J. Appl. Environ. Biol. Sci., 6(1)118-123, 2016

ISSN: 2090-4274
Journal of Applied Environmental and Biological Sciences
www.textroad.com

Study on the Factors of Sustainability in Housing with Approach of Environmental Principles in Sustainable Housing

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Received: June 15, 2015
Accepted: November 9, 2015

ABSTRACT

Considering sustainable housing in the future cities development process is important because these sustainable housing notice to sustainable urban development indicators. Therefore, the goal of this study is determining sustainable housing factors in Iran that carried out in a descriptive- analytical method. The results indicated a linear relationship between the two components of future cities and sustainable housing, so that they can interact with each other systematically and each of them without the the other one would not exist the possibility of survival in future urban system. The results of this study showed that by building sustainable housing with features such as insulation, the use of solar panels to generate electricity, rain water storage, optimization area in proportion with the needs of residents, interest of other environmental energy for ventilation and for good measure and orientation, other heating and cooling needs of residents, local materials and consistent with the nature and use of modern technologies, adequate green space, better conditions for living in the cities, construction of urban sustainability could be achieved. In addition to these, by creating safe neighborhoods, the possibility of construction of standard housing for low-income and common spaces for social interaction, we could establish cities in consistence with human needs in the future. However, to achieve such goal, if we do not use government smart policies to right orientation of housing constructors and citizens demands, it will not be achieved.
KEYWORDS: sustainable housing, cities of the future, housing planning, sustainable development

1- INTRODUCTION

Increasing knowledge about positive impacts of sustainable building encourage urban planners to design, spread, build and plan urban project with integrating environment and society aspects. Considering positive impacts of green building motivate urban planners to accept sustainable building standards, and use infrastructures for sustainable buildings [1, 2].

Stable housing is housing that provide perceptual and real needs through efficient use of resources and create attractive, safe and ecologically rich neighborhoods [3].

Planners believe to develop sustainable building should be recognized knowledge and information which are needed for stable construction. Lack of knowledge, information and understanding are serious barriers of sustainable construction success [3, 4].

Population in different countries, particularly in developing countries is increasing with high acceleration and consequently the cities expand their area. Especially in recent years, it has become nearly twice and so human needs are becoming more complex and taking a new dimension. Uncontrolled urbanization has caused serious harms to the environment in several countries and especially in recent decades, these damages have become very serious. However, Leman et al., believes that cities are the engines of society development and the centers of changes of technology [5]. On one hand, the most environmental damages in cities and on the other hand, the most effective ways to promote environmental issues can be occurred in them (Ibid).Housing not only determines our experience of home and family, but also determines the urban space. Quality and location of our houses in the cities have a significant effects on lifestyle, physical and psychological issues, cost of living, daily activities, and access to opportunities in the city, social interactions with other people, health and security. It means stable construction is closely in a relationship with the ways of residency and kinds of society population housings [6]. In addition, housing has many wonderful effects in the community and the roots of many social and cultural problems should be searched in housing and unfavorable living conditions [7]. Urban Sustainability is provided when a set of environmental sustainability with the aim of ecological balance, economic stability with the goal of economic viability, social sustainability with the goal of social justice and physical sustainability with the aim of morphologic balance are established. It is necessary to consider that

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housing is consumer of lots of energy and resources imported into cities. Each year, about 40 percent of the raw materials in case of weights are used in the construction of buildings [8].

Increasing population in developing countries is creating problems for housing construction [6]. Iran like other countries with high growth of population is facing limitations of fossil resources, changes in the weather, growing pollutions of cities, growing inequality in most countries and their low level of security and quality for human environment. In this study, Due to these problems, the importance and role of the housings according to all the problems facing humankind in providing human-centered environment, by sustainable, are responsive future needs of urban residents are investigated. Accordingly, in order to protect environmental resource and for promoting the quality of life and preserving it for sustainable future in cities, concentrating to sustainable housing is essential. Therefore, the characteristics of this type of housing and the experience of some countries in this regard are discussed.

2- MATERIAL AND METHODS

The theoretical principles and definitions were descriptive and analytical method based on library studies and referring to texts and books and documents, professional journals, research projects related to the use of global network information.

3- RESULTS

3-1- Definitions of sustainable housing

If in the housing issue, we are searching for sustainability, we should consider certain criteria, including the need to reduce poverty and eradication of slums, and more important protection of environmental and the importance of developing ways to profitable investment in eco-friendly buildings. However, without improvement of residents' employment situation and income level and housing polices, achieving to acceptable results are not possible [7]. According to a definition in UK, sustainable housing is more emphasized on urban renewal and renovation of urban sustainable particularly in existing residential areas [8] and housing that provides the biological needs of the current generation based on natural resources energy efficiency and to meet attractive and safe neighborhoods by attending to issues of ecological, cultural and economic is a sustainable housing [9]. Bagheri knew characteristics of sustainable housing with having enough space, physical accessibility, enough security, construction stability, continuity of profitable life, enjoyment of natural and artificial lighting, heating and ventilation, residence infrastructure and services such as water, electricity, sanitation facilities and waste management, environmental quality, social and neighborhood relations and enjoyment of nature and green space with reasonable costs for residents [3].In other definition, the housing that has a minimum incompatibility and compatibility with its surrounding environment, and in wider scope with the region and world, has been introduced as a sustainable housing [10] (Table 1).

Table 1. Historical pattern of carbon dioxide emissions per household in each year (14)

year	Amount (ton)	Fuel source
1900	11	**Coal**
1930	8	**Coal**
1976	6	**Oil**
1990	5	**Gas**
1998	4	**Gas / electric**
2010	2	**Renewable / gas / electricity**

3-2- Overall environmental principles of sustainable housing

1. Use of environmental beauty with plenty of green space and minimal negative impacts on environment
2. Strong local and social relations, security of residents and sense of belonging and identity
3. Flexibility and the ability to expand or reduce the space
4. Paying attention to construct housing for low income earners
5. The use of intelligent technology to increase efficiency and security [11].

To achieve sustainable housing goals in accordance with the climate, considering the following points are effective [12]:

1. The use of double-walled or multi-walled walls with empty space between the two shells to prevent heat loss.
2. Use of appropriate materials with high thermal insulation and capacity to cope with outside cold weather and preserving heat with thermal insulation [13].
3. Installation of steam blocker to prevent evaporative cooling in cold and mountainous weather [14].
4. To minimize the number and area of the openings and use of materials with lower temperature coefficient for windows frames.

5. The use of greenhouse plants and its combining with building facades to absorb sun heat energy from outer space into the building.
6. Adding a new layer of materials in surrounding details of inputs and windows to reduce cold air infiltration and energy consumption.
7. The exterior facades of the building in cold climates should be covered with dark colors and absorbing more heat energy

3-3- Review of some researches on sustainable housing

Kamalv in his dissertation counted the use of potential facilities of climatic in order to optimize housing, as saving in fuel consumption and, more importantly, increase of comfort quality and residential environment health [20]. Daryani in his dissertation entitled "sustainable housing" knows significant role of buildings in energy consumption and considers designing and implementation of housing in accordance with nature rather effective in reducing energy consumption [11]. Isaac introduces the role of building materials of housing on the environment and ecosystems of each region as important strategies for sustainable housing. Malinow mentions the role of housing characteristics with the quality in the attraction and society health and sustainable housing as a key tool in creating sustainable communities. Singeri with the study of housing samples in old and new tissues of Tabriz was searching to approach sustainable housing designing principles in Tabriz and concluded that exterior shells of traditional buildings of Tabriz in comparison to modern buildings had lower heat wasting and were in accordance with sustainable principles [13]. Hashemian has investigated the benefits of renewable energy, especially solar energy in buildings and has studied the design principles of such settlements [19]. Alalhesabi and Hosseini in a research entitled “study of local housing of Bushehr city” concluded that local housings have important aspects of sustainability that is applicable, and continue in future developments in this sector and could obtain to suitable approaches for new developments in housing sector. That can mention to the proper use of local materials and building fitness for better heating and cooling in them [2].

3-4- Sustainable housing, a step towards sustainable development

sustainability is a relatively issue, the more the size of the house are considered, the more stability of housing are obtained and longer step towards sustainable development is taken. Some of these principles are not applicable in large cities, however, is developable to urban housings, moreover, in construction of cottages and houses in the margins of cities, this type of housing construction can be used to provide required housing for today generation with the lowest damages to environment and to deliver this location to the next generation to prepare their appropriate living spaces in a favorable condition [21].

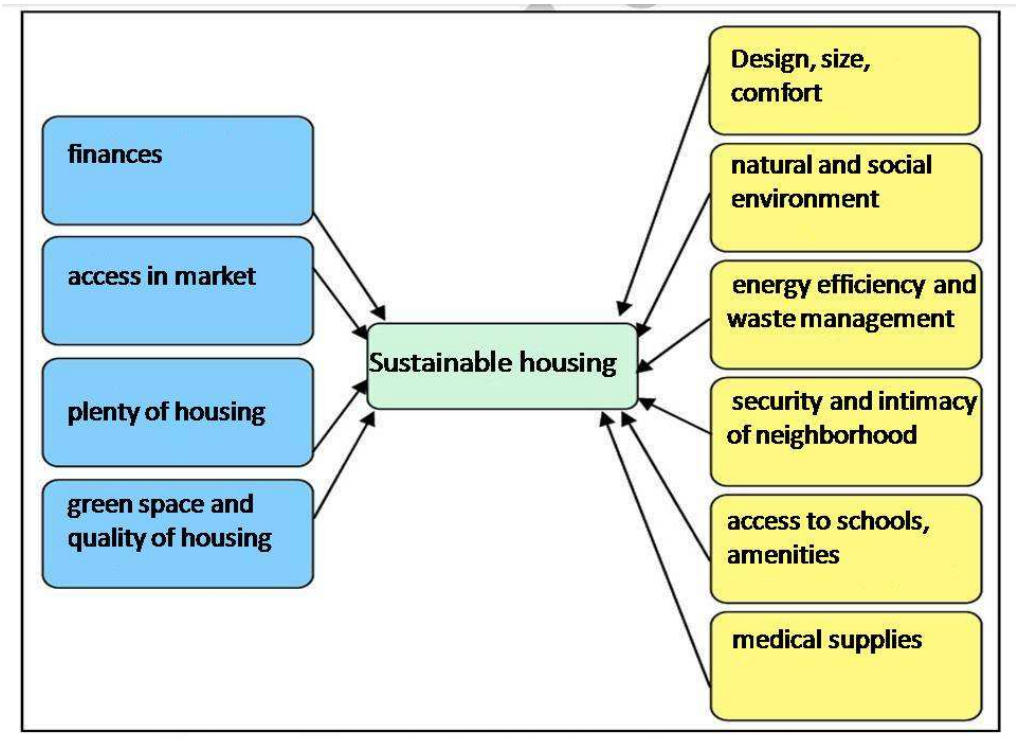

Fig 1. Sustainable housing characteristics [7]

3-5- Study on world experiences of sustainable housing

3-5-1- Issues facing the construction of sustainable housing: Evidences from China

With strong government support and increasing public awareness, construction of sustainable housing in recent decades has become a hot topic in the universities of the world. As a result, the body of knowledge in this field based on a series of analytical and empirical studies has well developed. However, the question is, whether the conceptual frameworks and analytical model, which have comprised by certain types of conditions, limitations and assumptions, really, for practical applications, are logical, or still need to be studied further. Furthermore, it is normal to be a gap between "what should be done" and "what is really done," because of complex reasons. In order to determine the gap between researches and practice in building sustainable housing, the ideas of people working in this field, especially in a scenario of specific project should be carefully considered. In this study, the laws and regulations of sustainable housing construction in the last two decades in China in order to identify the challenges and problems have been investigated. The results of the project, knew four major factors in achieving the sustainable housing. Four major factors in the implementation of sustainable housing:

1. Encouraging and promoting policies to motivate should be considered.
2. The exact standards and principles should be improved.
3. Survey and continuous inspection of laws in implementation process
4. The continuous support from other industrial sectors related to construction

The findings showed that to start construction of sustainable housing in the future presence of a reference for government, businesses and academia seems essential [22].

3-5-2- Investigating the causes of dissatisfaction with housing in the UK

The results of studies conducted in the UK in the case of items that caused discontent in the residential areas, except for the lack of peace and low physical health that were of second and third concerns among people have been listed in Table 2.

Table 2: The main reasons for dissatisfaction of UK people of housing based on the findings of Joseph Rantri research

%	Reasons for dissatisfaction
25	Fear of crime occurring
16	disturbing by dogs
15	weak leisure and recreational services
14	Vandalism
13	presence of garbage and solid waste

3-5-3- Providing stable construction for poor people in Nigeria

Poor housing conditions in the cities of Nigeria, like many undeveloped countries are causing great concerns, however, studies have shown that the problem of housing is universal problem for all countries, but in Nigeria, more than 75% of people live in slums and poor housing conditions.

That is why the housing situation in this country has reached a crisis point. However, troubles and problems of the poor have not been considered enough attention for private and governmental sectors. The results showed that just government intervention is not enough to achieve sustainable housing and local communities should also involve in solving housing problems in bottom-up approach [23].

3-5-4- Sustainable housing design methods with low CO_2 emissions in Denmark

Recently, a significant change in the attitude of politicians in European countries and Denmark has emerged to climate change. This change is because of increasing in the intensity of storms and flood water in Denmark such as Europe countries in recent years. In order to confront these problems government decides to build sustainable buildings to reduce the fossil energy using in new houses. Resulting carbon dioxide gases that is one of factors in global warming was reduced at word wide [24].

3-5-5- Study of sustainable housing polices in the Netherlands

The Dutch government has accepted its role in achieving sustainable housing and has not left it to market forces that are influenced by the global impacts. Based on this, ambitious programs of housing construction are in progress, because it was aware that achieving to environmental sustainability requires environmental innovation and new housing. Central government benefits of local authorities for planning to create demand for green housing. In addition, by policy between manufacturers and contractors create competition and to achieve stability in the local and national projects act in such a way that consumers are reasonably, seeking higher environmental standards based on the objectives of sustainable housing. In Netherlands, the guiding of construction industry in a sustainable way is through the improvement of new technologies by those involved in the construction of housing. In addition, in order to achieve to 30% of

increase in energy consumption efficiency and reduce of emissions of carbon dioxide is in the course of ten years [25].

3-6- Programs and policies for sustainable housing for low-income housing

In recent years, sustainable housing according to climate changes have been considered. To this time, almost rich people and their needs in urban areas has been considered, recently in United States, Brazil and Mexico, urban sustainability in the housing construction market, for poor people with low incomes have taken into consideration. In this study, some potential ways of sustainable housing programs for poor people and casual residents in the US and Latin America have been described by integration. The results indicated a wide range of increasing growth of housing sustainable programs in the US as a basis for discussion and evaluation of programs application for the marketing low-income building of the world-wide countries. Exploration design for evaluating the effectiveness of policy makers, non-governmental organizations and of low income families housing is permanent in the subject of housing sustainability, to determine the extent to which each have a role in building sustainable housing and finally, the result is that beyond the physical development plans, by emphasis on limitation of sustainable housing programs, a holistic approach must be adopted that the community and social organizational development, and legal and fiscal policies aspects accept the issue of sustainable housing [7].

4. DISCUSSION AND CONCLUSION

According to the mentioned items in the case of the characteristics of sustainable housing and universal importance, paying attention to it regarding the significant amount of residential energy consumption in residential uses in cities, addressing the issue of sustainable housing, should be one of the requirements and priorities of planners, managers and citizens in the cities of the future. However, according to the results of the research, in some countries, like Iran, we have taken away from housing sustainability, because in the past, in the original cities with traditional architecture, many aspects of the sustainability characteristics such as local materials, natural air exchange, using sunlight, insulation of walls and etc. existed and in new constructions lower attention has been paid to them. In some developing countries, the growth of urbanization has caused to create large informal settlements in cities, which have led to lower levels of human life in country. Therefore, it seems to be necessary to governments to support all aspects of organizing housing and citizen involvement to resolve the problems of housing and enhancing quality of the human environment living. In this way, paying attention to sustainability from just paying to construction should be given to a comprehensive overview regarding the holistic model with considering residence, work and leisure. As successful key factor in sustainable housing issue, in addition to all features that were mentioned, include the consent of the people, living in urban neighborhoods that is the ultimate goal of urban planning and human societies and should pay particular attention to residents' ideas in different issues and their living conditions. We need sustainable housing because no society reaches to balance, harmony with nature and vitality of cultural, social and economic without it [13]. Therefore, it is necessary to provide investment in renewable energy with careful planning to use opportunities and capabilities in sustainable housing. Along with the increasing number of households, growth in per capita water consumption, in the future, water will be invaluable as a source of oil. Therefore, in achievement to sustainable development and proper utilization of water resources especially in housing will be vital. In addition, promoting the status quo is the most effective way to reduce carbon dioxide and require fundamental changes in energy providing by aiming at renewable energy sources. This study shows that governments, in the issue of sustainable housing can play an important role, by supporting sustainable construction, culture, incentive policies, planning and supporting of development of green industries. However, in the end, the private sector, constructors and citizens should accept the principles of sustainable housing as a necessity. Solving the housing problem is not possible without powerful involvement of governments. Paying attention to this fact is essential given that more than a quarter of carbon dioxide emissions are as a result of heating systems, lighting and ventilation in dwellings, so, for sustainable urban, no other approach will not remain except sustainable housing design.

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