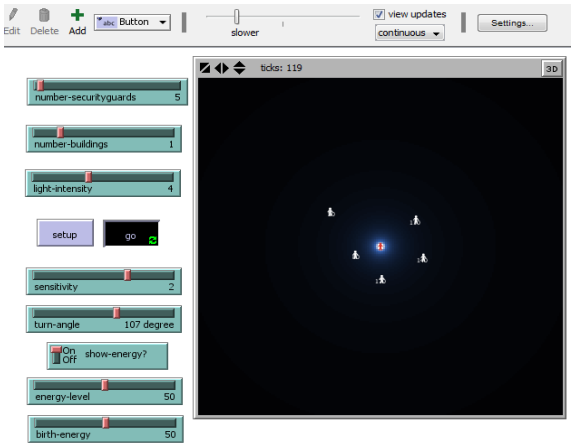

Figure 1.5: Screenshot showing that how security-guards providing the security to the building.

Now, what happens if any security guard fell ill or feels some weakness and wants to rest? So, in this case he will disappear from the scenario. We can see that in figure 1.6 we are left with four security-guards after one dies due to decrease in the energy level.

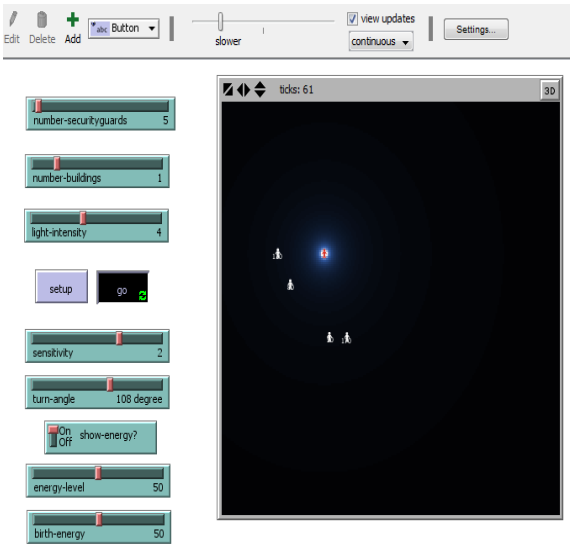

Figure 1.6: Screenshot when one security-guards dies after getting their energy down.

When any security-guard will, he then is replaced by the new security-guard. In figure 1.7 we can see that the entry of new security-guards without changing the input, in input we have 5 security-guards but in simulation we have six.

Figure 1.7: Screenshot of scenario when other security guard will enter the scenario on their own without changing the input parameters.

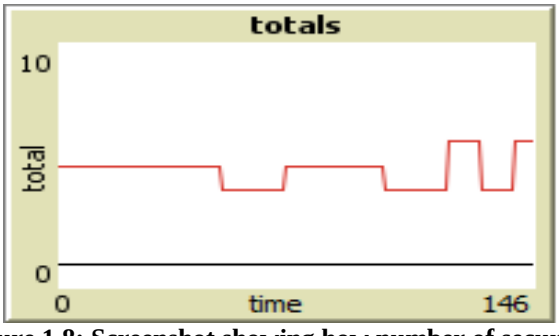

Figure 1.8: Screenshot showing how number of security-guards is changing.

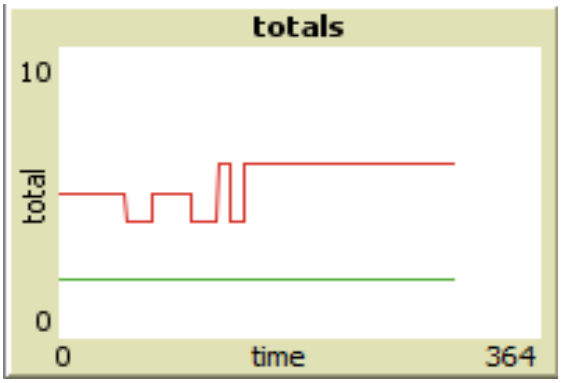

Figure 1.9: In this we have increased the number of building to two.

In figure 1.8, we can easily see that how number of security-guards are increasing or decreasing. Decreasing means security-guard has died due to decrease in the energy and increasing means there is the need for increase in the number of security-guards. So, this figure shows the fluctuations in the number of security-guards around the building while building is taken single for this example. We can increase the number of buildings also as in figure 1.9.

.

IV. CONCLUSION

In this paper, we have proposed an idea to provide the security to the building and buildings can be the banks, parliament house, prime ministers house, ambani's house or etc. We have implemented this scenario in the NetLogo to describe how we can provide the security to any building. By utilizing the ACO algorithm in contexts for which they are well-suited, this scenario provides an efficient method for providing the security.

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A Study on Status of Tsunami Affected Children's in Nagapattinam District

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Abstract- The word Tsunami is of Japanese origin, which means "harbor wave", tsunami are large waves that are sea floor is deformed by seismic activity vertically displacing the overlying water in the ocean. The quake occurred at a place where several massive geological plates push against each other with massive force. Tsunami has very low height while traveling over Deep Ocean. High waves occur only when it reaches the shallow waters, typically near the coast. The mega thrust earthquake measuring 9.2 at Richter scale of the western coast of northern Sumatra, Indonesia was the largest of its type since the 6.2 magnitude Good Friday earthquake of Alaska in 1964. The aim of the study is to assess the problems of tsunami affected children. The present descriptive study was carried out in one of the coastal village in Nagapattinam District . Census method was adopted and data was collected from 60 respondents. The major finding of the study reveals that majority of the respondents (75%) of the respondents have physical problems. Majority of the respondents (75%) have psychological problems, (65%) of the respondents face social and adjustmental problems respectively. Majority of the respondents (61%) face economic problems.

Index Terms- Tsunami affected children, status

I. INTRODUCTION

TSUNAMI:

1. One or a series of huge sea waves caused by earthquakes or other large – scale disturbance of the ocean floor.
2. An ocean wave produced by a sub – marine earthquake, landslide, or volcanic eruption. These waves may reach enormous dimensions and have sufficient energy to travel across entire oceans.
3. An ocean wave generated by a submarine earthquake, volcano or land side.

II. EARLY WARNING SYSTEM

The largest tsunami, which struck 11 nations that border the Indian ocean, was a complete surprise for the people living there. Many seismic networks recorded marine earthquake, but there was no tidal sensors there than wave sensors to provide confirmation as to whether a tsunami had been generated. No tsunami warning system exists for the Indian ocean as it exists in the pacific ocean.

III. TSUNAMI AFFECTED CHILDREN'S EMOTIONAL REACTIONS

Traumatic experiences causes stress, which is often beyond the coping capacity of an individual. In such situations, body and mind react by measures of "fight of flight". These reactions manifest in the form of changes n behaviour, bodily experiences and emotional reactions. This section helps children to understand some of these experiences. Understanding these reactions will help children feel more comfortable in dealing with these changes. **(Liao, S.C. Lee, 2002)**

IV. REVIEW OF LITERATURE

Ashfaq Ishaq, (2004). Children often bear the bunt of the trauma and pain caused by a natural or men made disaster. They are the most venerate, and their emotional scars can stay alive the longest, on the other had children are also the most resilient and first to recover, as through protected by their innate creativity and a natural coping mechanism.

Kitayanma S, Okada Y,Takumi. **(2005**).Recent research confirms previous knowledge that most children and young people are resilient, but also very vulnerable to the psychological effects of disasters. Most children are distressed in the immediate after month whey they gain their sense of safety from adults, predictable routines and consistent support systems. Others may develop serious mental disorders through post traumatic mental disorder may not develop may not develop until weeks moths or years later.

Babu.M, Sameer (2008). Disaster is server disruption of ecological psycho – social situation which greatly exceed the coping capacity at disasters. Poor infrastructure, adverse economic conditions and tough geographical terrain add on the existing problems. More than 200km at coastline along the southern India states of Tamil Nadu, Andhra Pradesh, Kerala and Pondicherry and Andaman and Nicobar islands, were devastated by the Tsunami on December 26th 2004

Steven R,(2008). Hokes untitled near to heal itself and the virgina teach community "About campus" editorial assistant Brianne Maceachran interviewed steve schneiter, a faculty co creator of the campus group that has organized responses to tragedies since the events of September 11, 2001, about managing suffering, this time their own. After September 11, and April 16th many children's are affected by psychological problems due to Tsunami.

V. MATERIALS AND METHODS

Aim of the study

- To assess the status of Tsunami affected children.

Objectives

- To know about the socio-demographic factors of the respondents
- To study the physical problems faced by the respondents.
- To study the psychological problems faced by the respondents.
- To asses the social problems faced by the respondents.
- To asses the economic and adjustmental problems faced by the respondents
- To suggest suitable measures to the respondents to overcome the problems

Study design

The researchers attempted to describe the various problems faced by the tsunami affected children (Physical, psychological, social, economic and adjustmental problems). Hence Descriptive design was used.

Universe and Sample

The study was carried out in one of the coastal village at Nagappattinam. There were 60 children in that village. The researcher adopted census method to collect the data and data was collected from all the 60 respondents.

Research Instruments

The researcher adopted a self – prepared interview schedule as a tool for data collection. The interview schedule consisted of personal data, type of family, economic status, health condition, and psychological problems. The schedule consists of fifty three questions including both open ended and close ended.

VI. FINDINGS AND DISCUSSIONS

Socio-Demographic Data

- Majority of the respondents (60%) were Female.
- Majority (67%) of the respondents belonged to Hindu religion.
- Vast majority (85%) of the respondents mother tongue was found to be Tamil.
- Vast majority (88%) of the respondents hailed from rural community.
- Majority (68%) of the respondents who were found to have 3-4 members in their family.
- Majority (61%) of the respondents were from middle income group.
- Majority (60%) of the respondents got welfare measures.
- Vast majority (71.7%) of the respondents expressed that they were having the desire to go for higher studies.

Table: 1
Age of the respondents

S.No	Age	No. of Respondents (n:60)	Percentage
1.	12 – 14	3	5
2.	15 – 17	27	45
3.	18 – 20	30	50
	Total	60	100.0

The above table depicts that half (50%) of the respondents belonged to the age group of 18 – 20 years. More than one third (45%) of the respondents were younger than the previous group and their age falls between 15 – 17 years, only a meager (5%) of the respondents were found to be in the group of 12 – 14 years.

Table: 2
Family type of the respondents

S.NO	Type of Family	No of Respondents (N-60)	Percentage
1	Joint Family	20	33
	Nuclear Family	40	67
	Total	60	100

While analyzing the type of the family of the respondents' it was found that a significant majority (67%) of the respondents belonged to nuclear family type. One third (33%) of the respondents belonged to joint family type.

Family type of the respondents

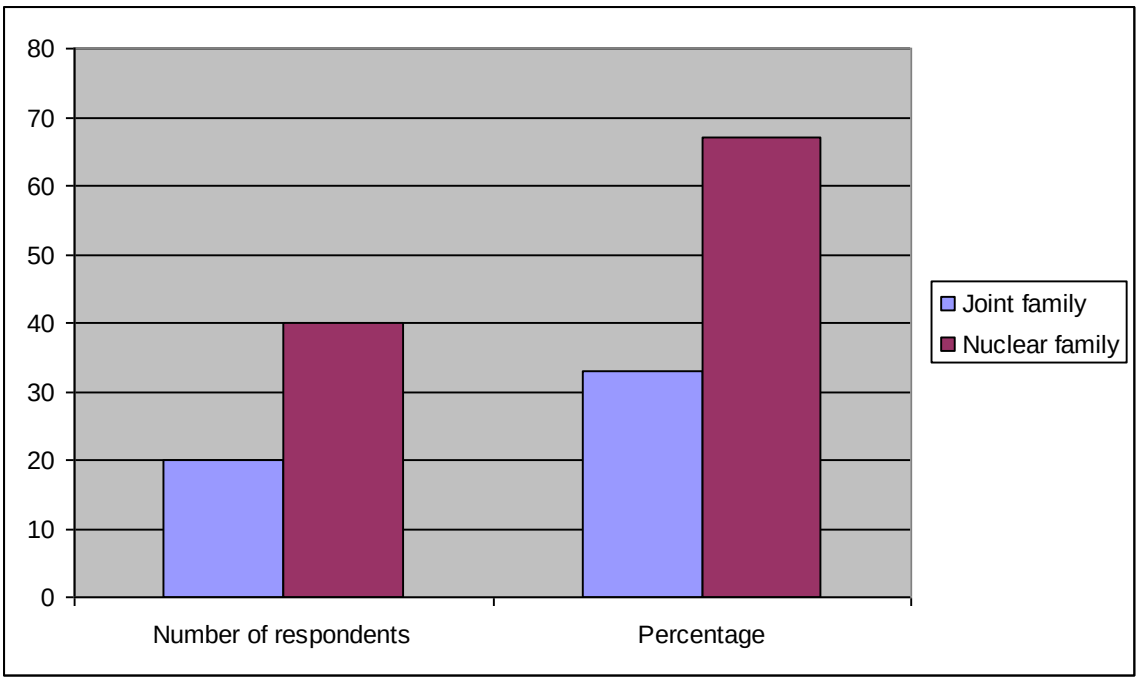

Table: 3
Type of problems faced by the respondents

S.NO	Type of problems	No of Respondents (N-60)	Percentage
1.	Physical problems		
	Yes	45	75
	No	15	25
2.	Psychological problems		
	Yes	45	75
	No	15	25
3.	Social problems		
	Yes	40	65
	No	10	35
4.	Economic problems		
	Yes	37	61
	No	23	39
5,	Adjustmental problems		
	Yes	40	65
	No	10	35

The above table shows that a majority (75%) of the respondents were affected by physical illness. Majority (75%) of the respondents were affected by psychological problems. Majority (65%) of the respondents were affected by social problems and Adjustmental problems. Majority (61%) of the respondents have economic problems. Majority (61%)

Table: 4
Economic status of the respondents

S.NO	Economic status	No of Respondents (N-60)	Percentage
1	High	13	22
2	Middle	37	62
3	Low	10	16
	Total	60	100

While analyzing the economic status of the respondents, it was found that a significant majority (61%) of the respondents' were from middle income group. Less than one fourth (22%) of the respondents were from high income status and remaining (16%) of the respondents were from low economical groups.

Economic status of the respondent sc

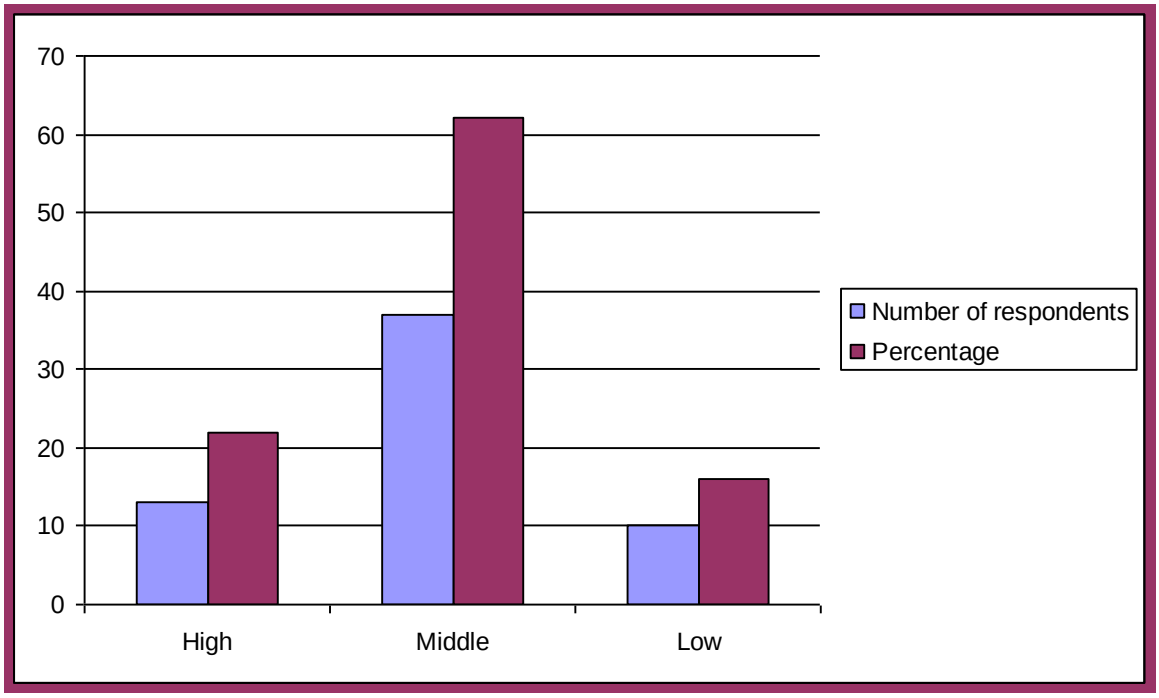

Table: 5
Monthly income of the respondents

S.NO	Income level	No of Respondents (n-60)	Percentage
1	Below 3000	13	22
2	3001 to 6000	34	56
3	6001 to 9000	11	18
4	9001 and above	2	4
	Total	60	100

The above table shows that more than half (56%) of the respondents' monthly income was in between Rs 3001 to 6000. Less than one fourth (22%) of the respondents revealed that their monthly income was below Rs 3000/. And (18%) of the respondents monthly income was found to be in between Rs 6001 – 9000/. Only meager (4%) of the respondents could earn Rs 9001/ and above.

Table: 6
Type of Physical illness faced by the respondents

S.NO	Type of illness	No of Respondents	Percentage
1	Fever	29	48.3
2	Cough	8	13.3
3	Malnutrition	1	1.7
4			
	Total	60	100

Of those who were affected by illness, it was found that, less than half (48.3%) of the respondents suffered from fever. (13.3%) of the respondents suffer from cough. (11.7%) of the respondents suffer from malnutrition and the remaining meager percent (2%) of the respondents suffer from stomach pain.

Table: 7
Types of Psychological problems faced by the respondents

S.No	Type of Psychological problems	No of Respondents (n- 60)			
		Yes	Percentage	No	Percentage
1	Getting angry	38	63	22	36
2	Constant worry	51	85	9	15
3	Stressed	35	58.3	25	41.7
4	Depressed	32	53	28	46.7
5	Feeling sad	33	55	27	45.0
6	Fearful	10	16.7	50	83.3
7	Social phobia	23	38.3	37	61.7
8	Insomnia	40	66.7	20	33.3
9	Feeling isolated	31	51.7	29	48.3
10	Loneliness	29	49.3	31	51.7

From the above table the following inference could be drawn, (16.7%) of the respondents expressed that they felt **"fearful**". (38.3%) of the respondents expressed that they felt "**social phobia**". (49.3%) of the respondents expressed that felt "**loneliness:** More than half (53%) of the respondents express that they felt "**depressed".** Vast Majority of the respondents (85%) of the respondents expressed that they had **"constant worry".**

Getting angry (6.3%), being **stressed** (58.3%), feeling sad (55%), i**nsomnia** (68.7%) and **feeling isolated** were the other psychological problems the children have experience.

VII. SOCIAL WORK INTERVENTION

Role of a social worker is very essential to redress the problems faced the tsunami affected children.

- Case work is an essential method to intervene with psychological problems of the tsunami affected children. Individual counseling should be to remove them from grief.
- Group work should be used for recreational purpose and educating them
- Through community organization problems awareness can be created about the precautionary measures they have take at the time of disaster. Disaster management can also be another ingredient.
- Social workers should be appointed on full time basis to mould the personality of the tsunami affected children
- A wide publicity of Government schemes for the welfare of children in particular should be made through mass media.

Tsunami affected children are affected by various problems. Suitable remedial measures should be taken to rehabilitate them and motivate them to study. The intellectual development of children is much essential for future development of the Nation

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A Study on Perceived Family Environment of Children Living In Slum in the Modern Era

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Abstract- Family is a social group in the society consists of one or two parents and their children. This is influenced by the environment in which they are living. The children in the slum are unprivileged to enjoy good family atmosphere as well as the good environment due to various causes like inadequate access to safe water, inadequate access to sanitation and other infrastructure, poor structural quality housing, overcrowding, insecure residential status, the low socio – economic status of its residents, poverty in terms of culture and material, breeding ground for all social problems, lack of communication and educational facilities, lack of welfare agencies and services. So, the researcher has made an attempt to study the family environment of slum children in Tiruchirappalli. The aim of the study is to analyze the family environment of slum children, since family is the first socializing agent of the child. The researcher has used descriptive design for the study. Questionnaire was used to collect the socio- demographic data and Family Environment Scale by Moss and Moss (1986) was used in the present study. The reliability of scale is 0.835. The universe of the study is consists of slum children dwelling in Kalnayakan Street at Trichy. Census method was adopted and data was collected from 100 respondents from 1st January to 25th January 2013. It was found that more than half of the respondents (57%) had low family environment. Social work intervention is very essential for young children and their families in slums to enhance their family environment. Since family is the first socializing agent of the child.

Index Terms- Family Environment, Slum Children

I. INTRODUCTION

The most common phenomenon throughout the world is the occurrence of slums. It is found in almost all the cities of the world and it is more so in the developing countries. The rural poor are attracted by the cities which can not afford conventional housing or for whom no housing has been planned. Vacant lands are most often occupied by the slum dwellers. The population of the cities of the developing world is growing faster than the rural areas. Urbanization poses several socio-economic and environmental problems for cities in India and one among them is the rise of slums. A slum represents a habitat unit with defective physical, social, and economic living conditions.

Family Environment of Slum Children

Housing conditions in slums

In slums housing conditions are found in a very poor with no proper lighting and ventilation. Slums seldom have streets; more common are narrow, winding lanes and dark passages, some houses are permitted indoor a way that the verandah of one serves as a passage to another giving the feeling that the houses source constructed first and the passageways as an afterthought.

Family size

Family is the basic important social institution, without which no society can't survive. Usually in slums size of the family is large because family planning methods are not followed. It is the family in which most of the needs and requirements of the people are met. It is the family in which people are born and brought up and prepared for different types of positions in society. It is the family in which the ailing members are taken care of and the last rides and rituals are performed. It is the family which moulds a biological individual in to a socialized person.

Family occupation

In slums occupation very much depends on the work available at the time. According to its season, during summer people go to construction work. Most of the women are engaged in construction work at the same time rag picking is also done by the women folks.

Types of occupation in slum community

- Cobblers
- Cow dung cake makers
- Domestic servants
- Rag pickers
- Bottle collectors
- Construction workers
- Street vendors

Income of the slum dweller

Income of the slums dwellers are low because they are daily wagers. They do not permanent nature of job.

Educational facilities in slums

There is seldom any high school and higher secondary schools in slums except for Balwadis. Since the slums children have to travel and spent a lot on transport most of the slum children are illiterate.

Recreation

Slum children only recreation is watching television and playing group games with friends or roaming about in streets.

II. REVIEW OF LITERATURE

Dewitt. R. (2006) "Slum dwellers, slum leaders and the Government Apparatus" attempted to probe in to the relations between the actors involved in the slum upgrading efforts in Madras, The study reveals that, inhabitants of madras slum workers had irregular job, with payment on a daily basis for men, the dominant job was coolie, often in the building sector. The main paid activity for women was house work for the richer families in near by parts of the city. In conclusion, it appears that main conformities of interest between the various actor groups exit between the slum leaders, government officials and the ruling party politicians. They are in the best position to manipulate the available resources for sum upgrading to their own benefit".

Pothens. K.P. (2007) "A study on slum children in India reveals the various means of the entertainment for 27 % of the only source of entertainment is playing , for 18.3 % it is watching T.V., for 58 % it is gossiping with friends and the next6 % use various means for their entertainment such as playing cards , gambling, etc.,"

Tuko Tsujita & Kumar, D. (2009) " To explore the prevalence and nature of gender based physical violence among women in slum population of UT Chandigarh to understand factors contributing towards physical violence to explore the perceived consequences of violence on women's health to examine the coping mechanism adopted by women while facing the violence. Slum population of UT Chandigarh, India. Married women in reproductive age willing to participate in the survey. 294 respondents by complete enumeration in the selected area. Study Variables: Age, educational status, religion, age at marriage, literacy, socio-economic status, and various aspects of violence like type of violence, perceptions regarding reasons of being victim of violence, coping mechanism, perceived consequences of physical violence etc.

Rebecca Juhus & Yang, (2009) "Children from slums, low-income families are least likely to begin school with strong literacy skills. Although early childhood education programs exist, they are not reaching the large numbers of children who could benefit from early learning support, nor are they being implemented well by early childhood educators who have limited formal training (Further, strong evidence of effectiveness has been found for few programs: A recent review of experimental studies on the impacts of preschool curricula revealed that just 2 of 15 had significant positive effects on early literacy skills in slums"

III. MATERIALS AND METHODS

Aim and Objectives

- To analyze the demographic factors of the respondents
- To analyze the family conditions of the respondents
- To know about the educational qualification of the respondents as well as of their parents
- To analyze the occupation of the respondents father
- To analyze the occupation of the respondents mother
- To analyze the adjustmental problems of the respondents
- To analyze the socio – economic status of the respondents
- To analyze their relationship with the family members
- To analyze the family type of the respondents

Research design

The researcher attempted to describe the family environment of slum children in relation with cohesion, expressiveness, conflict, independence, achievement orientation, and control and Occupation. Hence it was felt to base the study on descriptive design.

Universe and Sample

The study was carried out in Kalnayakan Street at Trichy. Census method was adopted and the data was collected from 100 respondents in that slum from 1st January to 25th January 2013.

Research Instruments

The researcher used Questionnaire as the tool for collecting the data for the present study. The first part of the schedule covered the socio-demographic data of the respondents. "Family Environmental Scale by Moss and Moss (1986) has been used in the present study. There are 90 true or false items related to family with 10 domains such as cohesion, expressiveness, conflict, independence, achievement orientation, intellectual, cultural orientation, active recreational orientations, moral religious emphasis, organization and control. The reliability of the scale is found to be 0.835

IV. FINDINGS AND DISCUSSIONS

The findings related to socio – demographic factors

Figure: 1
Distribution of the Respondents by their Age

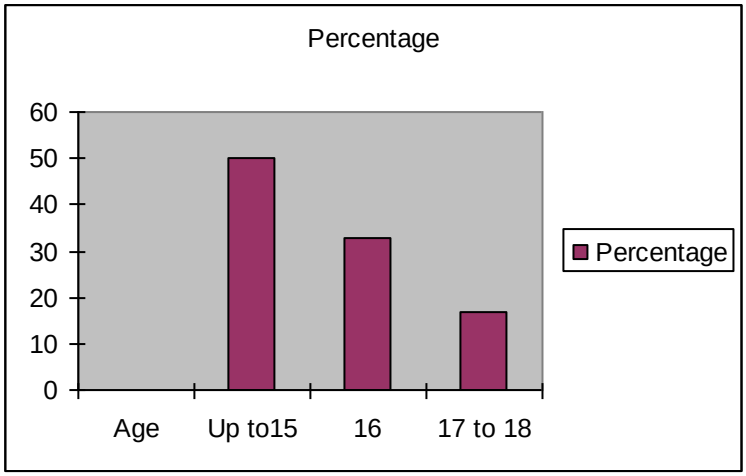


Figure: 2
Distribution of the Respondents by their Gender

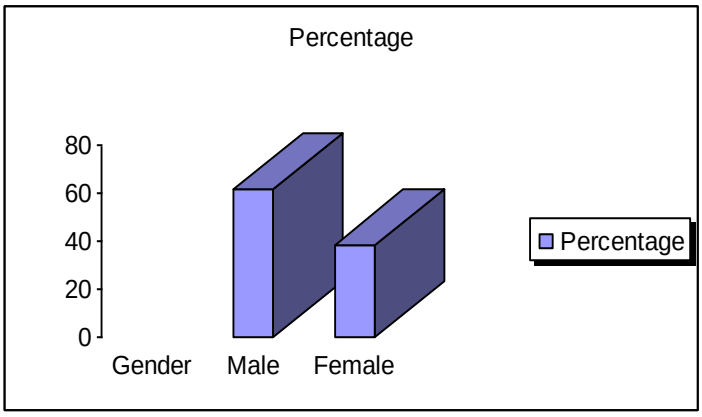


Figure: 3
Distribution of the Respondents by their religions

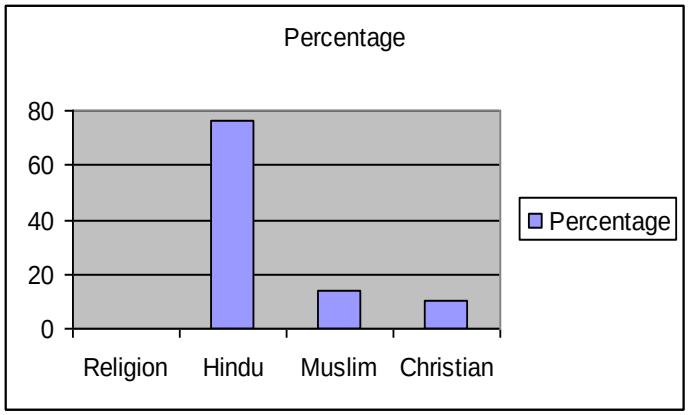


Figure: 4
Distribution of the Respondents by the number of family members

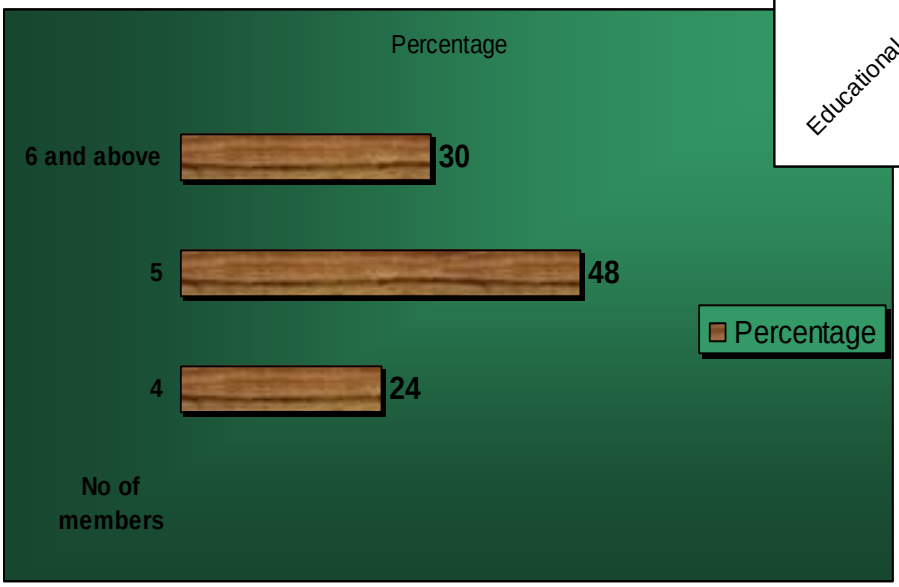


Figure: 5
Distribution of the Respondents by their Order of Birth

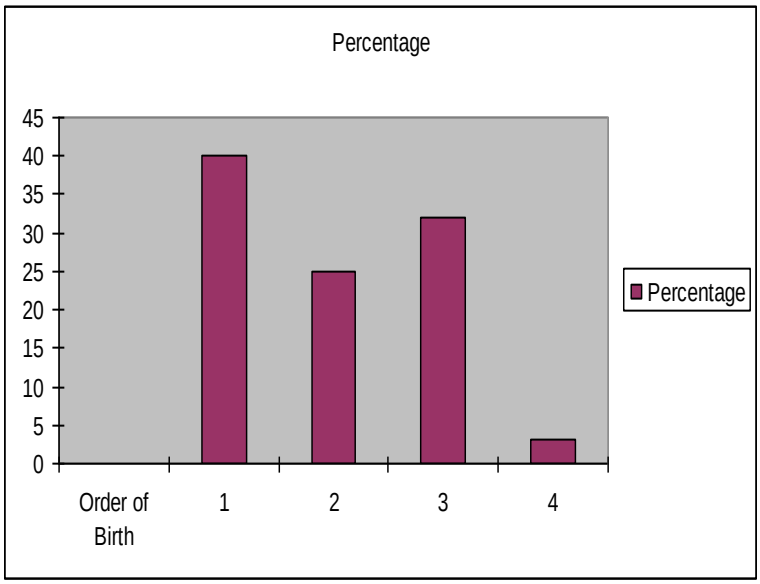


Figure: 6
Distribution of the Respondents by their Educational status

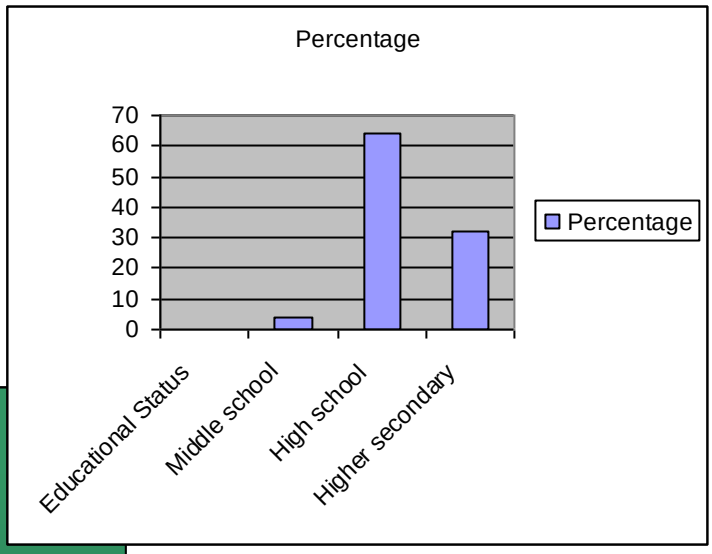
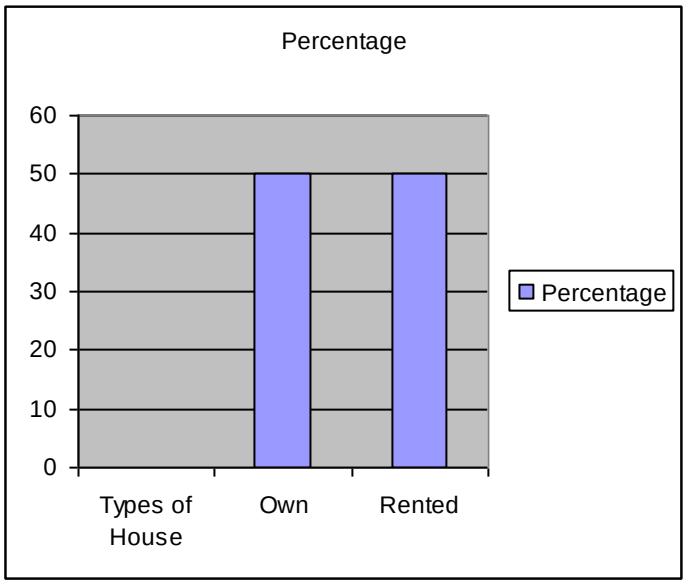


Figure:7
Distribution of the Respondents by the types of house



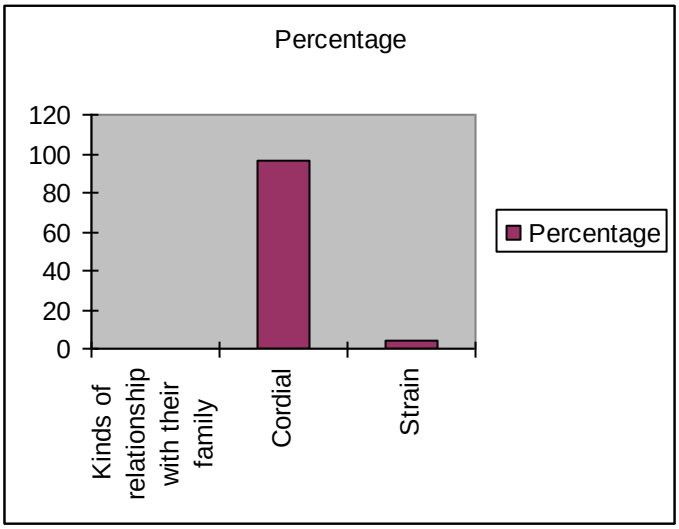


Figure: 8
Distribution of the Respondents by their Kinds of relationship with family

Table 1
Distribution of the Respondents by their level of Family Environment

S. No	Level of Family Environment	No. of Respondents (n :100)	Percentage
1	**Cohesion**		
	Low	76	76
	High	24	24
2	**Expressiveness**		
	Low	66	66
	High	34	34
3	**Conflict**		
	Low	23	23
	High	77	77
4	**Independence**		
	Low	61	61
	High	39	39
5	**Achievement**		
	Low	88	88
	High	12	12
6	**Intellectual Orientation**		
	Low	58	58
	High	42	42

S.No	Level of Family Environment	No. of of Respondents (n :100)	Percentage
7	**Active Recreation**		
	Low	42	42
	High	58	58
8	**Moral Religious Orientation**		65
	Low	65	65
	High	35	35
9	**Organization**		19
	Low	51	51
	High	49	49
10	**Control**		
	Low	19	19
	High	81	81
11	**Over all**		
	Low	57	57
	High	43	43

While analyzing the level of cohesion, it was found that (76%) of the respondents level of cohesion is low. It was found that (66%) of the respondents level of expressiveness is low. It was found that thee level of conflict of the respondents (77%) is high. It was found that (61%) of the respondents level of independence is low. While analyzing the level of achievement, it was found that a (88%) of the respondents level of achievement is low. It was found that (58%) of the respondents level of intellectual orientation is low. It was found that a (58%) of the respondents level of active reaction is high. Regarding the level of moral religious orientation, it was found that (65%) of the respondents level of moral religious orientation is low. It was found that (51%) of the respondents level of organization is low. Regarding the level of control, it was found that a (82%) of the respondents level control is high. It was found that (57%) of the respondents had low level of family environment..

V. SOCIAL WORK INTERVENTION

Role of a social worker is very essential to redress the problems faced the slum children.

- Case work is an essential method to intervene with psychological problems of the slum children. Individual counseling should be given to redress their psychological problems.
- Group work should be used for recreational purpose and educating them
- Through community organization problems awareness can be created about the precautionary measures they have take at the time of disaster. Disaster management can also be another ingredient.
- Social workers should be appointed on full time basis to mould the personality of the slum children.
- A wide publicity of Government schemes for the welfare of children in particular should be made through mass media.
- Suitable remedial measures should be taken to rehabilitate them and motivate them to study. The intellectual development of children is much essential for future development of the Nation.

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A Study on Child Rights Awareness among the Primary School Teachers in Tiruchirappalli District of Tamilnadu

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Abstract- Children are innocent, trustful and full of hope. Children have the right to survive, develop, be protected and participate in decisions that impact their lives. Knowledge and awareness about Child's rights among teachers is to be predicted due to its importance, the study is conducted among primary school teachers in and around Tiruchirappalli. About 140samples collected from both rural and urban area school teachers by utilizing a "Child Rights awareness Tool", using normative survey technique and descriptive statistics analysed and found that only 27% of teachers with high level awareness of child rights. And there is no significant difference among teachers with respective to gender and locality

I. INTRODUCTION

India's Commitment towards Children's Rights is also a signatory to the World Declaration on the Survival, Protection and Development of Children. In pursuance of the commitment made at the World Summit, the Department of Women and Child Development under the Ministry of Human Resource Development has formulated a National Plan of Action for Children. Most of the recommendations of the World Summit Action Plan are reflected in India's National Plan of Action. The National Plan of Action has been formulated keeping in mind the needs, rights and aspirations of 300 million children in the country and sets out quantifiable time limits for India's Charter of Action for Children by 2000 AD. The priority areas in the Plan are health, nutrition, education, water, sanitation and environment.

II. NEED AND SIGNIFICANCE OF THE STUDY

Children all around world are forced to work under conditions of outright slavery. They are subjected to physical, psychological and sexual abuse, forced into wars as soldiers or sex slaves and are bought and sold like cattle to be abused even further.

Children's rights are now laws. But it needs to be understood that this is a social law, not a penal law – in other words it can only be effectively implemented by people changing their approach; not by punishment. Better knowledge of Child Rights will lead to a better life for all children, and it is important that more teachers to know about this issue.

Children are the future citizens of the country .Child Rights are fundamental freedoms and the inherent rights of all human beings below the age of 18. These rights apply to every child, irrespective of the child's, parent's / legal guardian's race, colour, sex, creed or other status.

Teachers have a vital role in protecting children's rights. Teachers can make a significant and positive impact on the lives of children through their contact with the children formally and informally. Teacher's awareness of child rights is important in this context. In this backdrop the present study has undertaken with a view to find out the child rights awareness of primary school teachers in Tiruchirappalli district.

III. STATEMENT OF THE PROBLEM

The present study is entitled as, "A Study on Child Rights Awareness among the Primary School Teachers in Tiruchirappalli District of Tamil Nadu".

IV. OBJECTIVES OF THE STUDY

1. To find out the level of primary school teachers child rights awareness.
2. To find out whether there exists any significant difference in the child rights awareness among school teacher with respect to their gender and locality.
3.

V. HYPOTHESIS OF THE STUDY

In light of the above objectives the following were framed.

1. The level of child rights awareness of primary school teachers is low.
2. There no significant different in the child rights awareness among the primary school teachers with respect to their gender, locality.

VI. METHODOLOGY, SAMPLE AND TOOLS USED

Normative survey technique was used for the study as many as 131 primary school teachers were selected through stratified random sampling technique. Child Rights Awareness Scale (CRAS) for primary school teachers was constructed and standardised by the investigator with the help research supervisor. The items in CRAS are indicative of child rights awareness of primary school teachers. Provision was given within the tool itself for marking responses. The validity and reliability of the tool was established by appropriate method.

VII. STATISTICAL TECHNIQUES USED

The statistical techniques used in study are the following:

1. Descriptive statistics like Mean, Median, Mode, Standard deviation and 't' test were worked out for the total sample.

VIII. DATA ANALYSIS

TABLE 1
Showing Important Statistical Constants based on the scores of Child Rights awareness for the Total Sample.

Variable	Mean	Median	Mode	S.D.
Child Rights awareness	165.79	168	173	11.135

The Mean, Median, Mode for Child Rights awareness are 165.79,168, and 173 respectively. The Standard Deviation is 11.135. The values obtained for Mean, Median, Mode, Standard Deviation, and shows that the distribution is almost normal.

TABLE 1.2
Showing the level of child rights awareness of preschool teachers

Variable	Level	% of teachers
Child Rights awareness	Low	27
	Average	46
	High	27

The above table shows that only 27% of teachers have high level child rights awareness remaining near about 46% of teachers shows average level of child rights awareness. From this it is clear that there should be keen interest to be created among teachers with regard to child rights awareness.

TABLE 1.3
Summary of the test of significance of difference in means of child rights awareness between the groups of male and female primary school teachers.

Variable	Sub Variable	N	Mean	S.D	't' value
Gender	**Male**	62	165.53	11.516	0.247
	Female	69	166.01	10.861	
Locality	**Rural**	111	166.22	10.979	1.042
	Urban	20	163.40	11.975	

As shown in table male primary school teachers have of mean score of 165.53 with standard deviation 11.516. Female primary school teacher have mean score of 166.01 with standard deviation 10.861. The 't' value obtained for difference between means in scores of male and female primary school teachers 0.247. This 't' value is less than table for critical ratio to be not significant even at 0.05 level.

This reveals that the mean difference in child rights awareness of male and female primary school teacher is not significant.

As shown in table rural primary school teachers have of mean score of 166.22 with standard deviation 10.979. Urban primary school teacher have mean score of 163.40 with standard deviation 11.975. The 't' value obtained for difference between means in scores of rural and urban primary school teachers 1.042. This 't' value is less than table for critical ratio to be not significant even at 0.05 level.

This reveals that the mean difference in child rights awareness of Rural and urban primary school teacher is not significant.

IX. FINDINGS OF THE STUDY

The overall percentage clearly states that only 27% of teachers with high level, 46% of teachers with average level and 27% of teachers with low level of child rights awareness.

The 't' value obtained for difference between means in scores of male and female primary school teachers is not significant even at 0.05 level.

The 't' value obtained for difference between means in scores of Rural and Urban primary school teachers is not significant even at 0.05 level.

X. CONCLUSION

Although awareness and knowledge of children's rights are increasing around the world but still there is much more rhetoric paid to their value than genuine enforcement especially in developing countries like Nigeria and India. From the above study it clearly predicts that the child rights awareness of teachers does not differ based on Gender, Locality. There are teachers more only at average level and to be improved, concentrated and their interest in knowing and following the child rights.

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Work Organization and Work-Life Balance in the BPO Sector

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Abstract- This paper is an attempt to contribute to existing literature on work-life balance in general and the Business Process Outsourcing (BPO) industry in India in particular. In light of the work organizations in BPOs and resulting outcome that employees in their daily efforts within the industry, the significance of the issue of work-life balance should be stressed. Moreover, the conflict between work demands vis-à-vis personal and family needs is needed to be delved into in order to have sufficient institutional support at the employer, more so at the governmental level. This paper is an attempt to contribute to literature in three ways. First, it takes a critical look at the workplace setting and organization in BPOs. Second, the research examines the different benefits in BPO companies and if employees perceive them to foster work-life balance. Lastly, it discusses the recommendations from the BPO workers themselves in how to limit and alleviate the work-life disconnect and promote genuine work-life balance.

I. Introduction

Business Process Outsourcing (BPO) is a developing industry that is receiving significant attention from all other sectors such as government, business, as well as from the academe. BPO is basically formulated to outsource processes to a third party that are not core to a company but are necessary in its everyday operations. India has the most number of BPO companies in the world and consequently the most studies and researches made on this subject. With the sustained growth of this industry, BPOs are now receiving considerable academic attention dealing with multiple aspects like work conditions, organizational environment and specific organization and work-related issues.

II. BPO Work Environment and Organization

General organizational and work environment in BPOs are largely different from traditional organizations as "the customer-oriented nature of work often challenges the traditional conceptions of control and coordination" (Tripathy, 2006: 3). It is fast-paced with a 24/7 operations leading to "possibilities for novel modes of conceptualizing and organizing work, leading to discernible changes in work cultures" (Tripathy, 2006: 3).

Generally, organizational culture is highly informal; management and employees work together closely within participative decision-making and collaborative team-based organizational context. BPO organizations are inclined to high-performance and high productivity work team principles and tools; they subscribe to inclination towards operational and service excellence – promoting initiatives like total quality standards, Six Sigma, Customer Operations Performance Center (COPC) standards, Capability Maturity Model Integration (CMMI), and the like. Taylor et al. (2002) succinctly conveyed that in this work setting: "powerful implicit expectations of acceptable and output levels are embedded in the culture of each workflow, with managers and particularly, team leaders applying performance norms." These performance norms further reinforced in day-to-day operations even in individuals work practices. For example, Tripathy (2007:3) recalling a usual phenomenon in BPOs: "the entry of employees is strictly restricted to their work area and common spaces earmarked for recreation and refreshment…during the working hours, punctuality and admissible breaks are tracked continuously through computers… free time is limited… the structure prevents them from too many toilet and coffee breaks." The interplay between an informal workplace setting and the extreme rationalization of work makes the work environment appealing but at the same time confining and limiting to the BPO employees.

Currently BPO companies employ around 200,000 human resource across the country with at least one hundred twenty (120) BPO organizations – most of which are Call Centers; employment is estimated to grow to 900, 000 in 2010 (BPA/P, 2006; Shameen, 2006). BPO companies foster the latest global human resource models and practices in strengthening management-labor relationships and work force empowerment. In terms of recruitment, competency based assessment and behavioral assessment is stressed; workplace readiness and job fit is emphasized as new recruits usually receive 15-20 days training prior to start of work. High emphasis on people and talent development resulting in high level of activity and investments in training and coaching at all levels; companies spend an average of 21,000 - Php28, 000/year per employee for training and development (BPA/P, 2007). Every employee has a performance plan and career development plan; internal promotion is highly practiced, and promotion is based solely on merit and performance. Most of the Team Leaders and Supervisors rose from the ranks; on the average BPO supervisors and managers are within the age of 25-30 years old.

III. Work-Life Balance

Maintaining work-life balance has been the focus of industries' human resource practitioners amidst the demanding nature of work and the workers' personal endeavors in the age of information and technology. The fast-paced life, the instant

accessibility of almost anything does not put the individual in a more lax state; instead it pushes the person to do more with the seemingly more time in his/her hands. The individual engages himself/herself with more activities in and out of the office than usual as this seems to be supported by the adoption of flexibility measures in the workplace. The availability of technology anywhere which aids in the connectivity of people 24/7 further delineates the boundaries between work and personal life.

Work-life balance "is the stability characterized by the balancing of an individual's life complexity and dynamism with environmental and personal resources such as family, community, employer, profession, geography, information, economics, personality, or values" (Crooker et al, 2002: 389). The linkage of work and personal aspect of lives has always been emphasized (Bruck et al., 2002; Gibson, et al., 2006). Gibson et a. (2006: 197-198) offered two explanations regarding the interconnectedness of work and life in the organizational setting: (1) the compensation effect implies that employees tend to compensate for low work or personal life satisfaction by seeking contentment in the other domain; and (2) the spillover view that indicates that job satisfaction spills over into one's work life and vice versa.

Work-life balance is different for every individual in different stages of life. An individual who is fresh out from college and single would have a different notion of work-life balance compared with an individual who may be single but have certain 'obligations' to his/her family and again different for a married individual with kids, more so for single parents. According to Johnson (2005) the employees' age, lifestyle, and environment play important role in one's perception of work-life balance. The conflict between work and family spheres is also considered especially when there is role conflict and strain (Friede and Ryan 2005; Kossek and Lambert 2005); added to this is the productivity requirements in the workplace that often interferes with family responsibilities of individuals employed in sectors relying heavily on shift work (Williams 2008).

IV. Work-Life Balance Practices and Program

Studies suggest that employee morale, satisfaction, and performance are improved among employees who have received work/life programs such as onsite child care, time for elder care, opportunity to study, opportunities for telecommuting as these reduce the level and intensity of stress that employees experience (Bruck, et al., 2002; Harmon, 2001; Garvey, 2001; Gibson et al., 2006). Consequently, organizations are paying more attention to work and personal/family life-friendly programs, and are developing other benefits and activities that may help alleviate workplace stress and conflict between work-life. Thompson (2002) classified these work-life initiatives into five (5) categories namely, (1) Time-based strategies like flexi-time, telecommuting and job sharing; (2) Information-based strategies like relocation assistance, elder care resources, company work/life balance intranet; (3) Money-based strategies like leave with pay, scholarships for dependents; (4) Direct services like onsite childcare, concierge services and takeout dinners; and (5) Culture-change strategies like training or focus on employees' performance not office face time.

V. BPO and Work-Life Balance

With its 24/7 operations BPO companies has higher turnover rates compared to most other industries in . In a recent study, Hechanova (2008) explained that 1 of 2 call center representatives has turnover intent; this turnover intent is associated with age, career commitment, burnout, satisfaction with pay, boss, promotions, job responsibilities, firm management and promotions. Given the results of the research, she recommended that call centers and BPO companies should ensure effective rewards management, helping employees find the right fit and rethinking job design, as well as provide fun atmosphere and Employee Wellbeing Programs. Work-Life Balance in Philippine BPO organizations, are seen in these terms focusing on the extent to which benefits are not only commensurate and competitive but are also relevant to the needs of employees. Moreover, as BPO employees belong to fairly young age group, a supportive workplace and fun work environment is imperative to address the work-related stressors (Hechanova, 2008).

VI. Objectives of the Paper

Against this background, the overarching goal of this study is to examine the work organization and work-life balance of BPO workers Specifically, the paper intended to address the following research problems:

1. What is the general work organization of BPOs?
2. What are the available benefits and programs for the BPO employees? Do these existing benefits and programs promote work-life balance?
3. What is the BPO workers' perception of their work-life balance condition in their respective organizations?
4. What do BPO workers want to achieve in terms of work-life balance?

VII. SCOPE AND LIMITATION

As in all research, this study had its strength and limitations. One of its strength is the used of mixed method approach obtaining both qualitative and quantitative data. Moreover, unlike other studies, respondents and key informants came from different BPO sectors with different positions and work roles.

Another limitation of the study is the sample. This is limited only to the sixty-three (63) survey respondents and three (3) key informants of the in-depth interview. In fact, for this study, the researchers found it difficult to gain permission from the Human Resource Department of the different BPOs; the seeming hesitance and not being open to research may stem from their implicit concern that the responses may be construed as official responses of their own organizations, as well as revealing existing benefits and programs may negate the human resource departments' competitive advantage over other companies especially with the growing problem of the inadequacy of a talent pool for the BPO industry. Because the study focused on worker conditions, the researchers did not expand participation of administrators and executives in BPOs. The nature of the information and responses obtained from respondents were

affected by participants' openness and willingness to respond. Some respondents were reluctant to answer questions related to monetary benefits and their level of satisfaction with the work organization.

One of the proponents is an employee of a BPO; hence, may be deemed biased towards the plight of the BPO workers.

VIII. Summary, Conclusions, and Recommendations

This summarizes the results of the study and form conclusions based on analysis and interpretations made. Finally, practical and academic recommendations were formulated.

IX. Summary and Conclusions

This study delved into the work-life balance and work organization in the business process outsourcing sector. Specifically, the study would answer the following: (1) What is the general work organization of BPOs?; (2) What are the available benefits and programs for the BPO employees?; (3) Do these existing benefits and programs promote work-life balance?; (4) What is the BPO workers' perception of their work-life balance condition in their respective organizations?; and (5) What do BPO workers want to achieve in terms of work-life balance?

As various studies have shown (Broek et al, 2004; BPA/P, 2007; Grozman, 2005; Hechanova, 2009; Russel, 2002; Sharmeen, 2006; and Tripathy, 2006), work organization in the BPO sector composed of unusual work schedule, overbearing and irate callers, excessive work targets, and daily quality assurance and service performance measurements; workers are deemed to be most exposed to burn-out and other stressors compared to their contemporaries in different industry.

Results showed that most BPO companies employ high-caliber compensation and benefits packages for its workers and may be perceived as pioneer in work-life balance advocacy. Money-based strategies they offer surpassed those of other sectors as this comprised of meal and transportation allowances, performance incentives and bonuses, salary increase, overtime and night differential pays, and other bonuses. Moreover, their non-monetary benefits in the form of leaves with pay, HMO and health programs, flexible schedules, off-setting, opportunity to negotiate part time work, bedroom or sleeping quarters, health programs, career leaves and breaks, study/training scholarship and subsidy, early retirement, club membership and cultural/religious leave.

With the existence of the different benefits and programs, respondents perceived that these are sufficient to foster work-life balance. HMO and health programs ranked highly as benefits that promote work-life balance, this may be ascribed to the health risks involved in BPO settings as well as the importance of being healthy and health-related concerns to the employees. Paid paternity/maternity/career leaves and breaks, as well as flexible work schedules – like flextime and offsetting - are commonly considered as also important in promoting work-life balance as these may contribute to time spend with the family.

Findings revealed that most of the respondents experienced difficulties in work-life balance. A thin demarcation in terms of percentage separates those who encounter problems in terms of their personal life against their workload and those who are not. Schedules for studies and family sometimes are impeded by work schedules. In terms of family life, majority of the respondents did not experience difficulty in adjusting their family life; still some admitted having difficulty in managing time with the family and the demands of their work.

Majority of the BPO employees expressed the need to increase their monthly salaries and other benefits. More than tangible work-life programs and policies, data disclosed that BPO workers still are more focus on what they can get from their companies - like car plan, study/training scholarship, career breaks, exercise facilities, early retirement, and flexi time; this may imply that compensation and benefits are still seen as important to the BPO setting as means to outweigh the demand of the workload and help alleviate the working conditions.

X. Recommendations

Based on the results and the conclusions of this study, the following recommendations were formulated:

Institutional and Policy Recommendations

Results revealed that, despite of the relatively high compensation package, the different benefits they enjoy, and the various programs the companies offer, the integration of work-life balance in the respective BPO organizations is essential. More on improvement of the compensation and benefits structure of the BPO companies, the organizations should examine existing work-life policies and programs vis-à-vis workload and general working conditions.

There is a need to review the existing policies and thrusts of Department of Labor and Education and the government in general in terms of work-life balance policies and legislature. The government should rethink its role, especially in the monitoring of BPO companies to further protect the BPO workers.

Finally, the existence of work-life balance programs, policies and initiatives at the organizational level is significant but not necessarily sufficient. Guidelines established at the governmental, industry and sector levels, as well as the ability of individuals to capitalize on existing work-life balance programs have to be connected. BPO workers have to be knowledgeable about, and appreciative of, policies provided at the organization level, and should continue to protect their welfare. At the same time, there may be evidence that organizational climate and environment often curtail policy developments on the governmental level by being generally unsupportive of employees beyond their legally established rights. Consequently, accomplishing work-life balance is a complex issue that requires the interaction and cooperation of social actors at national, governmental, organizational, as well as the individual-worker level.

XI. Research Recommendations

Work-Life Balance in the BPO industry, and the different BPO sectors, will take on greater importance. What follows are initial thoughts for empirical investigations in the domain of Work-Life Balance in BPOs. Accomplishing this may necessitate interdisciplinary collaboration, and an expansion of research methods such as large-scale surveys, multi-site case studies, cross-group analysis, and evaluation studies.

Important limitations of this paper is the use of only three (2) cases in depth and less than fifty respondents, which made it difficult to draw strong generalizations. This study certainly enhanced our understanding of knowledge different benefits and work-life balance practices in BPOs, but future empirical work that includes multiple units and utilized mixed-method research in a grander scale with more organizations and across other sites. Other stakeholders like managers, executive as well as families of BPO workers can be identified as respondents for future study to further understand this phenomenon.

Another limitation is the focus on work organization and work-life balance in the BPO setting. There are reasons to believe other types of employee relations and human resource practices would portray different challenges and opportunities for work-life balance. Moreover, a look into organizational structure, hierarchical functions, as well as social and cultural factors affecting work-life balance in these companies may reveal important information.

In-depth researches of Work-Life Balance per BPO sector may be necessary. A comparative study across different setting and according to regions may be conducted. A cross-comparison of work-life balance in urban and provincial setting may also be considered.

Additionally, with ample research funding, case studies of individual company experience may also be considered as there are variance in work-life practices and program per company.

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Menorrhagia Causes Psychological Problems in Women

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Abstract- Menorrhagia is very common complaint which is found in women and not given much care. It is a symptom which detoriates women health. In menorrhagia the menstrual cycle is unaltered but the duration quantity of menstrual cycle is unaltered but the duration and quantity of menstrual loss is increased. The normal blood in every women should be 50-80 ml and shouldn't exceed 100 ml. this prolonged illness may cause many psychological Problems in women. So the researcher is made an attempt to study the problem scientifically. The aim of the study is to find out the psychological Problems of women due to menorrhagia.

The researcher has adopted descriptive design for the study and self constructed interview scheduled was used. The universes of the study consist of all the respondents who came to Parimiladevi clinic at Police colony from 15th June to 15th July 2007. Census method was adopted and collected data from 100 respondents it was found that there is a significant association between age and psychological Problems of the respondents. and there is a significant association between family type and psychological support of the respondents. Vast majority 90% of the respondents are experience in psychological Problems of the respondents due to Menorrhagia. and majorities 62% of the respondents are experience in psychological Problems of the respondents. Social work intervention is essential to deal with this silent problem faced by women Health education is must. Misconception about women health should be removed. Education should be given to avoid self medication and women should engage them self in recreation activities to avoid psychological Problems.

I. INTRODUCTION

Menorrhagia is a very common compliant which is grave problem of women folk due to lack of awareness and negligence. It accounts for 50% of all referrals to specialist.20% of women aged 30-49years consult their gynecologist each year with Menorrhagia. a normal blood loss is 50-80ml and shouldn't exceed 100ml . In Menorrhagia the menstrual cycle is unaltered but the duration and quantity of the menstrual loss are increased. Menorrhagia is essentially a symptom that transform to disease. The underlying cause difficult to detect. According to D.C.Dutta, Menorrhagia is defined as cyclic bleeding at normal intervals, bleeding is either excessive in amount (>80ml) or duration. The term menotaxis is often used to donate prolonged bleeding This prolonged illness may causes many physical problems like anemia, pelvic inflammatory disease, thyroid problem, liver, or kidney disease, uncommon blood disorders, and certain cancers. Menorrhagia may causes psychological Problems like anxiety, insecure feeling, frustration and poor adjustment.

Causes:

The following Causes are

- Fibroid
- Adenomyosis
- Chronic tube

Symptoms

The following symptoms

- Need to use double sanitary protection to control your menstrual flow.
- Menstrual flow that includes layer blood clots
- Irregular menstrual period

Diagnosis

Long duration of flow, the passage as big clots, use of increase number of thick sanitary pads, pallors and low level of hemoglobin give an idea about the correct diagnosis and magnitude of Menorrhagia.

Treatment

The following treatments are

- Hormone therapy
- Radio therapy
- Drug therapy

II. RESEARCH METHODOLOGY

Significance of the problem

The study tries to show the problems faced by women due to menorrhagia. This study can also be used as a means to understand various problems that are encountered by the women both physically and psychologically due to menorrhagia.

Aim and Objectives

- To find out the psychological problems of the women due to menorrhagia.

Hypothesis

- There is a significant association between age and psychological problems of the respondents due to menorrhagia.
- There is a significant association between family type and psychological problems of the respondents due to menorrhagia.

Research Design

The researcher has made an attempt to describe various characteristics such as demographic factors, clinical data,

physical , psychological problems and treatment aspects of the women with menorrhagia.

Universe and sampling

The universe of the study consists of all the respondents with menorrhagia problems who came for treatment to Parimala Devi clinic at police colony 15th June to 15th July 2007, the researcher adopted census method and collected date from 100 respondents.

Tools of data collection

The researcher used interview schedule to collect personal data, clinical data, physical problems, psychological problems and treatment etc.

III. RESULTS

Table -1
Age and psychological problem of the respondents

S. No	Age / Psychological Problems	Menorrhagia		Statistical Inference
		Yes	No	
1 2 3 4	25-30 30-35 35-40 40-45	20 9 44 17	3 4 2 1	$\chi 2$ =8.495 df=3 P<0.05 significant

There is a significant association between age and psychological problems of the respondents due to Menorrhagia. Hence null hypothesis is rejected.

Table-2
Family type and psychological support from the family members of the respondents

S.No	Family Type	Frequency (n=100)	Mean	Standard Deviation	Statistical Inference
1	Joint	53	1.47	0.504	t= 2.027 df=98
2	Nuclear	47	1.20	0.452	P<0.05 Significant

There is significant difference between family type and psychological support from the family members.

IV. FINDINGS

- Vast majority (90%) of the respondents are experience psychological problems due to menorrhagia
- Majority (62%) of the respondents family type and psychological support of the family members of the respondents

V. SOCIAL WORK INTERVENTION

1. Awareness can be given to the women about health education in the community.
2. Through group work women can be educated on health and relaxation method can be taught to them which can reduce psychological problems.
3. Social workers role is essential to cope with the myths and misconceptions regarding women health.

VI. SUGGESTION

- Women should take nutritious food and adequate care.
- Women should be educated about health.
- Women need physical and psychological support in general.

VII. CONCLUSION

Women should be take rich diet rather than eating the leftovers. They should engage themselves in recreational activities to keep them physically and psychological strong.

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The Problems of Elderly Tribal Women in Kodaikanal Hills: A Sociological Perspective

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I. Statement of the Problem

The elderly Paliyan tribes are illiterate and highly ignorant and gullible. They are ignorant as well as unaware of the day-to-day happenings not being assertive enough to grasp the opportunities that are offered by the Government. They continue to cling to their domicile and maintain the pattern of life sticking to the age-old customs. They evade assimilation and joining the mainstream of society. The lack confidence and they have competitive spirit. The occupations they engaged in are seasonal and fetch meagre income. They are not in a position to provide education to their children and are not able to avail of better medical facilities. They have to labour day and night to earn their daily bread.

A scientific method of study is necessary to gain knowledge of the problem of a study. In order to make the present study a scientific one the researcher followed certain research procedures. The present study is an attempt to analyse what are the problems existing among the elderly tribal women and how the attitudes of the member of the society affect the elderly women. The appropriate research methodology has been adopted for this study intends to explain the problems of elderly tribal women in Kodaikanal hills at Dindigul District.

II. Principal Objectives

1. To analyze the socio-economic background of the elderly tribal women.
2. To assess the level of awareness of Government schemes for tribals.
3. To examine factors and extent of problems found among the respondents.
4. To evaluate the role of supporting system for the welfare of the respondents.

III. Research Design

Descriptive research design has been adopted for this study. The purpose of this research design is to describe the problems and other units under investigation like socio-economic background of the respondents, and elicit new information about the elderly tribal women in the study area through the above objectives.

IV. Area of the Study

Based on the data available with the Government regarding the numerical concentration of the Paliyan tribals in Tamilnadu, a Kodaikanal hill was selected for the present study.

Table - 1
Schedule Tribes Population

S.No	Region	Schedule Tribes		Total
		Male	Female	
1.	India	40,69,232	40,13,283	8,082,515
2.	Tamil Nadu	3,22,404	3,28,917	6,51,321
3.	Dindigul District	3,320	3,164	6,484
4	Kodaikanal Taluk	1,025	989	2,014

V. Selection of Respondents: Procedure

Sampling involves the selection of a few items from the particular group to be studied with a view to obtaining relevant data that help draw conclusions regarding the entire group. Based on the objectives of the study an Interview schedule had been prepared to elicit the facts and details from the respondents selected for the purpose of the study. The total number of tribal population in Dindigul District is 6,484. The total number of tribal population in Kodaikanal Hills/Taluk among the 15 Panchayats, One Town Panchayat and one Municipality is 2,014, among the total population 1,025 male and 989 female respectively. There are 780 elderly (above 60 years old) tribals in Kodaikanal hills, from the total women elderly people (989), 10 per cent of the (98.9 arrived as 100) respondents were selected by simple random sampling through lottery method.

VI. Tools and Techniques of Data Collection

For the collection of primary data from the selected elderly tribals women in Kodaikanal Taluk, structured interview schedule was used. It was designed so as to cover the socio-economic background of the elderly tribes, assess the level of awareness of Government schemes for tribals, problems found among the respondents and role of supporting system for the welfare of the respondents. Observation method was also employed as a tool for data collection.

VII. Data Processing and Interpretation

The data collected by using the structured interview were edited and codified. The data were processed using SPSS. The simple percentage frequency tables were drawn. The data were correlated and crossed with the variables, etc. the tables were interpreted. The observations made during data collections were helpful to interpret the data.

VIII. Major Finding of the Study

Data were collected from 100 respondents from Adukkam, Kilakuchettipatti, Vaadadounchi, Thandikudi, Poolathur, Kookal and Kamanur village panchayats in Kodaikanal taluk. Study of the elderly tribal women must take into account a number of factors such as demographic, economic and social which describe the physical as well as the socio – psychological.

Age is an important demographic trend of a respondent. The role of age is an individual in performance in socio and economic problems. Age group is one of the most influential segments in the society. Here age groups classified by equal interval of the five years basis.

- Regarding age wise classification of respondents a good number (31.8 per cent) of them belonged to the age group between 60-64 years. And 2.6 per cent of them were above 80 years old.
- When the educational status of the elderly respondents was analysed, it was found that there were more of illiterate (91.2 per cent), and a few of the (8.8 per cent) respondents completed only primary level education. It is observed that most of the respondents were uneducated due to non-availability of school in the study area for the past few decades.
- Marital status revealed that out of 390 respondents a vast majority of them (53.6 per cent) were married and living with their spouse. 24.9 per cent of the respondents come under the widow category.
- A vast majority (47.4 per cent) of the married respondents come under the age group of 60-64, 44 per cent belong to 65-69 age group. 56.7 per cent of the respondents from widow category were belonging to 70-74 age groups.
- It found that 78.5 per cent tribal people living in huts or Thatched house at interior forest area, 18.7 per cent of the respondents residing at Pucca house these types of houses are made up of sand, stone, wood and leaf, and remaining 2.8 per cent of the respondents are living in concrete house.
- It is found from the study that majority of the respondents depend mainly on agriculture (42.7 per cent) and also depend on agricultural coolie works for livelihood. They belong to the age group of 60-64.
- The income of the respondents highlighted that high number (39.7 per cent) of the respondents were earning Rs. 1001 to 2000 per month.
- It is observed that 31.9 per cent of the respondents get financial support from their daughters. 12.1 per cent of the respondents are getting financial support from their spouse and remaining 11.7 per cent of the respondents are receiving from their sons. The inference drawn from the analysis is that female children were taking care of their parents during illness in the lost stage of elderly tribes.
- When assessed the level of awareness of supportive systems and welfare of the elderly tribal people, the majority (58.2 per cent) of them responded that they did not know about the Government programmes. It is observed that the elderly people are not well aware of Government tribal welfare programmes due to ignorance and illiteracy.
- Level of awareness about tribal welfare polices fall into three major divisions. They are high, Medium and Low. 58.2 per cent of the respondents came under the low level of awareness, 25.1 per cent of the respondents have the medium level of awareness and remaining 16.7 per cent of the respondents have much knowledge about the tribal welfare policies.
- The age groups of the respondents were divided into five categories that is 60-64, 65-69, 70-74, 75-79 and above 80. It is clear that the respondents from 60-64 are more aware than others for instance.

Based on the objective 'factors and extent of problems among the elderly tribal women's' the researcher finds factors and major problems of elderly tribal women in respect of their age, sex, dependency ratio, etc. and the conditions of the aged in respect of their economic dependency, number of dependants, living arrangements, persons supporting the aged, physical immobility, etc. The results obtained from the research are presented in this section.

- It is observed from the field that 85.9 per cent of the respondents have some kind of Physical problems like gastro intestinal disease, chronic constipation, chronic headache, joint pain, loss of vision, loss of hearing. These problems occurred due to food habits, climate condition and ageing factor. Malnutrition, as expected, is the most common health problem among the tribals. In addition, they from communicable diseases such as tuberculosis and malaria. Some tribal groups are also at high risk for sickle cell anemia. Generally tribal diets are seen to be deficient in protein, iron, iodine, and vitamins.
- In this modern medicine era, 45.1 per cent of the respondents are following sidha medicine for their physical illness like, fever, cold, jaundice and other problems from primitive period.
- 59.1 per cent of the agricultural coolie workers have the physical problems. 61.8 per cent of the agricultural coolie workers have economic problems. And 60 per cent of the agricultural coolie workers have psychological problems. These three major problems affect the agricultural coolies only. Because they were getting very low income, they cannot consume healthy food, and they do not get proper respect from the society.
- Regarding visual or eye sight problems 38.2 per cent of the respondents have visual problems. They lost their visions by Retinal detachment, Diabetic retinopathy,

senile muscular degeneration, Retinal defects, Excessive dryness, Excessive tears, Glaucoma, Cataract.

- Analysis of the care givers to the respondents 23.3 per cent of them stated that they get only minimum care from family members 2.6 per cent of the respondents are living singly.
- It is observed that half (50 per cent) of the respondents feel uncomfortable with their family members regarding respect and love. In addition to loss of respect, 35.4 per cent were not having food along with family members. And 21 per cent of respondents stated that 'no-income' is problem for loss of their respect in the family.
- Psychological problem is most common among elderly. Loneliness in old age is a common problem found in many of the developed and developing countries. Some old persons who are practically alone because they remained single after death of spouse (or) were widowed early and do not have any son or a daughter. But children are also thinking that the aged parents are a burden to them and treated as unwanted one. 13.3 per cent of the respondents stated that they have the feeling of isolation.

Both Central and State Governments have implemented new welfare programmes for old age people to improve their socio economic status and health conditions. Aged people are affected by economical support and meager health condition, because of inability to earn money, unaware of health conditions.

Central assistance to provide old age pension to the elderly is available to a destitute in the sense that he/she has no regular means of subsistence for his/her own source of income or through financial support from family members or other sources. The amount of old-age pension difference from State to State. The scheme is implemented in the state and union territories through panchayats and municipalities.

But, there is no separate welfare scheme for the Paliyan tribes in particular and the age of other tribes in general launched by the Government. In these circumstances the role of voluntary organization is the only means for the welfare of these people.

There are two types of welfare facilities received by the respondents from Central and State Governments. These are one from tribal welfare department and another one from old age scheme like old age pension scheme, Annapoorna scheme etc...

- Level of awareness about old age welfare schemes exposed that the out of 100 respondents majority (68.2 per cent) of the respondents are aware of the old age welfare schemes. 31.8 per cent of the respondents opined that they have not known about the old age welfare schemes.
- Awareness about old age welfare schemes like, National Old Age Pension Scheme (NOAPS), 93.6 per cent of the respondents have the awareness about it, only 6.4 per cent of the respondents' unaware bout this scheme. 92 per cent of the respondents were unaware of The Indira Gandhi National Old Age Pension Scheme (IGNOAPS). 56.4 per cent of the respondents were unaware about destitute widow pension scheme. 83.6 per cent of the respondents were ignorant about Annapoorana Scheme. 72.3 per cent of the respondents were unaware of Integrated Programmes for Older Persons scheme.
- The inference drawn from the analysis is that 19.2 per cent of the respondents opined that they faced some problems to get old age pension.
- Respondents faced problems while they didn't get pension. 11.5 per cent of the respondents were having problems in getting the pension due to rigid rules or no supporters. 3.5 per cent of the respondents cannot get old age pension due to physical illness.
- Next to physical problems 2.1 per cent of the respondents faced problems due to non-cooperation of Government officials like, Village Administrative Officers, Headship of the village, Presidents and etc..,

IX. Conclusion

Having studied the problems of elderly tribal women in the hill areas of Kodaikanal in Dindigul district, South Tamilnadu it is found out from the in-depth analysis of the problems and its extent faced by the elders revealed that tribal elders under study are more prone to be affected by physical, economical and psychological problems. Taking into account the nature of geographical location of the target and way of life, sources of livelihood have forced the poor elders to lead miserable life in the rest of their lives. As there is no alternative employment and their increasing age factors have become instrumental behind perpetuating their poor economic life.

Problems of the aged anywhere is unavoidable. It is nature's course of action; some problems can be solved with utilization of medical advancement and increasing economic position. But, the life of elders in hill area and their ever increasing problems remain the same despite taking steps to alleviate them.

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Constructing Ideal Strategies for Countering Workplace Violence

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I. INTRODUCTION

Workplace violence refers to violence that originates from employees or employers and threatens employers and/or other employees. The definition of work related violence that has received pan-European acceptance is as follows, "Incidents where people are abused threatened or assaulted in circumstances relating to their work, involving an explicit or implicit challenge to their safety, well-being, or health." This can involve violence resulting from industrial disputes, although this is not a major factor in most incidents. This definition establishes violence as behaviour with the potential to cause harm. Broadly speaking there are three forms:

- Non-physical violence (intimidation, abuse, threats etc)
- Physical violence (punching, kicking, pushing etc)
- Aggravated physical violence (use of weapons, e.g. guns, knives, syringes, pieces of furniture, bottles, glasses, etc).

Violence in all its forms is a concern for staff and management alike. For employers, violence can lead to poor morale and a poor image for the organization, making it difficult to recruit and keep staff. It can also mean extra costs, such as those associated with absenteeism, higher insurance premiums and legal fees, fines and compensation payments where negligence is proven. For employees, violence can cause pain, distress and even disability or death. Physical attacks are obviously dangerous but serious or persistent verbal abuse or threats can also damage employees' health through anxiety or stress. Workplace Gossip is also a form of workplace violence, noting that it is essentially a form of attack.

But, in recent years more women have been coming forward to report such practices the sexual harassment is the major form of violence, women are facing in the workplace It not only degrades the woman, but reinforces and reflects the idea of non-professionalism on the part of women workers, who are consequently regarded as less able to perform their duties than their male colleagues.

Violence within workplace

- Distress through verbal assaults
- Insults
- Threats
- Intimidation
- Humiliation
- Harassment
- Isolating a person from his/her family, friends, or regular activities
- Enforced social isolation
- Unwanted touching
- Forced sexual activity

II. WORKPLACE VIOLENCE DATA

Although workplace violence is receiving increased attention in the media, the incidents that make the news are only the tip of the iceberg.

- In 2000, 13,935 women had injuries or illnesses involving days away from work that resulted from assaults and violent acts (Bureau of Labor Statistics [Bureau of Labor Statistics 2010]).
- Homicide is the second-leading cause of fatal occupational injuries for women, after traffic accidents. Thirty-one percent of women who die at work are killed as a result of an assault or violent act. In 2003, 119 women died as a result of an assault or violent act in the workplace (BLS).
- 12.7 percent of all female violent crimes were committed while the victim was working or on duty. These acts of nonfatal violence include rape and sexual assault, robbery, aggravated assault and simple assault (BLS).
- Some 36,500 rapes and sexual assaults occur annually in the workplace. In 80 percent of these incidents, the victim was female (National Crime Victimization Survey 2008).
- Nurses experience workplace crime at a rate of 72 percent higher than medical technicians and at more than twice the rate of other medical fieldworkers (NCVS).
- Professional (social worker/psychiatrist) and custodial care providers in the mental health care field were victimized while working or on duty at rates more than three times those in the medical field (NCVS).
- Junior high school teachers have a rate of victimization in the workplace similar to convenience store clerks—54.2 versus 53.9 per 1,000 workers (NCVS).

The data on workplace violence is scattered and inadequate to understand the extent of the problem. Many acts of nonfatal violence and threats in the workplace go unreported because there is no coordinated data-collection system to process the information. More than 936,000 of the nearly 2 million workplace crimes committed yearly were not reported to the police. Rape and sexual assaults were reported to the police at an even lower rate of 24 percent.

III. TYPES OF WORKPLACE VIOLENCE

By understanding the cause of the violence we will be better able to eliminate, reduce or manage the risk of occurring. There are three main types of work related violence

Criminal violence

Violence perpetrated by individuals who have no relationship with the organization or victim. Normally their aim is to access cash, stock, drugs, or perform some other criminal or unlawful act.

Service user violence

Violence perpetrated by individuals who are recipients of a service provided in the workplace or by the victim. This often arises through frustration with service delivery or some other by-product of the organizations core business activities.

Worker–on-worker violence

Violence perpetrated by individuals working within the organization colleagues, supervisors, managers etc. This is often linked to protests against enforced redundancies, grudges against specific members of staff or in response to disciplinary action that the individual perceives as being unjust.

IV. RELATED REVIEW

Malhotra (**2004**) explains that women in Pakistan are constantly being harassed, at work place and on other public places. But, they do not report these incidents for fear of being restricted in their movements. Women also fear retaliation, stigmatization, and the uncooperative and humiliating attitude of officials and law enforcers. The Pakistan Penal Code prescribes punishments for sexual harassment offences, often policemen turn a blind eye even when they are approached by women. Women in Afghanistan have suffered a catastrophic assault on their human rights during regime of the Taliban.

National Commission for Women has laid down the code of conduct at work place to prevent sexual harassment of women, which has been sent to all Government offices, Ministries, and Universities with the hope that employers would become more sensitive towards women. The guidelines highlight that it shall be the duty of the employer to prevent or deter the commission of any act of sexual harassment at workplace would include unwelcome sexually determined behaviour by any person either individually or in association with other persons such as eve teasing, unsavoury remarks, jokes causing embarrassment, innuendo and taunts, gender based insults or sexist remarks and unwelcome sexual overtones in any manner, touching or brushing against any part of the body, molestation or displaying pornographic or other derogatory pictures or sayings (**Hindu, Sept 16, 1998**).

Debashish Sengupta (2011) has stated that the ILO has a much broader description on workplace violence. Workplace violence could be physical or psychological, anything at place of work that may fall under homicide, rape, kicking, biting, punching, and harassment, including sexual and racial abuse, bullying, mobbing, victimizing, and leaving offensive messages, name-calling or deliberate silence. Greater levels of awareness are required in organisations, both amongst managers and workers.

Methodology

Violence against women is a multifaceted problem that requires proactive mitigation strategies by the society, government, families and individuals. The significance of the problem emanates from the fact that its escalation and devastating effects not only lower quality of life but also leads to physical harm, emotional and psychological torture and even death. Negatively, Violence against women is thus a far reaching consequence in family and social relationship. Hence the researcher has chosen the topic for the study. Random sampling method has been adopted to investigate the violence against women issues from the respondents.

Significance of the Study

The results of this study will significantly contribute in understanding of the various issues relating to violence against women. Specifically, it will be possible to analytical understand and appreciate, with an aim of reducing the various causes and effects of violence, care givers, the policy makers and the society attempts to help curb the crime based on espoused effects to groups and individuals.

V. OBJECTIVES

- To know the response of women while facing violence
- To probe the causes of violence and its impact on development issues
- To analyze the impact of violence on workplace

VI. STUDY UNIVERSE

Tamil nadu has been a study universe. Out of 32 districts in Tamil Nadu, Six districts were selected for the study. Those districts have been selected on the basis of the data availed by the National Crime Records Bureau (ie) Three Districts from Higher rate of Violence(Tirunelveli, Madurai & Salem) and Three Districts from Lower rate of violence (Sivagangai, Thiruchirappalli & Nilgiris).

VII. LIMITATIONS OF THE STUDY

1. The study is limited to focus only the violence against women in the selected district of Tamil Nadu. The results of the study explicit only the six districts of Tamil Nadu.
2. Some of the respondents are very reluctant to share their experience regarding workplace violence with the researcher.

EMPLOYMENT STATUS OF WOMEN

DISTRICT	EMPLOYMENT STATUS OF WOMEN		
	Organized Sectors	Unorganized Sectors	TOTAL
Sivaganga	4 7.27%	6 10.90%	10 18.18%
Trichy	4 7.27%	7 12.72%	11 20.00%
Salem	2 3.63%	8 14.54%	10 18.18%
Madurai	2 3.63%	4 7.27%	6 10.90%
Nilgiris	2 3.63%	5 9.09%	7 12.72%
Tirunelveli	8 3.63%	9 16.36%	11 20.00%
TOTAL	**16 29.09%**	**39 70.90%**	**55 100.00%**

Majority of 71% of respondents were employed in unorganized sectors and 29% of the respondents were employed in organized sectors. Women in India are mostly employed in unorganized sectors. This general trend is also observed in the sample of respondents.

RESPONDENTS OPINION ABOUT THE WORKING ENVIRONMENT

DISTRICT	WORKING ENVIRONMENT			
	Sexual Abuse	Feel Jealous	Miss understanding	TOTAL
Sivaganga	2 3.63%	1 1.81%	3 5.45%	6 10.90%
Trichy	1 1.81%	3 5.45%	5 9.09%	9 16.36%
Salem	4 7.27%	3 5.45%	5 9.09%	12 21.81%
Madurai	0 0.00%	1 1.81%	4 7.27%	5 9.09%
Nilgiris	4 7.27%	2 3.63%	7 12.72%	13 23.63%
Tirunelveli	2 3.63%	0 0.00%	3 5.45%	5 9.09%
TOTAL	**13 23.63%**	**10 18.18%**	**32 58.18%**	**55 100.00%**

The above table shows that more than half (58%) of the respondents are not having mutual understanding with one another in workplace, 24% of the respondents have under gone sexual abuse in workplace and 18% of the respondents are feeling jealous with one another in the workplace. The respondents are willing to reveal their opinion about jealous feel and miss understanding but not about sexual abuse. The researcher adopted different strategies to collect the real information from the respondents.

TYPES OF VIOLENCE FACED BY WOMEN IN THE WORK PLACE

DISTRICT	TYPES OF VIOLENCE			
	Physical Violence	**Psychological Violence**	**Economic Violence**	**Social Violence**
Sivaganga	11 20%	7 12.72%	6 10.90%	7 12.72%
Trichy	10 18.18%	4 7.27%	5 9.09%	6 10.90%
Salem	8 14.54%	9 16.36%	7 12.72%	4 7.27%
Madurai	7 12.72%	11 20%	8 14.54%	9 16.36%
Nilgiris	10 18.18%	8 14.54%	7 12.72%	6 10.90%
Tirunelveli	6 10.90%	5 9.09%	5 9.09%	4 7.27%
TOTAL	**52** **94.54**%	**44** **80**%	**38** **69.09**%	**36** **65.45**%

(Multiple responses)

It is found that frequent incidence of violence in the work place. Women are facing all forms of violence in the work place. 95% of the respondents have faced physical violence. 80% of the respondents have reported that they are facing psychological violence in the work place. 69% and 65% of the respondents have faced economic violence and social violence respectively. All the working women are facing physical, psychological, economic and social violence.

REASONS FOR VIOLENCE AT WORK PLACE

DISTRICT	REASONS FOR VIOLENCE AT WORK PLACE				
	Misunderstanding	**Caste Discrimination**	**Feel jealous**	**Over work load**	**Total**
Sivaganga	0 0.00%	2 3.63%	1 1.81%	3 5.45%	6 10.90%
Trichy	4 7.27%	2 3.63%	1 1.81%	4 7.27%	11 20%
Salem	1	2	4	2	9

	1.81%	3.63%	7.27%	3.63%	16.36%
Madurai	3 6.00%	2 3.63%	4 7.27%	4 7.27%	13 23.63%
Nilgiris	2 3.63%	1 1.81%	3 5.45%	3 5.45%	9 16.36%
Tirunelveli	1 1.81%	2 3.63%	0 0.00%	4 7.27%	7 12.72%
TOTAL	**11** **20**%	**11** **20**%	**13** **23.63**%	**20** **36.36**%	**55** **100.00**%

In the perception of the respondents over work load, jealous feeling and misunderstanding with seniors and co-workers are the major reasons for the violence in the workplace. 36% of the respondents were of the opinion that over workload is major cause of violence in the workplace. 24% of the respondents were of the opinion that feeling jealous is one of the causes for violence in the workplace and 20% of the respondents were of the opinion that misunderstanding and caste discrimination is another cause for violence.

PERPETRATION VIOLENCE IN WORKPLACE

DISTRICT	**PERPETRATION VIOLENCE**			
	Higher Authority	**Co-workers**	**Subordinate**	**Total**
Sivaganga	7 12.72%	2 3.63%	3 5.45%	12 21.81%
Trichy	4 7.27%	4 7.27%	2 3.63%	10 18.18%
Salem	3 5.45%	2 3.63%	4 7.27%	9 16.36%
Madurai	4 7.27%	3 5.45%	3 5.45%	10 18.18%
Nilgiris	2 3.63%	2 3.63%	2 3.63%	6 10.90%
Tirunelveli	1 1.81%	5 9.09%	2 3.63%	8 14.54%
TOTAL	**21** **38.18**%	**18** **32.72**%	**16** **29.09**%	**55** **100.00**%

The respondents have stated that they face violence not only by the superiors but also by their co-workers they also behave violently towards them. From the above table, it was found that 38% of the respondents encounter violence in the workplace mostly from higher authority. It was opined that 33% and 29 % of the respondents are encountering violence in the workplace from co-workers and subordinates respectively.

PSYCHOLOGICAL IMPACT OF VIOLENCE ON THE RESPONDENTS

DISTRICT	PHYCHOLOGICAL IMPACT OF VIOLENCE					
	Fear	Anxiety	Anger	Tension	Stress	Total
Sivaganga	2	1	1	3	1	8
	3.63%	1.81%	1.81%	5.45%	1.81%	14.54%
Trichy	1	0	1	2	2	6
	1.81%	0.00%	1.81%	3.63%	3.63%	10.90%
Salem	3	1	2	1	1	8
	5.45%	1.81%	3.63%	1.81%	1.81%	14.54%
Madurai	1	3	1	3	1	9
	1.81%	5.45%	1.81%	5.45%	1.81%	16.36%
Nilgiris	1	1	2	8	2	4
	1.81%	1.81%	3.63%	14.54%	3.63%	25.45%
Tirunelveli	2	2	3	2	1	10
	3.63%	3.63%	5.45%	3.63%	1.81%	18.18%
TOTAL	**10**	**8**	**10**	**19**	**8**	**55**
	18.18%	**14.54%**	**18.18%**	**34.54%**	**14.54%**	**100.00%**

In addition to the physical violence, women suffer from the psychological problems also. Understanding psychological impact is of big importance in finding effective ways to support victims in the society. From the above table, it was found that the majority of 34% of the respondents feeling tension as the impact of violence, 18% of the respondents are feeling fear and anger and the remaining 14% of the respondents are feeling like anxiety and stress as the psychological impact of violence.

SHARING THE INCIDENCE OF VIOLENCE IN THE WORK PLACE

DISTRICT	SHARING				TOTAL
	Co-workers	Higher Authority	Union	Family Members	
Sivaganga	6	2	0	1	9
	10.90%	3.63%	0.00%	1.81%	16.36%
Trichy	5	2	0	1	8
	9.09%	3.63%	0.00%	1.81%	14.54%
Salem	5	5	1	0	11
	9.09%	9.09%	1.81%	0.00%	20%
Madurai	5	2	2	1	10
	10.00%	3.63%	3.63%	1.81%	18.18%
Nilgiris	4	5	2	2	13
	7.27%	9.09%	3.63%	3.63%	23.63%
Tirunelveli	3	0	1	2	4
	5.45%	0.00%	1.81%	3.63%	7.27%
TOTAL	**28**	**16**	**6**	**7**	**55**
	50.90%	**29.09%**	**10.90%**	**12.72%**	**100.00%**

Only colleagues can understand the problems faced by women in a better way than others. From the above table, it is noted that 51% of the respondents depend on their co-workers whenever they are in distress. A section of 29% and 1% of the respondents felt that they report their problems to the higher authority and their union in the organization respectively and the remaining 7% of the respondents are depend on their family members.

VIII. FINDINGS

- One third of the respondents are employed in unorganized sectors .Women in India is mostly employed in unorganized sectors.
- It is find out that more than half of the respondents are not having mutual understanding with one another in workplace.
- Sexual harassment is a major problem faced by the women in the workplace.
- It is noted that a significant number of respondents are working more than office hours in a day. The respondents reported that more workload, responsibilities and compulsion by employers of the respondents are the reasons for staying in workplace for longer hours.
- It is noted that the respondents are affected psychologically by the violence in the workplace.
- It is found that a significant number of women felt that returning home in late hours has resulted in misunderstanding between them and others in the family especially their husband.
- It is noticeable fact that Working women were not allowed to express their office tensions at home.
- It is opined that the stress faced by the respondents was responsible for many of their physical ailments.
- It is found that a significant number of respondents depend on their co-workers whenever they are in distress.

IX. CONCLUSION

In India, women are way ahead of their counterparts else-where in the matter of social legislation. But the implementation of laws granting rights to women has been so slow, lopsided and haphazard that socially, economically and politically women are kept far behind men. Indian women, thus, have been described as the underdogs of society where, in theory the law of equality exists, and women are considered to be on a par with their male counterparts, but in actual reality, men remain powerful and thrive at the expense of women.

In recent years, on the one hand, incidents of aggressive violence against women are reported to be escalating alarmingly in our country, and this in itself is a sufficient cause for increased concern, and on the other hand, awareness of rights among women has increased, leading to the rise of feminist movement, resulting in a new sensitivity to all forms of subjugation of women by men.

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Development and Validation of E-Content on DNA Replication in Botany at Higher Secondary Level

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Abstract- E-learning has influenced every sector of the society and can be used as a tool to improve the quality of education for the society and manpower. A study was undertaken to develop an e-content package related to the topic 'DNA replication' included in Botany for XII standard students of Biology and to compare the effectiveness of this package with conventional teaching methods. The e-content has been developed for learning the concept: *DNA replication using e-content package* from XII standard botany text book prescribed by Tamil Nadu Text Book Society. A pre-test, post-test single group experimental design was adopted. A sample of 20 XII standard students were exposed to different treatments namely e-content package and conventional method of teaching. The control and the experimental groups were assessed through pre and post tests and their achievement scores were compiled and analyzed using appropriate statistical procedure. It was found that the experimental group students who were exposed to e-content materials had better achievement scores than the control group in learning DNA replication.

Index Terms- DNA replication, Botany, 12 standard Biology, e-content package

I. INTRODUCTION

In the present era of modernization and mass education, Educational Technology has been widely used all over the world. It has to be in line with the demand in a competitive environment. Old ideas and methods have been replaced/supplemented by new ones. Conventional chalk and talk classroom instruction is no longer the favoured instructional method. The traditional role of teacher has been as: "Presenters of readymade information and as organizers of learning experiences". Application of Information Communication Technology (ICT) has become an able assistant to teachers and students in classroom learning and other academic engagements. Development, validation and application of e-content are necessary to have specific packages for the required topics.

Though there are packages developed and available for many educational topics, personal development of one for the specific purpose is desirable. This article is an attempt in that direction in developing a package for explaining a specific topic in Botany (DNA replication) and finding its comparative effectiveness in a real classroom situation.

II. DISCUSSION

NEED AND SIGNIFICANCE OF THE STUDY

The usual methods adopted so far in the field of biological science education have yielded limited results. If we use modern informative tools, it should receive maximum attention from the part of the learners, especially at the higher secondary level. An integral component of such attractive medium of classroom communication - e-content - is most suited, economical and effective for imparting knowledge and skills to students and to learn the subject matter thoroughly with full of joy, interest and greater attention shown by students.

Recognizing this importance, the National Policy on Education (NPE) (1986) emphasized that modern technology aids need be used to improve the process of teaching and learning at all levels of education and to improve the learning environment of the institution.

Against this background of importance and necessity, the researchers have chosen the technology of e-content for development and assessment of its effectiveness. Conventional method of teaching does not significantly help the students in easy understanding, retaining and uniform pace of learning. Learning is best facilitated by adopting right type of methods and technology, including ICT using individually developed e-contents for specific purposes.

III. OBJECTIVES OF THE STUDY

The objectives of the study are:

1. To develop an e-content on 'DNA replication' in Botany for teaching Higher Secondary Students
2. To validate the e- content on 'DNA replication' for higher secondary students
3. To find the effectiveness of e-content in learning 'DNA replication'

(Employing pre- and post- achievement tests on the selected topic)

IV. HYPOTHESES OF THE STUDY

The following hypotheses were formulated based on objectives of the study:

1. There is no significant difference between control and experimental group at pre – test level
2. There is no significant difference between control and experimental group at post- test level

3. There is no significant difference between the pre-test and post test scores of the control group
4. There is no significant difference between the pre- test and post- test scores of the experimental group

V. DEVELOPMENT OF E-CONTENT

The development of e-content for the study includes the following different steps:

- Planning of e-content.
  - Frame the objectives
  - Consider the learners
  - Prepare the specifications
- Preparation of script writing
- Making a story board for video/audio
- Video shooting
- Editing the pictures/ narrations
- Merging of text, voice, graphics, sound, video and animations
- Designing the e-content **:**
  - Planning a script for e-content in consultation with subject experts/teachers of the concerned subject
  - Editing the script with the help of technical experts and software programmers.

VI. VALIDATION OF E-CONTENT

- The e-content material in Botany was screened to a group, consisting of experts in the subject, to ascertain subject matter.
- Service of senior teachers, who were handling the subject (Botany) at higher secondary level utilized.
- The faculty in the University Department of Educational Technology ascertained validity of the e-content - both production and subject matter.
- Technical validity from "Teacher Oriented Televised Education" Studio Staff (TOTE studio).

VII. METHODOLOGY IN BRIEF

The higher secondary students from two different schools situated in rural area of Pudukkottai District were randomly selected (Kothari, 2008) as sample for the study. In each school 20 students have been selected for experimental group and another 20 students for control group on the basis of pre achievement scores. Here both the groups were equally matched in terms of their knowledge at Pre-test level. The study followed pre test, post test equivalent groups design. The samples of two groups were subjected to different treatments. After one week the experimental group was taught through the e-content and the control group with the traditional teaching. At the end of the treatment, the post-achievement test was administered to them. The difference between the mean scores of control and experimental group was analyzed by using appropriate statistical techniques -mean, standard deviation and t-test (Aggrawal, 2000). The results are tabulated in Tables 1-4.

VIII. DATA ANALYSIS

Hypothesis 1 (No difference in the pre achievement test 'mean score' in the two groups)

Table 1: Comparison of pre test-test scores of experimental and control groups

Groups compared	No. of students	Mean	S. D.	't' value	Level of significance
Control group	20	11.4	3.24	0.28	Not significant
Experimental group	20	11.2	3.10		

The calculated t-value 0.28 is less than the critical value 2.10 corresponding to the 0.01 level of significance. This implies that the control group and experimental group do not differ significantly in the level of achievement at pre test, agreeing with the hypothesis1.

Hypothesis 2 (No difference in the post achievement test scores in the two groups)

Table 2: Comparison of post-test scores of experimental group and control group

Groups Compared	No. of students	Mean	S. D.	't' value	Level of significance
Control group	20	13.5	3.35	3.43	Significant
Experimental group	20	17.8	3.56		

The calculated t-value 3.43 is greater than the critical value 2.10 corresponding to 0.01 level of significance. This implies that the control group and experimental group differ significantly in their achievement at post test; this is contrary to hypothesis 2. Further, it is concluded that the experimental group has better level of achievement than the control group. This indicates that e-content material is more effective than traditional instruction.

Hypothesis 3 (no significant difference between pre- and post- test scores of control group)

Table 3: Comparison of pre –test and post- test scores of control group.

Control Group	No. of students	Mean	S. D.	't' value	Level of significance
Pre-test	20	11.42	3.051	0.77	Not significant
Post-test	20	12.25	3.42		

The calculated t- value 0 .77 is less than the critical value 2.07 corresponding to 0.01 level of significance. This implies that the pre-test and post- test scores of control group do not

differ significantly in their achievement, in agreement with hypothesis3.

Hypothesis 4 (No significant difference between the pre- and post-test scores of experimental group)

Table 4: Comparison of pre-test and post-test scores of experimental group

Experimental group	No. of students	Mean	S. D.	't' value	Level of significance
Pre-test	20	12.33	3.08	10.92	significant
Post-test	20	19.02	3.59		

The calculated t-value 10.92 is higher than the critical value 2.81 corresponding to 0.01 level of significance. This implies that the pre- and post-test scores of experimental group differ significantly in their achievement; this is contrary to hypothesis 4. Further, based on this difference, it is concluded that the instruction assisted by e-content material is superior to conventional method.

IX. MAJOR FINDINGS

1. The mean difference between pre- test scores of control and experimental groups is not significant. The control and experimental group students got similar level of achievement at the initial level in the selected topic

2. Significant difference was found between control and experimental groups in the post-test. The higher secondary students exposed to e-content in experimental group got higher achievement scores than the control group, exposed to traditional method

3. The mean difference between pre-test and post-test mean scores of control group is found not significant. This group students do not improve their achievement, while adopting usual method.

4. The difference between pre-test and post-test mean scores of experimental group is found to be statistically significant. The higher post-test mean scores of experimental group indicate that e-content material is more effective in the process of teaching and learning.

X. RESULTS AND ANALYSIS

It is observed that the pre-test mean of the control group and experimental group is almost same, with no significant difference between them before treatment.

When considered the post-test average marks, both the groups had increased value. The average marks for controlled groups were less than that of the experimental group and this difference is slightly statistically significant.

The striking and statistically significant difference is noticed between the average of pre-test and post-test marks of both the groups. Therefore the teaching through e-content has significantly improved the performance of experimental group students. Though the average marks of the controlled group has increased (pre-test to post-test), it is less than the increase (pre-test to post-test) of the experimental group. This difference could be attributed to the use of e-content material in teaching.

XI. CONCLUSION

This study clearly indicated that the development of e-content in teaching DNA replication in Botany for higher secondary students was effective. The effectiveness was found in terms of post-test of the students of experimental group taught through e-content. One can presume similar effects in other topics and other science subjects by the application of e-learning techniques. It's hoped that there would be wider application of e-learning packages developed for specific topics and subjects for more effective knowledge transaction at school level.

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Economic Emancipation of Women through SHGs in Thanjavur District- An Analysis

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Abstract- The roles assigned for women are subordinated to those set apart for men and the rights given to women are fewer and less emancipating than those given to men and the obligations of women are more limited than those of men. SHGs have emerged as the appropriate people's institution which provided the poor women with the space and support necessary to take effective steps towards greater control of their personal and social life. It is not a static body; rather it grows in its resources and management skills of its members. In promoting SHG movement both Governmental and Non-Governmental agencies were involved. SHG movement had been designed to benefit women, especially the rural belt, by providing them social status and identity. In India, Tamil Nadu and Andhra Pradesh had been successful in SHG movement. The present study analyse the impact of the self-help groups on rural women in the study area of Thanjavur District, Tamil Nadu. The impact is measured in terms of the changes brought about in the levels of income, employment, expenditure, savings and borrowings after becoming members in the SHGs. Both primary and secondary data are used in this study. In Thanjavur District there were, 34 NGOs. The total sample respondents taken for this study was 300. The 300 sample women respondents were selected randomly from different NGOs by adopting proportionate random sampling technique. The sample respondents cover all blocks and their membership had varied from a minimum of 6 months to a maximum of 10 years of experience in the SHGs. Z test was applied to study the impact of SHGs on the economic emancipation of women. The result indicates that there has been a significant improvement in the employment, income, expenditure, and savings of the respondents. It is also observed that the level of debt has decreased.

Index Terms: SHGs, Economic emancipation, NGOs, Employment, Income, Expenditure

I. INTRODUCTION

Every sphere of human functioning, the roles assigned for women are subordinated to those set apart for men and the rights given to women are fewer and less emancipating than those given to men and the obligations of women are more limited than those of men. Unequal gender relations imply that men not only can exercise greater power than women in almost all the spheres of human functioning but they have also culturally and often legally more sanctioned power over women and have a greater control of and access to resources and information. SHGs have emerged as the appropriate people's institution which provided the poor women with the space and support necessary to take effective steps towards greater control of their personal and social life. It is not a static body; rather it grows in its resources and management skills of its members. Their increasing confidence has motivated them for enhanced involvement in public spheres and has provoked them to undertake common action programmes. Self-help groups are voluntary small group structures for mutual aid in the accomplishment of a specific purpose. They are usually formed by peers who had come together for mutual assistance, in satisfying a common need, overcoming a common handicap or life-disrupting problem and bringing about desired change. The seven distinctive characteristics of self-help groups are, voluntary activity, members having shared problems, meetings for mutual benefit, sharing the role of helpers and the helped, constructive action towards shared goals, groups run by members and groups existing without outside funding

There is a very strong role for civil society organisations in this process. The state alone cannot empower women. What the state can do is to create enabling conditions which legitimize a change in women's position. In promoting SHG movement both Governmental and Non-Governmental agencies were involved. SHG movement had been designed to benefit women, especially the rural belt, by providing them social status and identity. In India, Tamil Nadu and Andhra Pradesh had been successful in SHG movement. Self-

Help Groups become the agents of empowerment promoting agencies in rural India. They have gained the momentum as a movement and they can make sustainable development a reality in rural India. Specific efforts to promote SHGs to all the rural areas are a need of the hour. Further, it is essential to probe into the process and dimensions of empowerment of the women members in SHGs. As it is an emerging new concept, a scientific prediction and implementation would be of great help. The present research study is an attempt to contribute to the women-studies specific to the empowerment of women at the grass-root level. Rural women empowerment through self-help groups can be certainly a significant step and a milestone in the history of rural development in India. Unlike the other governmental programmes it was not organised by government officials but by women themselves. SHG was a phenomenon, which had emerged in the financial system primarily to protect women from the clutches of moneylenders. It had also aspirations to bring about integral changes in the lives of rural women (Evaluation Report, 2004).

II. STATEMENT OF THE PROBLEM

Women's participation in the economic activity is important for their own personal advancement as also for an improvement of their status in the society. Women should join the labour force of the country on an equal footing with those of men and get themselves integrated into the economic system. The present analysis is undertaken to find out the empowerment achieved among the socially deprived classes to improve health and nutritional status, educational achievements, access to resources and to increase the real per capita income. Their empowerment needs are to be looked at from different perspectives such as individual, group, community, collaborating organisations and the state too. Hence the present study is mainly confined to an analysis of the impact of the self-help groups on rural women in the study area of Thanjavur District, Tamil Nadu. The impact is measured in terms of the changes brought about in the levels of income, employment, expenditure, savings and borrowings after becoming members in the SHGs.

III. OBJECTIVES OF THE STUDY

1. To study the socio-economic profile of the SHG members in the Thanjavur District.

2. To analyse the impact of the SHGs on employment, income, expenditure, savings, indebtedness, housing conditions and utilisation of consumer durables

IV. REVIEW OF LITERATURE

Surekha Rao and Padmaja (1998) in their study on self-help groups in Tirupathi, Andhra Pradesh had analysed the socio-economic background of the respondents, their income, expenditure, and their savings, and the involvement of women in the SHGs, and their future plans and suggestions. From this study it had become clear that women had been very active in participating in the group and in saving money. Most of the women had started their own self-employment ventures such as petty shops, canteens, tailoring units, milk business and the like and the loans had been taken from the groups and all of them were satisfied with the functioning of the group.

Dolly Sunny (2005) had analysed the activities of the SHGs which had facilitated, with the help of micro credit, in the attainment of sustainable growth through empowerment of women. According to him, to overcome the hindrances in the socio economic development of women, such as illiteracy, poverty, low standards of living, and lack of employment opportunities, an integrated and a balanced development oriented policy should be adopted.

Gangaiah B. Nagaraja and C. Vasudevalu (2006) had conducted a study on the impact of the self-help groups on the income and employment of the women members in Andhra Pradesh. The major findings of the study had been that the SHGs had generated

sufficient employment opportunities to make the women earn their livelihood, and in creating awareness about the various government programmes.

V. METHODOLOGY AND TOOLS OF ANALYSIS

Both primary and secondary data are used in this study. In Thanjavur District there were, 34 NGOs. The total sample respondents taken for this study was 300. The 300 sample women respondents were selected randomly from different NGOs by adopting proportionate random sampling technique. The sample respondents cover all blocks and their membership had varied from a minimum of 6 months to a maximum of 10 years of experience in the SHGs. Z test was applied to study the impact of SHGs on the economic emancipation of women along with percentage analysis.

VI. IMPACT OF SHGs ON ECONOMIC EMANCIPATION OF WOMEN

Self help-groups help the rural women to improve their economic status and thereby enhance their social image. The basic idea of self help group is simple: if the poor people are provided access to financial services, including credit, they may very well be able to start and expand a micro-enterprise that will allow them to improve their economic and income status. An increase in income would lead to an increase in the expenditure as well as in the savings. This chapter deals with the impact of the self-help groups on a few chosen economic variables such as their income, employment, savings, enjoyment of a few consumer durable goods, indebtedness, their expenditure and their housing conditions.

VII. IMPACT ON INCOME

Several grass root level programmes in India have been undertaken by the SHGs with a view to undertake the task of increasing incomes of the poor women by strengthening and promoting economic activities and their capabilities. The financial assistance provided by the banks in the form of providing micro-credit loans had led to an increase in the incomes of the beneficiaries. It had enabled the member beneficiaries to supplement their family income to a certain extent.

TABLE – 1: Business and Income level of the respondents – before and after Joining SHGs

Category of Business	Before Joining the SHGs				After Joining the SHGs			
	Income Level				Income Level			
	Upto Rs.4800	Rs.4800-Rs.9600	Above Rs.9600	Total	Upto Rs.4800	Rs.4800 to Rs.9600	Above Rs.9600	Total
Petty business	30 (58.82)	19 (37.25)	2 (3.92)	51 (100.00)	52 (33.33)	37 (23.72)	67 (42.95)	156 (100.00)
Processing units	16 (51.61)	9 (29.03)	6 (19.35)	31 (100.00)	8 (19.51)	14 (34.15)	19 (46.34)	41 (100.00)
Production units	6 (17.65)	21 (61.76)	7 (20.59)	34 (100.00)	10 (20.83)	21 (43.75)	17 (35.42	48 (100.00)

Service units	9 (42.86)	7 (33.33)	5 (23.81)	21 (100.00)	12 (21.82)	25 (45.45)	18 (32.73)	55 (100.00)
Overall	61 (44.53)	56 (40.88)	20 (14.60)	137 (100.00)	82 (27.33)	97 (32.33)	121 (40.33)	300 (100.00)

Source: Calculated on the basis of Survey Data.

. Before joining SHG there were 51 members engaged in Petty business and that has increased to 156 after joining. Thirty one respondents were engaged in processing units and that was increased to 41 after becoming SHG members. The number of respondents engaged in production units was only 34 before joining SHG and that has increased to 48. The respondents undertaking service units increased from 21 to 55. On the whole the respondents doing small business increased from 137 to 300 after joining in SHG. Similarly the number of respondents in the income level up Rs.4, 800 was 61 and that has increased to 82 after membership. The respondents who fall under the level of income from Rs.4, 800 to 9,600 increased from 56 to 97. The number of respondents in the income level of above Rs.9, 600 also increased to 121. Before joining in SHG it was only 20. The total number of respondents earning income increased from 137 to 300. It is concluded that SHG has brought not only employment to the respondents but also increase in the level of income. More number of respondents is engaged in Petty business compared to other business because of easy marketing and transporting facilities.

It is concluded that all women beneficiaries who were in the lowest income group are able to move out of the lowest income group whereas the percentage of women respondents in the income above Rs.9, 600 has increased with the increase in business.

The average income before and after joining in SHG on the basis of business undertaken is presented in Table - 4 along with the 'Z' test values.

TABLE - 2

'Z' Test for the Mean Income of the Respondents before and after Joining SHGs

Sl. No.	Category of Business	Before Joining the SHGs			After Joining the SHGs			Z – value
		N	$\bar{X}$	SD	N	$\bar{X}$	SD	
1.	Petty business	51	6549.02	2650.009	156	10228.85 (56.19)	4538.296	7.086*
2.	Processing units	31	7645.161	3728.703	41	11092.68 (45.09)	4070.712	3.734*
3.	Production units	34	9235.294	2987.944	48	10427.08 (12.91)	3895.155	1.567*

4.	Service units	21	8261.905	3845.839	55	10230.91 (23.83)	3856.782	1.994*
	Overall	137	7726.277	3335.4	300	10379 (34.33)	4248.658	7.055*

* Significant at 5 per cent level.

Figures in the parentheses represent the percentage increase in the average income after becoming members in SHG.

It could be observed from Table-4 that the average income has increased from Rs.6349.02 to 10,228.85 showing the increase of 56.19 per cent in case of petty business. In processing units the average income has increased from Rs.7645.16 to 11092.68 revealing an increase of 45.09 per cent. The income of the respondents engaged in production units increased from Rs.9235.29 to Rs.10427.08 revealing an increase of 12.91 per cent and the income of the respondents engaged in service units increased from Rs.8261.91 to 10230.91 and the level of increase was 23.83 per cent. Petty business and processing units have enabled the sample respondents to improve their income to a greater level compared to production and service units. In order to find out the average income and business level of the respondents before and after joining SHG 'Z' test was used and from the table it is clear that the Z-test values are significant at 5 per cent level. Hence, it can be concluded that there is a significant difference in the mean income of the respondents irrespective of the business undertaken after joining in self-help groups.

VIII. IMPACT ON EMPLOYMENT

The employment of women is an index of their economic status in the society, especially with reference to equality. It has been recognised as the critical entry point for their integration into main stream development. Employment of women has a direct bearing on the quality of their life. Even though there may be limitation of financial resource in India, available human resources are plenty and yet to be fully exploited. Bank credit provides a medium for ensuring optimum use of financial and human resources. Self-employment facilitates women to have flexible working hours.

TABLE - 3

Employment Level before and after Joining SHGs

Sl. No.	Employment Level	Before Joining the SHGs		After Joining the SHGs	
		Number of Respondents	% to Total	Number of Respondents	% to Total
1.	Up to 4 hours	220	73.33	11	3.67
2.	5 hours	33	11.00	41	13.67
3.	6 hours	9	3.00	44	14.67
4.	7 hours	13	4.33	62	20.67
5.	8 hours and above	25	8.33	142	47.33

	Total	300	100.0	300	100.0

Source: Primary Data.

There is an increase in employment level of the respondents due to the impact of SHGs. Before the membership in SHG nearly 220 respondents got employment only for up to 4 hours and the number had decreased to 11 after joining in SHG. After joining in SHG the number of respondents who were employed for 8 hours increased from 25 to 142. The change in percentage of the employment level of the respondents also shows an increasing trend.

The number of respondents employed below 4 hours had declined to a very low level of 11 members. In general, the number of hours of employment of the beneficiaries has improved. Many of the beneficiaries who were unemployed previously are able to become self-employed with the help of SHGs.

IX. IMPACT ON SAVINGS

A small portion of the profits earned through the operation of small enterprises is saved by the women respondents. Saving practice enables the rural women to mobilize their own resources and reduce their dependency on external assistance. The credit given by banks has turned to be an effective strategy for mobilizing savings. Credit is given only to those who save with the self-help groups for at least 6 months.

TABLE - 4

Savings of the Respondents before and after Joining SHGs

Sl. No.	Savings (in Rs.)	Before Joining the SHGs		After Joining the SHGs	
		Number of Respondents	Percentage to Total	Number of Respondents	Percentage to Total
1.	Below 500	50	36.50	18	6.00
2.	500 – 1000	64	46.72	142	47.33
3.	1000 – 1500	17	12.41	53	17.67
4.	Above 1500	6	4.38	87	29.00
	Total	137	100.0	300	100.0

Source: Primary Data.

It is inferred from Table that there is a significant increase in savings of the sample respondents after joining self-help group. The NGOs encourages the SHGs to save regularly. Further, when the respondents obtain micro-credit one per cent of the loan amount is put into the group's savings account. 'Z' test has been applied to find out the significant difference between the average savings amount before and after joining SHG. It is given in Table 5

TABLE - 5

Savings of the Respondents before and after Joining SHGs - 'Z' Test

Sl. No.	**Variables**	Number of Respondents						
		Before Joining the SHGs			After Joining the SHGs			
		N	$\bar{X}$ (in Rs.)	**S.D**	**N**	$\bar{X}$ (in Rs.)	**S.D**	**Z**
1.	Savings	137	734.307	309.99	300	1158.667 (57.79)	358.567	12.624*

* Significant at 5 per cent level.

Figures in the parentheses are percentages.

The 'Z' value indicates that there is a significant difference in the average savings amount of the respondents before and after joining self-help group. The average savings amount was Rs.734.30 before joining self-help group and it increased to 1158.67, an increase of 57.79 per cent.

X. IMPACT ON HOUSEHOLD INDEBTEDNESS

Traditionally, poor women in India have a tendency to borrow from the informal sector as they do not generally have an access to the formal banking sector and the organised formal credit systems. Since structural changes had been taking place in the rural areas, also the institutional credit facility had now become available to the rural women folk also. Table highlights the extent of the indebtedness of the respondents' households before and after becoming members of SHGs.

TABLE - 6

Household Indebtedness of the Respondents before and after Joining SHGs

Sl. No.	Indebtedness (in Rs.)	Before Joining the SHGs		After Joining the SHGs	
		Number of Respondents	Percentage to Total	Number of Respondents	Percentage to Total
1.	Below 2000	102	34.00	18	6.00
2.	2000 – 4000	34	11.33	25	8.33
3.	4000 – 6000	30	10.00	33	11.00
4.	Above 6000	54	18.00	58	19.33
	Total	220	73.33	134	44.66

Source: Primary Data.

Table 6 indicates that the number of households which had borrowed and were indebted had declined from 220 to 134, that is, 73.33 per cent of the 300 women respondents had borrowed and were in debt before becoming members of the SHGs and the number had been reduced to the level of 44.66 per cent of the sample respondents after becoming members. But the percentages of households that have borrowed above Rs.6000 have increased considerably. This may be due to the increase in repaying capacity. At the same time the households that have borrowed below Rs.2000 have been reduced from 34 per cent to 6 per cent that is after their membership of SHG they have a tendency either not to borrow or borrow more because their repayment capacity increases. The table gives the sources of credit other than micro-credit to the household borrowings of the sample respondents before and after availing of micro-credit.

TABLE - 7

Sources of Household Indebtedness of the Respondents before and after Joining SHGs

Sl. No.	Sources	Before Joining the SHGs		After Joining the SHGs	
		Number of Respondents	Percentage to Total	Number of Respondents	Percentage to Total
1.	Banks	101	33.67	70	23.33
2.	Money lenders	65	21.67	33	11.00
3.	Banks and Money lenders	54	18.0	31	10.33
	Total	220	73.33	134	44.66

Source: Primary Data.

Before becoming members of the SHGs 220 households were in debt. This number has been reduced to 134 after becoming a member. The percentage of the households that borrowed from banks has decreased from 33.67 per cent to 23.33 per cent whereas borrowings from moneylenders have declined from 21.67 per cent to 11 per cent. The percentage change shows that after becoming a member of the SHG they are slowly come out from their debt. To find out whether there had been any significant difference between the average amounts of the indebtedness of the households of the women respondents before and after their becoming members of the SHGs, the 'Z' test has been applied and the result is given in Table 8.

TABLE – 8.

'Z' Test for Indebtedness of the Respondents before and after Joining SHGs

Sl. No.	**Variable**	**Number of Respondents**						
		Before Joining the SHGs			After Joining the SHGs			
		N	$\bar{X}$ (in Rs.)	S.D	N	$\bar{X}$ (in Rs.)	S.D	Z

1.	Household indebtedness	220	3729.091	2163.071	134	3376.11 9 (9.47)	1641.94	1.735

Figures in the parentheses are percentages.

The 'Z' value obtained for the indebtedness position of the sample respondents after their joining the self-help groups has been reduced significantly at the 5 per cent level of significance. This indicates that the micro credit is found to be effective in reducing the borrowings of the households and has a greater role in reducing the rural indebtedness. The improvement in the earning capacity of the women respondents might have influenced the household members to borrow less from other non-institutional sources.

XI. IMPACT ON EXPENDITURE PATTERN

The standard of living of the people is judged generally by the per capita expenditure on consumption items. The standard of living has its own primary and secondary components. The primary component of the standard of living consists of the expenditure on nutrition, housing, medical care, clothing and education. The secondary component includes the enjoyment of leisure, security and that of entertainment. The expenditure on the primary component of standard of living by an average household could be considered as an approximate indicator of the standard of living of the household.

TABLE –9.

Per capita Household Expenditure of the Respondents before and after Joining SHGs (Per Annum)

Sl. No.	Household Expenditure (in Rs.)	Before Joining the SHGs		After Joining the SHGs	
		Number of Respondents	Percentage to Total	Number of Respondents	Percentage to Total
1.	Below 3000	210	67.00	18	6.00
2.	3000 – 4000	16	5.33	24	8.00
3.	4000 – 5000	14	4.67	40	13.33
4.	5000 – 6000	12	4.00	63	21.00
5.	6000 – 7000	13	4.33	65	21.67
6.	7000 – 8000	18	6.00	36	12.0
7.	Above 8000	26	8.67	54	18.00
	Total	300	100.00	300	100.00

Source: Primary Data.

It is inferred from Table 9 that there is a significant increase in the per capita household expenditure of the women respondents after joining self-help groups. The figures in the table suggest that the percentage of per capita household expenditure of the women respondents who have expenditure below 3000 per annum has decreased from the level of 67 per cent to that of 6 per cent. The beneficiaries in the expenditure category of Rs.3000 to above Rs.8000 have increased from the level of 33 per cent to that of 94

per cent. A change in the pattern of expenditure on consumption items is an index of economic development and an improvement in the standard of living.

The 'Z' test has been applied to find out the significant difference between the average per capita household expenditure amount of the sample respondents before and after their joining the self-help groups.

TABLE - 10

'Z' Test for Per capita Household Expenditure of the Respondents before and after Joining SHGs

Sl. No.	Variables	Number of Respondents						
		Before Joining the SHGs			After Joining the SHGs			
		N	$\bar{X}$ (in Rs.)	S.D	N	$\bar{X}$ (in Rs.)	S.D	Z
1.	Household Expenditure	300	3699	1950.413	300	6344.333 (71.52)	1788.593	17.314*

* Significant at 5 per cent level.

Figures in the parentheses are percentages.

The 'Z' value that was found to be significant at the 5 per cent level indicates that the difference is significant. The average per capita household expenditure amount was Rs.3699 and after joining self-help group it has increased to Rs.6344.33 that is increased by 71.52 per cent. So it is concluded that SHG have a positive impact on household expenditure of the sample respondents. .

XII. SUMMARY OF FINDINGS AND CONCLUSION

Business and Income Level of the Respondents:

Before joining SHG, out of 300 respondents 51 members were engaged in petty business and this has increased to 156 after joining as a member in SHG. The respondents engaged in processing units also increased from 31 to 41, and in the production units also. On the whole the respondents doing some businesses increased from 137 to 300 after joining SHG. 'Z' test was applied to test whether the means differed significantly. The results were significant at 5 per cent level. The mean income had increased from 7,726.277 to 10,379. Hence it can be concluded that there was a significant difference in the mean income irrespective of the business undertaken by the respondents after joining self-help groups.

Employment and Nature of Business:

The percentage of respondents employed below 4 hours per day has declined from 58.82 per cent to 3.20 per cent after joining self-groups. The number of respondents who had worked for 8 hours and above per day had increased from 3.92 per cent to 48.08 per cent. The same trend prevails in other units also. Even though an improvement had been made in the employment status of the sample respondents 3.67 per cent were still under employed.The 'Z' test results reveal that the impact of self-help groups on the

employment in petty business, processing, production and service units are significant at 5 per cent level. The overall value 6.93 shows that the women self-help groups are successful in increasing the average hours of employment of the sample respondents.

Impact on Savings:

There has been a significant increase in the savings of the respondents after joining self-help group. The respondents who saved below Rs.500 per annum have declined from 36.50 per cent to 6 per cent. The respondents who saved above Rs.1500 per annum have increased to 29 per cent. Before it that was 4.38 per cent.The 'Z' value 1158.667 indicates that there is significant increase in the saving amount of the respondents after joining SHGs. The SHGs have a positive impact on the savings of the respondents.

Impact on Household Indebtedness:

The number of households that had borrowed declined to 134 from 220 that are 73.33 per cent. In the case of the respondents who had borrowed before becoming members in SHG has been reduced to 44.66 per cent. The percentage borrowings of above Rs.6000 has increased considerably because of their repayment capacity.The 'Z' value obtained for the borrowing position after joining self-help group is significantly declining. So the value is not significant at 5 per cent level. Before membership the mean value was Rs.3, 729.091 and after membership the value was 3,376.119. The improvement in earning capacity of the respondents has reduced their borrowings.

Impact on Expenditure Pattern:

There is a significant increase in the per capita household expenditure of the respondents after joining SHG. The respondents who had expenditure below Rs.3000 per annum had decreased to 6 per cent from 67 per cent. The respondents in the expenditure category of Rs.3000 and above had increased from 33 per cent to 94 per cent.The 'Z' value which is significant at 5 per cent level indicates that the average percapita household expenditure amount was Rs.3699 and after joining SHG it had increased to Rs.6344.33. The increase is 71.52 per cent.

CONCLUSION

Rural women, who are in the lowest rung of the Indian society, are in need of empowerment and upliftment. SHGs had a major role in bringing empowerment among them. The dehumanizing bondages of caste, class and gender have to be eliminated and their right to live with human dignity has to be restored. The self-help group movement and joint ventures of government and non-governmental agencies had paved the way for the emancipation of rural women.

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Enhancing Security for Storage Services in Cloud Computing

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Abstract- Storage Services in cloud computing allows users to store away for the high quality cloud applications on-demand to enjoy without the hassle of managing their own hardware and software their data. While the benefits of these services are more, there are new security threats in the direction of the accuracy of the data in the cloud due to the physical possession of their outsourced data. To address this new problem and improved security and reliable cloud storage service to realize, we propose a distributed storage integrity auditing mechanism, by utilizing the homomorphic token and distributed erasure-coded data in this article. The proposed design allows users to monitor the cloud storage with very lightweight communication and computation costs. This provides strong cloud storage accuracy, and also allows for faster fault location data, that is to say, the identification of misbehaving server. The proposed design supports continued safe and efficient dynamic activities, including block modification, deletion and append. The proposed system is very effective against server colluding attacks and data modification attacks.

I. INTRODUCTION

Processors cheaper and more powerful, along with the software as (SaaS), service computing architecture, are transforming data centers into service groups to large scale computing. The growing connections reliable and flexible network that is still possible that users can now subscribe high quality services from data and software that resides only in remote data centers

The movement of data in the cloud offers convenience to users because they do not have to worry about the complexities of direct hardware management. Online services do not offer large amounts of storage space and customization of computer resources. Bu users are at the mercy of their cloud service providers (CSP) the availability and integrity of their data. Because users cannot save a local copy of the external data, CSP has to behave unfaithful to cloud users. CSP can even try to hide the loss of data in order to maintain a reputation. In order to achieve the assurance of the integrity and availability of data in cloud and enforce the quality of storage service in the cloud, on-demand that allows verification of correctness of the data on behalf of users of the cloud.

To achieve guarantees of integrity and availability of data cloud and enforce the quality of cloud storage services have to enable the effective methods that correct the review letter, the data on behalf of the cloud users, be developed. However, prohibiting the fact that users no longer physically in possession of the data directly in the cloud over the traditional cryptographic primitives for the purpose of protecting the integrity of the data. Therefore, check the accuracy of cloud storage space without explicit knowledge of the entire data files must be. Meanwhile, cloud storage is not only a third of the data storage. The data is stored in the cloud not only accessible, but also uses updated frequently, including insertion, deletion, modification, attachments, etc. Therefore, it is important to integrate these dynamic roles in correcting supports cloud storage backup, the system design difficult. Last but not least, the use of cloud computing data centers, driven and worked on a distributed concurrent. It is more advantages for individual users to store data redundantly across multiple physical servers to reduce the data integrity and availability threats. Therefore distributed protocols for ensuring storage correctness is most important in achieving systems robust cloud storage and insurance. However, this important area has not been studied in the literature.

In this paper, we propose a verification scheme efficient and flexible distributed storage with explicit dynamic data support to ensure the accuracy and availability of user data in the cloud. We erasure correction code in the file distribution preparation to provide redundancies and guarantee the data reliability Byzantine servers in a storage server may fail arbitrarily. This construction drastically reduces the communication and storage overhead compared to the distribution techniques traditional file-based replication. By using homomorphic signal with the verification of erasure-coded distributed data, our scheme achieves the storage correctness insurance as well as data error localization: whenever corruption is detected during verification data storage of the correction, our scheme can almost guarantee simultaneous localization error data, i.e., identification of misbehaving server (s). In order to achieve a good balance between error resilience and dynamics data, we explore the algebraic property over our symbolic computation and data erasure coded, and demonstrate how efficiently support dynamic operation of data blocks, while maintaining the same level of storage correctness assurance. To save time, computing resources, and even load-related online

users, we also provide the extension of the main scheme proposal to support third-party audit, where users can safely.

The data presented in cloud storage are insured, but the integrity and availability is not assured. The data can be hacked in the cloud storage and databases can get corrupted. To overcome this problem, an intermediate TPA is enhanced with encryption techniques, authentication and auditing.

II. PROBLEM STATEMENT

2.1 System Model

Representative Network Architecture cloud storage service can be identified as follows:

• User: an entity that has data to be stored in the cloud and cloud-based data storage and calculation, can be either company or individual clients.

• Cloud Server (CS): an entity that is managed by the cloud service provider (CSP) to provide a data storage service and has storage and computation significant resources (we will not differentiate CS and CSP onwards).

• Auditor of others: the optional TPA, which has experience and capability that users can not have, is trusted to assess and expose risk of storage services in the cloud, on behalf of the users on request.

As users no longer have their data locally, it is vital to ensure users that their data is being stored and maintained properly. That is, users must be equipped with safety means for them to make assurance continuity correction (to enforce a service level agreement cloud storage) of your stored data, even in the absence of local copies. If users do not have at the moment, feasibility or resources to manage their data online, you can delegate the audit data to a trusted TPA Optional their options. However, to safely introduce such TPA, for leaking external data users to the TPA through the audit protocol should be prohibited.

In our model, we assume that communication channels between each point to point cloud server and the user is authenticated and reliable, which can be achieved in practice with little overhead.

2.2 Design Goals

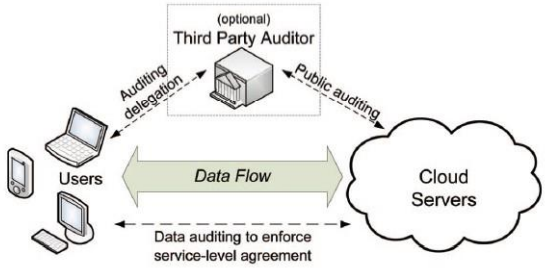
To ensure safety and reliability for cloud data storage in former adversary model, our goal is to design effective mechanisms for dynamic data verification operation and the achievement of the following objectives:

1. Correction storage: to assure users that their data is actually stored properly and kept intact all the time in the cloud.
2. Quick data error localization: to locate the server is running effectively when detected data corruption.
3. Dynamic Data Support: to maintain the same level of assurance of the correctness of storage, although users to modify, delete or add data files in the cloud.
4. Reliability: to improve the availability of data against Byzantine failures, data modification and collusion malicious server attacks, i.e. minimizing the effect brought by data errors or failures of the server.
5. Lightweight: to allow users to perform accuracy checks with minimal overhead storage.

III. PROPOSED STATEMENT

In the data storage system in the cloud, users store their data in the cloud and do not have the data locally. Therefore, you should ensure the correctness and availability of the data files that are stored on distributed cloud servers. One of the key issues is effectively detect any modification and unauthorized data corruption, possibly due to the commitment of the server and / or random Byzantine fault. Furthermore, in the case when detecting distributed successfully these inconsistencies, to find that the data server error is in is also very important, since you can always be the first step to quickly recover storage errors and / or identifying potential external threats attacks.

To address these problems, our main scheme to ensure cloud data storage is presented in this section.



The first part of the section is devoted to a review of the basic tools of coding theory in our distribution program files needed by cloud servers. The token is used homomorphic next. The counter is one of a calculation based on universal family of hash function is selected to obtain the homomorphic properties which can be seamlessly in the verification of erasure coded data is integrated. Then it is shown how to obtain a challenge-response protocol to verify the proper storage and labeling of crashed servers. The method of file recovery and troubleshooting based on erasure correcting code are also described. Finally, we describe how tight third parties only with a slight modification of the core extend audit procedures to our plan.

3.1 Toward Third Party Auditing

As discussed in the architecture, in the event that the user does not have the time, viability, or the resources to carry out the verification of the correctness of storage, which may delegate this task to an independent external auditor, so that the cloud Storage publicly verifiable. However, as the recent work safely introduces an effective TPA should the audit process to bring in no new vulnerabilities to the privacy of user data. That is, should not learn TPA content of user data through data auditing delegates. Now we can show that only with a slight modification, the protocol can support privacy preserving audit by a third party.

The new design is based on the observation of the linear property blinding process parity vector based. Recall that the reason for the process of blinding the secret matrix P to cloud servers to protect. However, this can be either through blinding glare of the parity vector or vector data (assuming k <m) can be achieved. Therefore, if we blind data vector before coding file distribution, then the storage inspection task can be delegated preserves successful testing by third parties in a way that privacy.

The proposed system overcomes the security risks through the implementation of Third Party Audit (TPA) authentication

capability. TPA stores user information such as user password, date and time. It is envisaged, where the loading and unloading of data encryption and decryption algorithms. If there is no change in the facts that informs the user TPA. This ensures greater security, availability and integrity

IV. PROVIDING DYNAMIC DATA OPERATION SUPPORT

So far we have assumed that F represents the static data or archived. This model can be adapted to some application scenarios, such as libraries and academic records. Nevertheless, the storage of data in the cloud, there are many scenarios where data is stored in the cloud dynamically as electronic documents, pictures, or log files, etc. Therefore, it is important to consider the dynamic case, where a want to perform user update various block-level operations, delete and append to change the data file while the ensure storage correctness.

Since the data are not in the local user of the site, but the domain of management cloud service provider supports dynamic data operation can be quite difficult. On the one hand, the CSP must request material to process dynamic data without knowledge of the secret key. On the other hand, the user must ensure that every request for dynamic data operation has been faithfully processed by CSP.

To address this problem, we focus briefly explain our methodology and provide the details later. Dynamic operation for all data, the user must have the appropriate blocks and parity files first revolution. This part of the operation performed by the user, since only he knows the secret matrix P. In addition, to ensure that data block changes reflected correctly in the domain address cloud, the user also has to check token corresponding change memory to accommodate changes in data blocks. Just check sheets changed accordingly storage, the challenge-response protocol discussed above are performed on success, even after the data dynamics.

V. RELATED WORKS

Juels and Kaliski Jr., described as a proof of retrievability model, formal ensure the integrity of the remote database. His plan to combine randomly checked and an error correction code, both owned and exploitable guarantee.

Shah et al suggested that keep online storage honest first encrypting the data, send a set of pre-computed hash TPA symmetric key encrypted data to the auditor. However, the system works only encrypted files and auditors should receive long-term illness. Black Miller proposed to improve the reliability of static files distributed across multiple servers, in which ensure the encryption and block-level verification of the integrity of the deleted file. We have adopted some of his thoughts on distributed storage authentication protocol. However, studies show our support system, the dynamic disk problem and crashed the server when they are identified. Recently, Wang et al to check many existing solutions for remote data integrity and discuss their advantages and disadvantages in different scenarios project cloud storage services safely.

VI. CONCLUSION

In this paper, we study the problem of data security in data storage in the cloud, which is essentially a distributed storage system. To achieve guarantees of integrity and availability of data in the cloud and enforce service quality reliable cloud storage to users, distributed propose an efficient and flexible scheme. By utilizing the homomorphic token with distributed verification of erasure coded data, our system is the integration of storage correctness insurance and data error localization, i.e. achieved, we can ensure the simultaneous identification of misconduct server (s). Given time, computing resources, and even user online sensitive cargo, we also provide an extension of the main scheme proposed third party audit, where users can safely delegate tasks supports the auditors check integrity of others and be free of concerns to use cloud storage services

With the adoption of the proposed system, the correction of the integrity and availability of cloud data, encrypting stored data can be achieved. The resulting system will be protected against data corruption and piracy. Unauthorized access by CSP is preventable.

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