Determinants of AIS Effectiveness: Assessment thereof in Pakistan

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ABSTRACT

Accounting Information System (AIS) is the application of new and innovative information technology in accounting system of a company. To make this application effective and beneficial certain factors are required to be present. This study reviews these factors (determinants of AIS effectiveness) and then measures them in context of Pakistan. For this purpose a questionnaire as proposed by Ismail (2009) is used to measure these variables in two sectors-Textile and Cement-from Karachi Stock Exchange Pakistan. Survey is based on total nine variables. Eight independent variables are AIS sophistication, manager's AIS knowledge, manager's participation in AIS implementation, consultant effectiveness, vendor effectiveness, government agencies effectiveness and accounting firm effectiveness. The dependent variable is AIS effectiveness. Data analysis is based on correlation and regression. It is found that two variables, Manager Participation in AIS Implementation and Manager Accounting Knowledge have strong relation to the AIS effectiveness in Pakistan.

Keywords: Accounting Information System, AIS, Effectiveness, Pakistan, Assessment, Survey
JEL Codes: M19, M41, M43, M49

INTRODUCTION

Business firms must develop new businesses methods and use new technologie. The paramount method which should be chosen in order to enhance competitive advantage and to avoid any decline in value of production is the adoption of new technologies; (Caldeira & Ward, 2003). Development efforts for technical capabilities in Pakistan through larger and more subtle diffusion of communication technologies, is very common nowadays and it is very effective and important strategy to improve productivity and competitiveness. The effectiveness of technology adoption among enterprises and the availability of data play a vital tool for strengthening the company's business.

Computerized accounting system mainly facilitates small and medium business enterprises, to overcome their weakness and thereby increases the prospects for achievement (DeLone, 1988); the application of technology in corporate data business in Pakistan is also increasing and it became the source of increase in productivity.

An information system consist of collecting, entering, processing, storing, managing, controlling, and reporting information so a corporation is able to do its objectives and goals (Romney et al., 1997:18). This explanation of information systems show that's information system has following parts. Every information system is intended to complete one or additional goals or objectives. As an example, an information system is also intended to gather information and methods to assist managers concerning workers prepares payroll reports.

In order to determine the effectiveness of specific Accounting Information Systems (AIS), it is important that this term must be clearly defined first. There are various definitions of AIS. Viewed as a subsystem of management information system, it performs the operation method is primarily for monetary, and as non-financial operations that directly have an effect on economic transaction processing (Siegel & Shim 1997). AIS contain four key sub-systems as mentioned in Hall (2006) and that are relevant to this study:

- Transaction processing systems that support routine business operations with the documents vary from organization
- Final books / financial reporting systems, which generate reports normal money, such as income statements, balance sheets and cash flow statements, tax returns, and the different reports required by law
- Fixed asset system, that processes the transaction refers to the acquisition, maintenance, and removal of fixed assets, and
- Management reporting system, which provides internal management purposes with reports of unusual money and knowledge necessary to create the call, such as budgets, variance reports, and reporting responsibilities.

AIS created during a business, is directly related to the level, organizational culture and strategic design of information technology that this specific business have. A number of functions required in the accounting information system that appears in a business are: gather and record information about the activities and transactions; designing, processing and converting data into information that will be used in decision making for planning, application and management activities, and an end to mandatory controls so to keep the business assets. Accounting information plays an important role in the method of managing corporate activities.

AIS is said to be valuable when the information provided serves the usual needs of system users. An effective system should systematically provide information that has potential effects on decision-making process. Accounting Information is sometimes divided into two groups: 1) All those information that affects decision-making and is mainly used in order to control the organization and 2) those information which are used by the management within the company decisions.Huber argues that the combination of AISs leads to coordination within the organization which, in turn, will improve the quality of decisions. Several studies in accounting show that the effectiveness of the accounting information system depends on the quality of the output of an information system that will meet the needs of users. AISs helps organizations to increase its performance through better decision making as it provide useful information and reports on a daily and weekly basis. Moreover, company monitors all its activities on the basis of this information. Information technology has led to some changes in the process of reporting information as well. It facilitates the decision-maker by allowing more alternatives to the solution

of problems in their hands. According to Nicoloau & Sidnei (2001) AIS is computer-based system that will improve and enhance corporate control in the organization. Management is involved with various types of activities that require good quality and reliable information. They also require non-financial information such as production statistics, production quality and so on. However, the quality of information generated by the AIS is very important for management. Narasimhan & Kim (2001) argues that the use of AIS depends on the perceived quality of information by the user. The general rule of the standard depends on the reliability, timeliness of the information, forms and extent and importance of the decision. The effectiveness of the accounting system also depends on the perception of decision makers about the usefulness of the information generated by the system information required for business process management, reporting, budgeting and control, to run the organization.

The effectiveness of accounting information systems is analyzed on three bases: 1) the scope of information 2) timeliness 3) aggregation. The amount of information, for example, financial accounts, internal and external information is useful in predicting future events. Timeliness is the quality of the power system of accounting information for a systematic review of the required information on user satisfaction. Aggregation of information taken into account, as has been observed that the collection and synthesis of information within a specified period. Doll and Torkzadeh (1988) used some concept of user satisfaction to measure the effectiveness of accounting information systems. These concepts are information content, accuracy, format, ease of use and timeliness.

To our knowledge no research in Pakistan were held on success factors of AIS till now. This research will be very useful for organizations who want to adopt AIS in their organizations and also the interested users of an entity. This research will help to indicate the factors and variables that effect on the success of AIS in different organizations where it is used. It will also help those organizations who want to adopt AIS for the first time in their organization, by considering the influencing factors of AIS identify in this research. The overall objective of this research is the awareness of organizations about the importance of AIS and also to enhance the efficiency of AIS in organizations where it is currently used.

LITERATURE REVIEW

Information systems offer a chance for business to enhance their effectiveness and value and even to get competitive advantage, (Kimberly & Evanisko, 1981, Porter &Millar, 1985). With additional powerful user friendly personal computers and higher software packages, the advantages of Information System events are accessible to smallest business (Thong, 1999). Although massive businesses are using the PC for a few times, small and medium business enterprises are slow in adopting this technology innovation.

According to the Attawell's theory of technology diffusion, companies tend to delay adoption of technology because of lack of information about how to implement and operate the Accounting Information Systems. Ismail and King (2007) argue a lack of understanding of accounting information managers hinder the company's strategic business of aligning them with the capacity of the AIS requirements. Although business managers can provide expertise in areas of their operations, a mixture of a lot of advice from external consultants may provide relevant information for the effective implementation of the AIS; (De Guinea et al., 2005). In addition to the three top external experts commonly found in the literature AIS, accounting firms can also play an important role in the implementation of the AIS for the company's business (Davis, 1997; Mitchell et al, 2000; Berry et al., 2006) because accounting firms can recommend a company in the field of business costs, expenses, and cash flow to support the monitoring and control.

Meanwhile, consultants and vendors can facilitate them to choose the right technology fit the needs of business information (de Guinea et al, 2005). Therefore, this support lowers the absence of any external expert informational and technical information relating to the implementation of the AIS that the company's business may face.

Subsequently, Wernerfelt (1995)'s resource-based theory of firms indicates that firms are collections of resources in which the value of resources is partly dependent on the presence of different resources. Since SMEs typically operate under tight time, finances, and constraints of experience (Cragg& King, 1993; Berry et al, 2006), they have a tendency to regulate their limited funds for the implementation of AIS (Alasadi & Abdelrahim, 2007). However, managers of SMEs have the ability to commit resources towards the implementation of the AIS. Therefore, taking the diffusion of technology and resource-based theory into thinking, conceptual model for the study theorizes that less managerial commitment and external experience, information and poverty faced by SMEs are the obstacles to use and implementation of the AIS.

The importance of management commitment to the effectiveness of AIS in SMEs has always been recognized in the literature AIS (Cragg & King, 1993; Igbaria et al, 1997; Thong, 1999; Seyal & Abdul Rahman, 2003; De Guinea et al, 2005; Ismail & King, 2007). In accordance with Yap (1989), there are two reasons why managers support the implementation of the AIS. First, managers in the best position mark the exploitation of business opportunities for AIS. Justification is that managers are those who think their business is simple (Thong et al., 1996). Thus, the manager will bring the AIS into line with company objectives and methods (Jarvenpaa & Ives, 1991). Second, the implementation of the AIS needs extensive investment and has an effect on the organization's all aspects (Yap, 1989). In the case of SMEs, the manager has the authority to confirm the allotment of adequate resources and create a favorable atmosphere in addition to the application of AIS (Lucas, 1981). In addition, managerial commitment in a variety of information and participation in the implementation of AIS encourages users to develop positive attitudes toward the use of AIS (Thong et al, 1996). Furthermore, empirical evidencehas verified that management commitment is strongly associated with the use of simple felt and perceived usefulness of AIS in SMEs. Therefore, management commitment to the AIS will establish the difference between AIS implementation successful and unsuccessful (de Guinea et al., 2005).The effectiveness of AIS is one of the main dependent variables common in AIS literature (DeLone & McLean, 1992; Thong et al, 1996; Seddon, 1997; Foong, 1999). Raymond (1990) describes the effectiveness of the AIS, because it contributes to the achievement of business objectives. But researchers are still struggling to find definitions and concepts for AIS effectiveness, because effectiveness varies significantly between studies (De Guinea et al., 2005). The last important study on which this research is based is Ismail (2009).Author conducted a survey in Malaysia using a sample of 232 registered SMEs. It focuses on the effectiveness of AIS by using the likert scale of five points. It formulated the eight independent variables as the drivers of AIS effectiveness based on literature and then tested their relation to the AIS effectiveness. These variables are AIS sophistication, manager AIS knowledge, manager participation in AIS implementation, consultant effectiveness, vendor effectiveness, government agencies effectiveness and accounting firm effectiveness. Study used the Cronbach's alpha and principles components analysis to check the consistency and validity of its research instrument which yielded positive results. The results show that manager accounting knowledge, and the effectiveness of vendors and accounting firms significantly contributed to AIS effectiveness.

RESEARCH METHODOLOGY

Researchers conducted in the area of information system and information technology are categorized in two types normally. One include those addressing the adoption factors, incentives

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or reasons, second category include the researches those addresses the impacts of adoption. Research studies addressing the adoption process, reasons and factors affecting the decisions during adoption, usually have the survey research design. We study the factors of effectiveness of Accounting Information System. This study as lying in the first category employs the questionnaire to gather the data. This chapter explains the variables of study, sample of study, hypotheses, and statistical methods for analysis.

Variables of the Study
Research study formulates the nine variables to study; one is dependent variable and remaining eight are independent variables. These are explained below:

- AIS Sophistication (X_1)
- Manager Participation in AIS Implementation (X_2)
- Manager AIS Knowledge (X_3)
- Manager Accounting Knowledge (X_4)
- Consultants Effectiveness (X_5)
- Vendors Effectiveness (X_6)
- Government Agencies Effectiveness (X_7)
- Accounting Firms Effectiveness (X_8)
- AIS Effectiveness (X_9)

Above diagram shows the relationship between the variables and elaborates the research model used in the study.

AIS Sophistication
AIS sophistication refers to the number of AIS applications portfolio adopted by responding firms. The respondents were asked to indicate whether they adopt or not eighteen AIS applications. To measure the level of AIS sophistication, an aggregate measure, termed as 'application score' was created to represent the number of applications adopted by the responding companies. The values of AIS sophistication range from 1 through 18.

Manager Participation in AIS Implementation
In the questionnaire the respondent asked to indicate their level of participation through a five-point scale anchored between no participation and high participation. These areas are: definition of needs (information requirements), selection of hardware and software, implementation of systems, systems maintenance and problem solving, and planning for future AIS deployment.

Manager AIS knowledge
We measured manager AIS knowledge using a list of seven applications commonly found in companies. The respondents were asked to indicate their knowledge level regarding word processing, spreadsheet, database, accounting, e-mail, Internet and computer-assisted production management applications based on bipolar anchors with a five-point scale anchored between no knowledge and extensive knowledge.

Manager Accounting Knowledge
With the help of questionnaire people were asked to mention their knowledge lever relating to different financial and accounting techniques and methods using the same scale as AIS knowledge.

Sources of Consultancy

The major bases of external expertise explored from the existing literature and these are included in the questionnaire like consultants, vendors, government agencies and accounting firms.

The respondents mention the major sources of advice which is used by their firms through questionnaire.

And in this way respondents were asked to rate the effectiveness of each external expert based on bipolar anchors with a five-point scale anchored between very ineffective and effective.

AIS Effectiveness

The respondents were asked, based on bipolar anchors with a five-point scale anchored between strongly disagree and strongly agree, to indicate the level of effectiveness of their AIS regarding systems quality, information quality, information use, user satisfaction, individual impact, and organizational impact.

Sampling

Research uses the purposive sampling technique. Companies are selected from two sectors, Textile and Cement, based on the need of research study. Only those companies are selected for studies those have adopted the AIS. List of sample companies is given in appendix.

Hypotheses of Study

It has been argued that investment in sophisticated IT would help firms produce more accurate and timely information for effective decision making (Huber, 1990). An appropriate level of IT and AIS sophistication was found to have a positive and significant impact on the firms' ability to align IT strategy and business strategy (Hussin et al., 2002; Ismail & King, 2007). Hence, it is expected that firms with more sophisticated AIS will have a higher degree of AIS effectiveness. Similarly other independent variables are tested against the dependent variable AIS effectiveness on the basis of evidence found in the literature. Following hypotheses are formed on the bases of variables to study and literature reviewed:

- H_1: There is a positive relationship between AIS sophistication (X1) and AIS effectiveness (X9).
- H_2: There is a positive relationship between manager participation (X2) and AIS effectiveness (X9).
- H_3: There is a positive relationship between managers AIS knowledge (X3) and AIS effectiveness (X9).
- H_4: There is a positive relationship between managers accounting knowledge (X4) and AIS effectiveness (X9).
- H_5: There is a positive relationship between consultant's effectiveness (X5) and AIS effectiveness (X9).
- H_6: There is a positive relationship between vendor's effectiveness (X6) and AIS effectiveness (X9).
- H_7: There is a positive relationship between government agencies effectiveness (X7) and AIS effectiveness (X9).
- H_8: There is a positive relationship between accounting firms effectiveness (X8) and AIS effectiveness (X9).

Data Collection

All the data is collected through the survey. A questionnaire adopted from Ismail (2009), is used to collect the data from sample companies. It uses six questions having some factors by each based on likert scale of 5 points. Questionnaire is provided in the annexure of thesis report.

Statistical Methods and Analyses

Research used many statistical; techniques to analyze the data collected, and to interpret the results thereof. Research instrument as adopted from Ismail (2009) is tested and have been proved a valid model for measurement, by author. He performed the reliability analysis measured through Cranach's alpha, principle components analysis proved that these factors can be used to measure AIS effectiveness as a single variable. We used the coding in SPSS 16 and calculated the average scores for each variable, and then calculated descriptive statistics measures. Correlation test and multiple regressions is performed using MS Excel 2007, to check the relationship between the independent and dependent variables. Analysis is performed at three levels first for Cement sector second for Textile sector and third for Overall basis.

DATA ANALYSIS

Analysis of collected data is conducted according to the research design, explained in the research design. This chapter expressed the empirical findings and analysis type for hypotheses formulated. Data analysis is done for each hypothesis. All the statistical methods are applied using three levels data, one for cement sector data, second for textile sector and third using whole study period data. The chapter is divided into these sections, Preliminary findings, Approach used for analysis, Descriptive Analysis, Correlation Analysis and Regression Analysis.

Preliminary findings

We will start from the AIS sophistication. Cement sector firms have high AIS sophistication on average. Following table describes the results for the two sample t-test between the AIS applications used by cement sector and textile sector. Below diagram is showing the number of computer applications used by each company of cement and textile sector.

The statistics for external export consultancy is also given below using the graph. Consultants Effectiveness (X5), Vendors Effectiveness (X6), Government Agencies Effectiveness (X7) and Accounting Firms Effectiveness (X8), are expressed that how much companies in each sector have external export consultancy in each case. Following diagrams also explain the characteristics of firms for external consultancy by each type.

Above shown diagrams elaborate that accounting firms are used as consultants for more firms in both cement sector as well as textile sector. However many textile firms also used the other consultants also.

Descriptive Statistics for the variables

Following is given the descriptive statistics measures for the selected variables for the study. Below tables are elaborating the basic descriptive measures calculated for the scores obtained from cement and textile sector sample companies and on overall basis as well.

We summarize the descriptive statistics for the main variables in table 4.6.the results indicate that respondent firms perceived their AIS implementations fairly effective (mean=3.94). Out of eighteen applications the average number of AIS application adopted by respondent firms is 9.50. Most managers of respondent firms participated highly in AIS implementation (mean=4.24). AIS knowledge (mean=4.34) and accounting knowledge (mean=4.70) are good. When we ask about

the effectiveness of external experts, respondent firms rated accounting firms (mean=4.33) as the most effective followed by the consultant (mean=3.96), vendors (mean=3.42) and government agencies (mean=1.58) in this X7 mean is below the average. The element of trust could explain the findings. For example, Davis (1997) argued that most SMEs treated accounting firm as their most trusted business advisors. Furthermore accounting firms are more knowledgeable about their clients and their clients businesses and thus could help them implement effective AIS that meet their business requirements.

In overall sample companies descriptive statistics we find that all the independent and dependent variables are above the average except government agencies. This tables elaborate that the average number of AIS applications used is almost same for both cement and textile sector. However mode differs among the two sectors. In cement sector most firms have 7 AIS applications and in textile sector, most frequent number of applications is 9.

Correlation Analysis

On the second stage research study used the correlation analysis to test the hypothesis. Pearson correlation coefficient indicates the strength of a linear relationship between two variables, but its value generally does not completely characterize their relationship. Correlation analysis just show the numerical relationship and its results may be meaningless. So we can't rely only on correlation to check the relationship between the variables. Following tables include the correlation matrices for the variables of study. However hypotheses cannot be tested merely on the basis of correlation analysis.

This table elaborate that there is insignificant relationship between all variable except X7 and X8. There is significant relationship between these variable because the relation value is above 0.8. These tables describe that there is the insignificant relationship between the independent variables and dependent variable. However relation is further expressed through the charts presented below.

Correlation analysis remained under the criticism in the literature of statistics. Correlation just expresses the linear relationship and there may be a non-linear relation. In that case result could be misleading. Correlation as measures through the Pearson's coefficient of correlation is a rough measure. To have a clear picture of the results one must have to use the regression analysis. We also used the multiple regression analysis to find the actual relationship between the study variables. Correlation analysis was necessary to conduct to avoid the multi-co linearity between the independent variables. Results show that all the figures are less than .80 for between independent variables correlation. But hypotheses cannot be tested merely on the basis of correlation analysis.

Multiple Linear Regression

At the end regression analysis is used to answer the research question and test the hypothesis formulated. These outputs are produced using the "Data Analyses" Add-in provided in MS Excel 2007. Regression analysis like other analyses made, is conducted at three levels i.e. for cement sector firms, textile sector firms and overall basis. Below tables are giving the summary of regression results.

Regression analysis of Cement sector show that model developed is 23 percent good as denoted by adjusted r square. For cement sector companies' scores we can see that the hypotheses made are rejected fully. No variable has p-value less than the level of significance 0.05. Only one variables x3 are near to significance level because there p-value is 0.079.

Regression analysis shows that model developed is 22 percent good as denoted by the adjusted r-squared for overall sample companies. For cement sector companies' scores we can see that the hypotheses made are rejected fully. No variable has p-value less than the level of significance 0.05. But analysis using all sample companies' observations produced satisfactory results. Here two variables x3 (Manager AIS Knowledge) and x4 (Manager Accounting Knowledge) are showing significant impact on the dependent variable x9 (AIS effectiveness).

However the value of multiple R and R-squared remained good for cement sector and overall basis. The figures are 23% and 22% for R-squared respectively. The values here represent that these independent variables together denote significant variations in the dependent variable. By utilizing whole results of analysis we can reject H_1, H_2, H_5, H_6, H_7, and H_8. The study used for the analysis Ismail (2009), found the X4, X6, and X8 significant factors of AIS effectiveness. However in our case, we find different factors affecting the AIS effectiveness. On the other side goodness of model is 30 percent as stated by Ismail (2009) but we find it 22 percent. Similarly R-squared is 38 percent against the 31 percent. Overall basis we can say that results are significantly consistent to those found by the Ismail (2009).

CONCLUSIONS

Several implications can be drawn for research and practice based on this study. With respect to research, there are three main implications. First, there is a positive and significant association between Manager AIS Knowledge and manager accounting knowledge and AIS effectiveness.Thus, this study complements previous research by having supported this association within a Pakistani context.Second, there are contradictory findings between this study and previous literature with respect to the relation of manager Participation in AIS Implementation and AIS effectiveness, consultant effectiveness and AIS effectiveness, and government agencies effectiveness and AIS effectiveness.There are a number of potential phenomena, such as the AIS maturity in Cement sector that may affect the results.Finally, it would be interesting to expand the research model by introducing new constructs such as sources of software and time to plan for AIS, using a more sophisticated technique such as structural equation modeling.

This study has two implications for practice. First, managers should engage qualified AIS vendors who have experience and understand unique characteristics of cement sector. Qualified AIS vendor can also help cement sector to overcome their lack of AIS knowledge and thus cement companies should take the opportunity to increase AIS knowledge of the business. Merely engaging external expert such as vendors would not guarantee future AIS success without a proper transfer of knowledge to the firms. Second, managers of cement companies need to acquire sufficient accounting knowledge as accounting is the most important component of modern AIS within cement sector. Being the person who best understands a firm's business operations, the managers can make use of accounting knowledge to identify business information requirements, and probably with the help of qualified and effective AIS vendors, would be able to choose the right technology to meet those needs. Cement companies should also exploit the good relationship with their accounting firms. Being the most trusted advisors to the cement sector, accounting firms are also the only external party that best understand their clients' business, and thus are in a better position to help cement companies identify their business information requirements, and with the help of vendors would contribute to more effective AIS. Manager should get training about information system to implement the effective AIS in the company. It is important for cement companies to learn from their AIS implementation so that opportunities can be recognized and priority can be given to those initiatives that help AIS support their

information needs. He should asked users about their requirements for System and also consults qualified Consultant for effective and efficient Accounting Information System.

This study examined eight hypotheses concerning the effectiveness of AIS implementation in the specific context of cement in Pakistan. All the firms taken as a sample are listed in Karachi Stock Exchange (KSE). The evidence suggests that the major factors that influenced AIS effectiveness among the sample firms were Manager Participation in AIS Implementation (X2) and Manager Accounting Knowledge (X3). Thus, this study has made an important contribution by increasing current understanding of AIS implementation and its influence factors in cement sector as well as in Textile sector. Manager AIS Knowledge, effectiveness of consultants, effectiveness of accounting firms, effectiveness of Government Agencies and Vendors, however, appeared to have insignificant relationship with AIS effectiveness. These unexpected findings indicate the need for further research into the processes associated with the effectiveness of AIS implementation in cement sector of Pakistan.

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Appendix-1: List of Sample Companies

Cement Sector	*Textile Sector*
Fauji Cement Ltd.	Dar-es-Salaam Textile Mills Ltd.
Maple Leaf Cement Ltd.	Reliance Weaving Mills Ltd.
Dandot Cement Ltd.	Ellcot Spinning Mills Ltd.
KohatCemant Ltd.	Arshad Textile Mills Ltd.
Lucky Cement Ltd	Fatima Enterprise Ltd.
Gharibwal Cement Ltd.	Allah Wasaya Textile And Finishing Mills Ltd.
D.G. Khan Cemeny Ltd.	Ishaq Textile Mills Ltd.
Bestway Cement Ltd.	Sun Rays Textile Mills Ltd.
Flying Cement Ltd.	Chenab Ltd.
Pakistan Cement Ltd.	Masood Textile Ltd.
Fecto Cement Ltd.	Fazal Cloth Mills Ltd.
Cherat Cement Ltd.	Ahmad Hassan Textile Mills Ltd.
Al-Abbas Cement Ltd.	HussainIndustries Ltd.
Attock Cement Ltd.	Sargodha Spinning Mills Ltd.
Dewan Cement Ltd.	Shadab Textile Mills Ltd.
Javedan Cement Ltd.	Ibrahim Fibres Ltd.
Poineer Cement Ltd.	Ahmad Fine Textile Mills Ltd.
Mustehkam Cement Ltd.	Moderno Fabrics Ltd.
Thatta Cement Ltd.	Ali Asghar Textile Ltd.
Dadabhoy Cement Ltd.	Adil Textile Ltd.

Appendix-2: Notations for Variables

X1	AIS Sophistication
X2	Manager Participation in AIS Implementation
X3	Manager AIS Knowledge
X4	Manager Accounting Knowledge
X5	Consultant Effectiveness
X6	Vendor Effectiveness
X7	Government Agencies Effectiveness
X8	Accounting Firm Effectiveness
X9	AIS Effectiveness

Appendix-3: Use of Consultancy in AIS Implementation

Sector/Party	Cement Sector	Textile Sector	Full Sample
X5	No. of companies	No. of companies	No. of companies
Not-Applicable	8	4	12
Applicable	12	16	28
Total	20	20	40
X6	No. of companies	No. of companies	No. of companies
Not-Applicable	7	8	15
Applicable	13	12	25
Total	20	20	40
X7	No. of companies	No. of companies	No. of companies
Not-Applicable	14	7	21
Applicable	6	13	19
Total	20	20	40
X8	No. of companies	No. of companies	No. of companies
Not-Applicable	5	4	9
Applicable	15	16	31
Total	20	20	40

Appendix-4: Descriptive Analysis

Table-1: Cement Sector Companies Descriptive Measures

Measure	X1	X2	X3	X4	X5	X6	X7	X8	X9
Mean	9.50	4.24	4.34	4.70	3.96	3.42	1.58	4.33	3.94
Standard Error	0.64	0.17	0.12	0.09	0.25	0.38	0.15	0.14	0.10
Median	8.50	4.40	4.43	5.00	4.00	3.50	1.50	4.50	3.83
Mode	7.00	5.00	4.43	5.00	5.00	5.00	1.50	4.50	3.83
Standard Deviation	2.87	0.75	0.56	0.41	0.86	1.37	0.38	0.52	0.45
Kurtosis	0.06	-0.20	0.81	2.61	-1.22	-1.65	-0.10	1.83	-0.54
Skewness	1.00	-0.89	-1.07	-1.55	-0.23	-0.24	-0.31	-0.94	-0.02
Range	10.00	2.40	2.00	1.50	2.50	3.50	1.00	2.00	1.50
Minimum	6.00	2.60	3.00	3.50	2.50	1.50	1.00	3.00	3.17
Maximum	16.00	5.00	5.00	5.00	5.00	5.00	2.00	5.00	4.67

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Table-2: Textile Sector Companies Descriptive Measures

Measure	X1	X2	X3	X4	X5	X6	X7	X8	X9
Mean	9.10	4.24	4.49	4.75	3.66	3.75	3.62	4.22	4.29
Standard Error	0.71	0.17	0.13	0.12	0.30	0.16	0.40	0.27	0.06
Median	9.00	4.40	4.50	5.00	4.00	3.75	4.00	5.00	4.25
Mode	9.00	5.00	5.00	5.00	5.00	4.00	5.00	5.00	4.00
Standard Deviation	3.18	0.75	0.59	0.53	1.21	0.54	1.46	1.09	0.29
Kurtosis	0.42	-0.20	5.11	6.00	-0.83	1.58	-0.41	1.09	-1.01
Skewness	0.13	-0.89	-1.96	-2.42	-0.55	0.76	-0.91	-1.34	0.29
Range	13.00	2.40	2.43	2.00	3.50	2.00	4.00	3.50	1.00
Minimum	3.00	2.60	2.57	3.00	1.50	3.00	1.00	1.50	3.83
Maximum	16.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.83

Table-3: Overall Sample Companies Descriptive Statistics

Measure	X1	X2	X3	X4	X5	X6	X7	X8	X9
Mean	9.30	4.24	4.41	4.73	3.79	3.58	2.97	4.27	4.12
Standard Error	0.47	0.12	0.09	0.07	0.20	0.21	0.36	0.15	0.06
Median	9.00	4.40	4.43	5.00	4.00	3.50	3.00	4.50	4.17
Mode	8.00	5.00	4.43	5.00	5.00	4.00	5.00	5.00	4.00
Standard Deviation	3.00	0.74	0.57	0.47	1.07	1.05	1.55	0.85	0.41
Kurtosis	0.22	-0.33	2.25	4.42	-0.48	-0.33	-1.71	2.64	-0.07
Skewness	0.46	-0.86	-1.43	-2.05	-0.60	-0.55	0.08	-1.54	-0.43
Range	13.00	2.40	2.43	2.00	3.50	3.50	4.00	3.50	1.67
Minimum	3.00	2.60	2.57	3.00	1.50	1.50	1.00	1.50	3.17
Maximum	16.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.83

Appendix-5: Correlation Analysis

Table-1: Correlation Matrix for Cement Sector Firms

	X1	X2	X3	X4	X5	X6	X7	X8	X9
X1	1.00								
X2	-0.03	1.00							
X3	-0.10	0.20	1.00						
X4	0.25	0.08	0.33	1.00					
X5	-0.10	0.41	0.40	0.32	1.00				
X6	-0.04	0.18	0.60	0.02	0.42	1.00			
X7	0.31	-0.56	0.01	0.19	-0.66	0.23	1.00		
X8	0.16	0.08	0.30	0.14	0.34	0.20	-0.87	1.00	
X9	0.00	0.07	-0.38	-0.36	0.09	-0.13	-0.68	0.44	1.00

Table-2: Correlation Matrix for Textile Sector Firms

	X1	X2	X3	X4	X5	X6	X7	X8	X9
X1	1.00								
X2	-0.23	1.00							
X3	-0.35	0.48	1.00						
X4	-0.02	0.08	-0.16	1.00					
X5	-0.13	0.19	0.02	-0.42	1.00				
X6	0.39	0.33	0.26	0.14	0.53	1.00			
X7	0.00	0.11	-0.24	0.54	-0.14	0.11	1.00		
X8	-0.27	0.11	0.16	-0.40	0.69	0.12	0.07	1.00	
X9	0.15	-0.03	-0.25	-0.10	0.04	0.39	0.20	-0.08	1.00

Table-3: Correlation Matrix for Overall Sample Firms

	X1	X2	X3	X4	X5	X6	X7	X8	X9
X1	1.00								
X2	-0.14	1.00							
X3	-0.24	0.34	1.00						
X4	0.09	0.08	0.06	1.00					
X5	-0.09	0.25	0.12	-0.11	1.00				
X6	0.03	0.19	0.54	0.10	0.32	1.00			
X7	-0.04	0.15	0.21	0.45	-0.11	0.41	1.00		
X8	-0.12	0.09	0.17	-0.24	0.62	0.08	-0.04	1.00	
X9	0.03	0.02	-0.23	-0.19	0.01	0.03	0.27	0.07	1.00

Appendix-6: Regression Analysis

Panel-1: Cement Sector Regression Results

Regression Statistics	
Multiple R	0.74538035
R Square	0.555591867
Adjusted R Square	0.232385951
Standard Error	0.391461683
Observations	20

	Coefficients	Standard Error	t Stat	P-value
X1	0.006026678	0.03641646	0.165493228	0.871558106
X2	0.04063259	0.139120928	0.292066695	0.775670448
X3	-0.410399678	0.212603607	-1.930351436	0.079738852
X4	-0.2924219	0.268451364	-1.089291913	0.299313679
X5	0.011382144	0.05274794	0.21578367	0.833105466
X6	0.081890357	0.054670402	1.497891993	0.162297078
X7	-0.156128188	0.136910637	-1.140365654	0.278355057
X8	0.082145604	0.053321892	1.540560565	0.151682479

Panel-2: Textile Sector Regression Results

Regression Statistics	
Multiple R	0.615740975
R Square	0.379136948
Adjusted R Square	-0.072399817
Standard Error	0.295646506
Observations	20

	Coefficients	Standard Error	t Stat	P-value
X1	-0.011532816	0.027080274	-0.425875159	0.678412265
X2	0.061647773	0.122673766	0.502534281	0.625200044
X3	-0.342505054	0.175435982	-1.952307902	0.076814999
X4	-0.362340471	0.184452365	-1.96441217	0.075245982
X5	0.023844227	0.057862224	0.412086258	0.688192603
X6	0.073954139	0.065644054	1.1265931	0.28389177
X7	0.038379592	0.051301116	0.748123923	0.47007842
X8	-0.003579235	0.048672101	-0.073537707	0.942698433

Panel-3: Full Sample Regression Results

Regression Statistics	
Multiple R	0.616116562
R Square	0.379599618
Adjusted R Square	0.219496293
Standard Error	0.362516407
Observations	40

	Coefficients	Standard Error	t Stat	P-value
X1	-0.002657329	0.021691813	-0.122503759	0.903290813
X2	0.042426273	0.093880448	0.451918092	0.654474267
X3	-0.255033412	0.123217664	-2.069779641	0.046893366
X4	-0.330013512	0.135470543	-2.436053664	0.020791057
X5	0.027774188	0.03676507	0.755450441	0.455680767
X6	0.052671182	0.037250985	1.413954055	0.16734018
X7	0.071008192	0.035980063	1.973542732	0.057404679
X8	0.029611447	0.036515895	0.810919387	0.423594327