

# Sustainable Development in Iran: a Case Study of Implementation of Sustainable Factors in Housing Development in Iran

Milad Samari<sup>+</sup>

School of Housing, and Building and Planning, University Sains Malaysia

**Abstract.** The present study primarily aims to investigate the implementation of sustainable development among Iranian construction industries while it examines the understanding and awareness of the industries about the green houses as well. To do so, the study focused on the implementation of the three main elements of sustainable development i.e. environment, economy, society, that are necessary to be taken into consideration in housing. The method of data collection for the present study was questionnaire survey. The questionnaire used in this study included eclectic questions (5 items Likert scale), developed from the standard questionnaires used in previous studies. The main section of the study began by giving out the questioner to the subjects who were randomly selected from among engineers, architects, project managers and contractors operating in construction industries in Iran. Having collected the questioners back from the respondents, the responses were turned into numbers in order to be analyzed. Then, analysis was carried out by SPSS version 17. The research results made clear that while the awareness of green houses is high among the professionals of construction industries, the level of implementation of environmental, economic and social factors of sustainability is not satisfactory and needed to be essentially reviewed. The government should establish the new rules and regulations to support the professionals in construction in Iran in order to develop sustainable development in housing context. In addition the government should provide financial incentive such as grant and tax in order to encourage developers to construct the green houses to achieve sustainable development in Iran.

**Keywords:** Sustainable development, Factors of sustainability, Green house, Iran

## 1. Introduction

In the McGraw-Hill Dictionary of Scientific and Technical Terms (2003), the term “Sustainable Development” is defined as developing natural and industrial resources that meet the energy needs of the current times without settling the ability of next generations for meeting their needs in the same manner. In addition, the United Nations (1987) explains that:

Sustainable development is collection of methods to create and sustain development which seeks to relieve poverty, create equitable standards of living, satisfy the basic needs of all peoples, and establish sustainable political practices all while taking the steps necessary to avoid irreversible damages to natural capital in the long term in turn for short term benefits by reconciling development project with the regenerative capacity of the natural environment.

The sustainable developments concept basically, obtained global momentum in the 1980's when the evidence of the exhausting of resources and depleting environment became transparent. The World Commission on Development and Environment (WCED) then incorporated and developed a concept of sustainable in 1987, with the submitting of the “Brundtland Report”. This report put forth seven methods for sustainable development that includes: renewing growth, making a change in the quality growth, meeting the necessary need for jobs, sanitation, energy, food water, guaranteeing a sustainable leave of population,

---

<sup>+</sup> Corresponding author Tel: +60108977815  
Email address: milad.s1366@gmail.com

preserving and improving the resource base, managing risks and reorienting technology, and emerging the economy and environment in the process of making decision (Langston and Ding, 1997).

The construction and building sector is a fundamental sector for sustainable development. The “cradle to grave” aspects of the construction and building that is related to create, use and disposal of built facilities, create economic and social advantages to the society however, it simultaneously constitute negative effects on the environment.(UNEP-SBCI,2006).

Areas of main concern in sustainable development include associated greenhouse gas with energy use emissions waste generation, water consumption, construction materials consumption and integration of buildings, and their discharge with other social systems and infrastructure (UNEP, 2006; Putte,2007). This suggests indirectly that the construction industry and the sustainability of its products, mainly buildings encounter an environmental challenge that is bigger than any other industrial sector, to have more sustainability in the long term. Recent reports (UNEP-SBCI, 2006) suggested on the construction of sustainable building as a means to reduce climate change and global warming.

## **2. Statement of the problem**

Buildings use resources such as, water, energy and raw materials, produce waste and generate potentially harmful atmospheric emissions. It is necessary to build in an environmentally sustainable method, since the construction sections release the major greenhouse gases (GHGs), making it one of the basic man made causes of change in climate. Moreover, some activities like mining and manufacturing which can be used in construction and the transportation of materials to be used in construction are assisting greatly to climate change (Kruse, 2004).

Since the early 1990s, the implementation of green homes concept was often taken into national debates across the globe. However the gap between the developed and the developing countries has resulted in the recognition of different "degrees" of sustainability of housing development, from strong that completely embraces extensive understanding and implementation of green houses, to 'weak" forms which are still far away from taking the necessary steps needed in green houses.

Green building is defined as sustainable building or green construction refers to using a process and structure that is responsible in terms of environment and resource-efficient all around a building's life-cycle from sitting to construction, design, maintenance, operation, renovation, and demolition(EPA, 2009). However Green homes are considered to an important part of green building. Basically, a Greenhouse can be defined as a building that creates the lowest pollution in environment (Kibert, 2004). It is an essential matter in global urbanization that has a remarkable effect on the environment (Kruse, 2004). As a significant element in urban development, green housing has an important role in achieving the aim of sustainable development (Fisk, 1988). Construction industries have indirect and direct emissions in a high amount. Therefore building environmentally sustainable buildings is tremendously important. Furthermore, living in environmentally sustainable houses have many advantages such as increased health of occupants, improve worker performance.

In an effort to investigate the degree of sustainability of housing development, this study aims to examine the understanding and awareness among the Iranian construction industries as well to settle how the green houses that have been utilized in housing, is perceived. In addition, the main elements of sustainable houses that are necessary to be taken into consideration in housing are recognized. Moreover this study makes an attempt to verify the level of implementation of sustainable development factors i.e. environment, economy, society which are recently being integrated into Iranian housing context.

However on the basis of information present so far, the study tries to answer the following questions:

- How familiar are Iranian construction industries with the Green House?
- Should sustainable development be applied to housing in Iran?
- Who are responsible for developing green houses in Iran?
- What is the implementation level of sustainable development in housing development conducted in Iran?

### **3. Methodology**

The present research which is a quantitative study was conducted as a survey with the help of eclectic questions which were developed from the standard questionnaire used in previous studies. The questionnaire was structured in the following three sections:

#### **3.1. Background of the respondent**

In this section, the following 6 items were presented in order to ask the respondents for the basic specifications: gender, age, work experience in housing development projects, education level of respondent, and involvement in housing project.

#### **3.2. Level of awareness and understanding about the of green homes**

Since the subjects of the study were all directly involved in sustainable housing development, it was of great importance to know the level of awareness about greenhouses among them, for it is obvious that no one is supposed to implement what he is not aware of. Therefore, the second section of the questionnaire used in the present study consisted of 6 items aimed to investigate the awareness of the subjects on the of houses development.

#### **3.3. Level of implementation of sustainable development in housing among Iranian construction industries**

The last section of the questionnaire which is in fact the main section, consisted of 21 items in order to investigate the three elements of sustainable development, namely environment, economy, society, that are necessary to be taken into consideration in sustainable housing. In addition, it should be said that a 5 items Likert scale was used in the second and the third sections of the questionnaire for which the respondents were asked to circle or check their level of agreement with each item.

Having finished developing the questionnaire, it was randomly given out to 140 subjects working in Iranian construction industries. Due to low level of participation among Iranians, unfortunately 44 subjects did not participated in the research and the researcher collected back only 96 questioners. To start analyzing the data, the collected responses were turned into numbers in order to be entered into the analyzing program. SPSS 17.0 was used to run quantitative analysis in order to determine the Mean and Percentage of each item under study.

### **4. Data Analysis**

140 sets of questionnaires were hand delivered and mailed, then 96 responses were received. The response rate of 68.5% is good. It is concluded from the present research that most respondents who were male engineers, 40 years old and over, having at least 10 years of experience involving in 5-10 projects and most of them had bachelor education.

In terms of knowledge about green house, the results show that, the 62.5% of respondents have high levels of awareness, and the mean score is 3.8 on a 5-point scale (5= full awareness). It can be concluded that the awareness about the green house among the professionals is high.

In terms of sustainable development should be applied to housing in Iran, the finding shows that the majority 56.3% of respondents agree about it and the mean score is 4.29 on a 5-point scale (5= Strongly Agree). In addition 36.4% of respondents strongly agree about it. It can be concluded that the professional's respondents believe that applying sustainable development in construction in Iran is essential.

According to the results, majority of respondents, 44.8% believe that, Project Manager, Architects and Engineers have major role in developing green houses in Iran. In the other hand 22.9% of respondents, think that the government has major role in developing green buildings in construction industry in Iran. It can conclude that, the government should prepare the new rules and regulations to support the professionals in construction in Iran in order to develop sustainable development in housing context.

The following tables are the analysis of the data collected from respondents on the third section of the questionnaire about the level of implementation of sustainable development in housing development among Iranian construction industries.

Table 1: Descriptive Statistics about Environment

	Choice of the Site	Development intensity on the local ecological system	Energy Efficiency	Efficient Waste Management	Water Conservation	Proper Sanitation	Building Materials Selection	Minimization of Disruption to the local environment such as control Noise, pollution and dust	Minimization of Environmental hazard waste /materials	Workmanship or Quality of end products	
N	Valid	96	96	96	96	96	96	96	96	96	
*Mean		2.82	3.08	3.35	3.19	3.54	3.35	3.60	4.46	3.40	4.25
*Median		3.00	3.00	4.00	3.00	4.00	3.00	3.00	5.00	4.00	4.00
Variance		.800	.877	.694	.428	.882	.568	1.042	.588	1.147	.526
*Minimum		1	1	1	1	1	2	1	3	1	3
*Maximum		4	4	4	5	5	5	5	5	5	5

(\*Note: Never: 1, Rarely=2, Undecided: 3, Almost: 4, Always: 5)

Table 2: Descriptive Statistics of Economic

	Financial Issue - Housing affordability	Life cycle cost of housing/indirect cost	Building life span by incorporating Building Maintenance Aspects	Opportunity to optimize existing infrastructure	
N	Valid	96	96	96	
*Mean		3.15	3.25	3.26	3.97
*Median		3.00	3.00	3.00	4.00
Variance		.463	.526	.595	.620
*Minimum		2	2	1	1
*Maximum		4	5	5	5

(\*Note: Never: 1, Rarely=2, Undecided: 3, Almost: 4, Always: 5)

Table 3: Descriptive Statistics of Social

	Accessibility / public transport connections to homes and recreational facilities	Design aims for present and long-term use	Safety / Security to tenure	Tenant participation in housing design and management	Better Quality of Housing and Living Environment	Encouraging social networks and social solidarity in neighborhoods	Impact of housing quality on physical and mental health of occupants	
N	Valid	96	96	96	96	96	96	
*Mean		4.46	4.49	4.40	1.38	2.70	2.86	3.25
*Median		5.00	5.00	5.00	1.00	3.00	3.00	3.00
Variance		.588	.674	.873	.447	.655	.687	.526
*Minimum		3	2	1	1	1	1	2
*Maximum		5	5	5	3	4	4	5

(\*Note: Never: 1, Rarely=2, Undecided: 3, Almost: 4, Always: 5)

According to the results Mean scores about 3. Then it is concluded that the level of implementation of environmental, economic and social factors of sustainability in Iran is not satisfactory. However, some factors of sustainability such as minimization of disruption to the local environment including noise control, pollution and dust, safety or security to tenure, design aims for present and long term use, accessibility or public transport connections to homes and recreational facilities, have been implemented into housing development (Mean scores more than 4).

The research made it clear that, some key environmental factors such as choice of the site, efficient waste management, proper sanitation and building materials selection has not been focused. However, this could be reflecting the real scenario of the Iranian construction industries where level of implementation on these

particular sustainable factors is not getting much into the attention. Unfortunately the same goes with most of the economic factors of sustainability namely financial issue, housing affordability, life cycle cost of housing or indirect cost, building life span by incorporating building maintenance aspects.

Only one factor among the economic factors of sustainability has been implemented in housing development (Mean score about 4). As for social factors of sustainability such as, better quality of housing and living environment, encouraging social networks and social solidarity in neighborhoods, impact of housing quality on physical and mental health of occupants, tenant participation in housing design and management has never been implemented and need to be reviewed in order to be developed.

## 5. Conclusion

Based on the abovementioned finding it can be concluded that the Iranian construction industries implement some items and leave the others which in turn is a misconception that needs to be resolved. The current government policy should be changed, and it should prepare financial incentive such as structural incentives, subsidy and rebate programme, tax incentive scheme, low interest or mortgage loan, voluntary rating system and market and technology assistance to develop green building and find barriers in order to solve them. At the end it is suggested that all in charge of Iranian construction industries attend periodic seminar aimed at promoting the knowledge of sustainable development to be provided with a better understanding of sustainability factors, and to be familiar with practical ways of implementing green houses concept in housing developments. Furthermore the current suggested rules and regulations should be replaced with an enforcing new one in support of green houses development. Needless to say that promoting the social understanding of green houses benefits among people may be of great help, since it can turn the demand of green house into a pervasive demand.

## 6. References

- [1] Energy Use and Greenhouse Gas Emissions from Construction and Buildings Review prepared by Sustainable Building and Construction Initiative (SBCI) Climate Change Think Tank Working Group (TTWG), UNEP SBCI 2006. UNEP, DTIE, Paris, France.
- [2] EPA (2009a), Basic information, US Environmental Protection Agency, Washington D.C. Available at: <http://www.epa.gov/greenbuilding/pubs/about.htm#1> (accessed 16 Dec 2011).
- [3] Fisk, W. and Rosenfeld, A. (1998), *Potential nationwide improvements in productivity and health from better indoor environments*, Lawrence Berkeley National Laboratory, Berkeley.
- [4] Hill, M. (2003). *Dictionary of Scientific and Technical Terms*. USA, McGraw-Hill Publication.
- [5] Kibert, C.J. (2004), "Green buildings: an overview of progress", *Journal of Land Use and Environmental Law*, Vol. 19, No. 2, pp. 491- 502.
- [6] Kruse, C. (2004), *ISIS Asset Management: Briefing Note on Climate Change and the Construction Sector*, Institutional Investors Group on Climate Change, London.
- [7] Langston C. A. and Ding G. K. C (1997). *Environmental law, Sustainable Practices: ESD and the Construction Industry 24 Refereed Papers*. Envirobook Sydney. PP: 45-52
- [8] Putte, I. 2007. Monitoring Climate Change. Greenhouse gas emissions from construction and buildings. AWE International, March 2007, p 31-37
- [9] Portland Development Commission and City of Portland Green Building Initiative. *Greening Portland's Affordable Housing: Design and Construction Guidelines to Improving Environmental Performance, Tenant Health, and Long-Term Durability in Affordable Housing*. April 2001.
- [10] UNEP. Sustainable Building and Construction Initiative. 2006 Information Note UNEP, DTIE, Paris, France, 12 pp
- [11] World Commission on Environment and Development, 1987. *Our Common Future*. Oxford: Oxford University Press.