Stallion Journal for Multidisciplinary Associated Research Studies
ISSN (Online): 2583-3340
Volume-1 Issue-1 || February 2022 || PP. 24-30

Intelligent Buildings that are Both Energy Efficient and Kind to the Environment

Abhinav Kumar[1] and Tanishq Singh[2]
[1]Department of Zoology, Barkatullah University, Bhopal, Madhya Pradesh, INDIA.
[2]Department of Zoology, Barkatullah University, Bhopal, Madhya Pradesh, INDIA.

[2]Corresponding Author: tanishq.singh27@rediffmail.com

Date of Submission: 06-11-2022 **Date of Acceptance:** 27-12-2022 **Date of Publication:** 31-12-2022

ABSTRACT

Architecture and environmentally responsible development go hand in hand. The production of architecture is an essential component of this sustainable architectural proposal. Because people spend between 70 and 90 percent of their time inside buildings and architecture accounts for 50 percent of the world's total energy consumption, this industry has taken on a significant challenge as a large system. In light of this problem, the current investigation, which is of a developmental-applied character and makes use of a descriptive-analytical research approach, was initiated by two questions: a) whether or not there has ever been sustainable architecture in the past, or whether or not there hasn't. b) What role do buildings play in ensuring the welfare of people and maintaining a healthy ecological interaction with the surrounding environment? According to the findings, environmentally responsible architecture used to be in sync with its surroundings in the past. On the other hand, what has been realised in the environment these days is a form of discrete encounter, and it is distinct from the natural world. In the contemporary modern civilization, we are in a position to provide people with such a sustainable design that it not only satisfies all of their requirements but also advances the field of sustainable development and architecture.

Keywords- Intelligent Buildings, Energy, Environment, energy consumption, modern civilization.

I. INTRODUCTION

Closest and most familiar phenomenal on for human is the space that he lives in and is in contact with at different moment of his life. So, most of psychological and social human traits manifest in his life (Papoli, 2001). Coincide to urban development and environment degradation's trend, application of sustainable concept in architecture has made discussion of sustainable architecture. Buildings in this architecture have interaction with their location, their climate condition and the environment around them. So, the most important achievement of sustainable architecture is decrease in energy and natural resource consumption with respect to building coordination with its natural environment's bed, irrenwable energy uses and maximum protecting of nature and the environment. In today's world, Architects in line with other professionals are seeking new guidelines to provide desirable life for people. Obviously, the life, work, entertainment, resting and etc are activities that have been done in designed spatial by architects. Since strength and weakness points of a building will effect on the world ecosystems (Marandi and Ali, 2006).

Satiability and sustainable development in architecture have started a discussion called (sustainable architect). The most important its topics are "eco-tech architecture energy and architecture green architecture. In order to improve equality of the life in the sustainable development, architecture not only should reduce energy consumption and environmental pollution but also should coordinate its element as smaller system with the goal of sustainable development. As well as today, the sustainable principles have been in the past. Environmental condition was important in the building's construction in the past. For example with long term historical background has been observed in different forms and with an open roof in all kind of the past climate. In spite of high heat loss and resting disturbance it was widely accepted in the past (Moatlabi, 2006).

According to data by the Energy Information Administration, buildings in the United States, consume about 40 percent of primary energy consumption, and half of all the consumed energy. The building's energy is mainly used for heating, air ventilation and lighting. In addition, existing data highlighted the artificial environment in resources depletion. global warming and carbon emissions. The solution provided by the building sector to reduce the environment alimpact of buildings has led to the practice of sustainable construction action. Environmental assessment and rating systems such as LEED, BREEAM, and etc. environmental cycle life assessment and building constructions with high energy efficiency is the main to discover in this article.

Stallion Journal for Multidisciplinary Associated Research Studies
ISSN (Online): 2583-3340
Volume-1 Issue-1 || February 2022 || PP. 24-30

II. METHODS

1) Research method in management and urban planning means to achieve facts about the construction and development of a city (Motavaf,1987) and have been common followed by industrialization and structural population growth in different area (Alajgrdy, 1987). Present study with developmental-applied nature and descriptive-analytical research method has been dedicated to surveying sustainable architecture in coordination with sustainable development. Objective of this study are surveying about major issues in relation to the construction and design of sustainable buildings in the past and modern society with lesser environmental impact and compatible with the environment. The main objectives of the study are as followed:

1. Understanding the method so for eating architectural in the past with different climatic conditions.
2. How to use construction materials in order to achieves stainable architecture.
3. Recognition of different level of environmental potential lineation to sustainable architecture.
4. Evaluating the overall goals of sustainable building and their principles.
5. Recognition of different level of environmental potential lineation to sustainable architecture.
6. Evaluating the overall goals of sustainable building and their principles.

Experience in the Sustanable Architecture

These days most of the scientists believe that sustainable development is not possible without considering the energy consumption and environment.

Therefore, human activities should be conducted in relation to two categories of environmental resources and designing skill consistent with social values and human's relation enforcement. Similarly, sustainable architecture is in relation with environment, energy and ecology. In such architecture, interior part as interconnected and integrated component has an independent identity itself and, simultaneously it has been coordinated with the buildings form in a comprehensive process and makes branches of a sustainable architecture (Curtis,2003). Such architecture has the least damaging impaction the environment and has ecological relationship with it. Sustainable architecture design complex and planned process. The major goals of this architecture are as followed:

- Having versatile and flexible Functions.
- Possibility in maximum use of able energy.
- Not having Environmental impact on the inside.
- Having design with respect to the climate.
- Using previous experiments.

Studying Native forms as forms that are compatible with the climatic condition Improving life quality and sense of participation among the people. Historically, the pure and most original form of sustainable architecture can be seen in the buildings of the primitive and traditional buildings. Formation of These buildings have been achieved based on the existed material of the environment, human experiences and direct perceptions of climatic condition and maximum adaption with it. The most efficiency space of these buildings is a room with fenestration of the roof or seraglio which has been from Ancient Rome to the Far East; it also is existed in Iran with different forms and, generally is known as A triums the public buildings now. Modern architecture with an emphasis on interior spaces and exterior surfaces has made an internal-external architectural model and has provided the need for entering of the light at middle of the building. So, Atriums could able to give natural light and protected space from the wind and the rain with easiness so faces and beautiful tree sand tropical green cover to residents. In addition to maintaining interior architecture, spatial patterns among buildings in different areas have three main characteristics of architecture in spatial pattern (Spatial variability, hierarchy and respect among the masses). In other word it means that security insurance and no dominance of buildings have been remained stable for many years (Figure 1 and 2).

III. RESULTS

Urban areas are growing more crowded and complex every day and we should always ask ourselves whether the past availability and quality of public spaces are existed or not? In ancient cities of the Iran, Greek and Roman hierarchy accessing from public to and private spaces has been existed in the form of the detailed classified structure? Public spaces in these cities not only had the role of accessing but also, they developed human's contacts. The visual communication was a public need and something yet can be understood.

The concept of sustainable development and architecture is conceptual in relation to the nature and man. This issue is reflected by viewing the past architecture and architecture in the civil society. It can be said that sustainable development and sustainable architecture considering environmental conservation by changing the nature of the approach, but what now appear to be in the built environment is a discrete encounter of the nature. Principles of the sustainable

Stallion Journal for Multidisciplinary Associated Research Studies
ISSN (Online): 2583-3340
Volume-1 Issue-1 || February 2022 || PP. 24-30

architecture include a wide application range from the simplest to the most complex technology but the issue of the appropriateness of the method and its consistence with the Social and cultural context of the people and users has been considered. Sustain ability requires a continuous effort. Without people participation, there is no possibility of improving the built environment. Sustainable architecture focuses on the sustain ability of the architecture as a scientific field and production of a scientific field. It should have ecological information. Recently, many approaches of environmental technology are failed before they successfully completed due to the inability of their designers who have failed to recognize continuity and socio-cultural content of the architecture or could not understand the needs and expectations of those who intend to use them. New target that architects have considered in the designing or the development of the buildings is the possibility of establishing a new relationship between interior building.

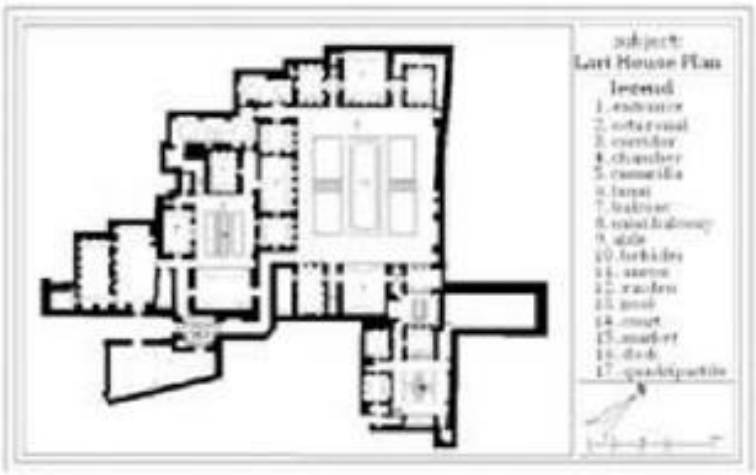

Figure 1: Example of The Internal- External Architectural Pattern in the Desert Climate

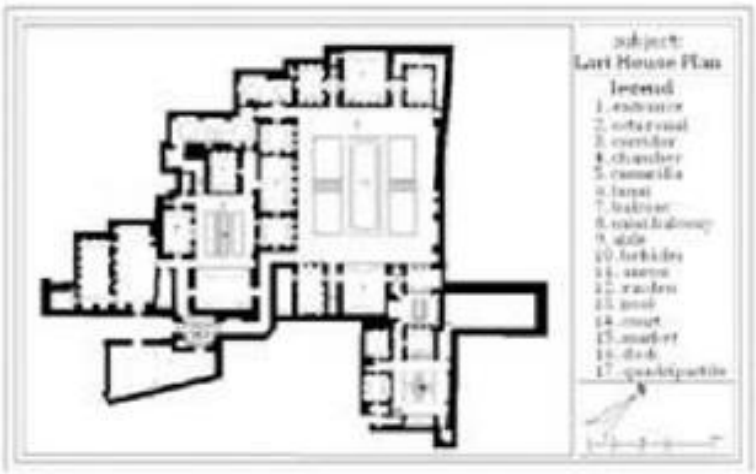

Figure 2: Distribution Percentage of House Holds Habitat by Type of Materials Used in the Buildings In 2010

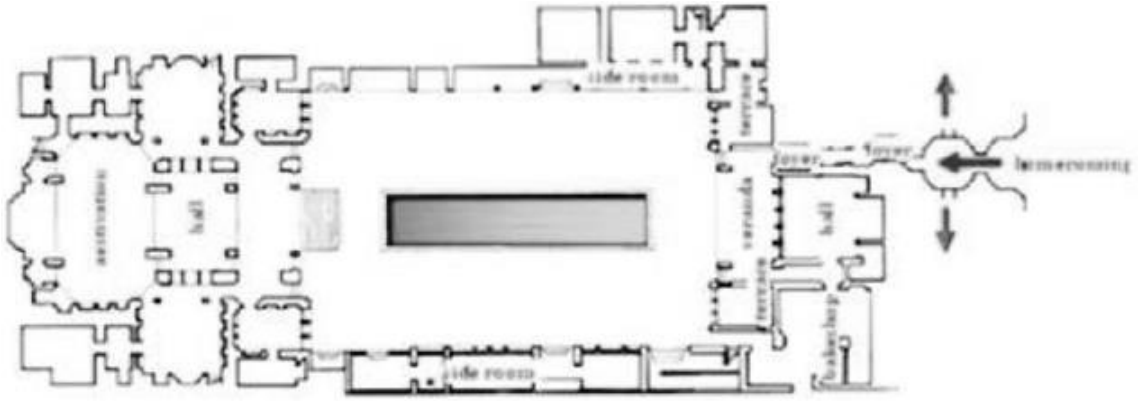

Figure 3: Larry House plan in accordance with the climate (Source: Shemirani and Mofidi, 2007 and researcher drawing

IV. DISCUSSION

A according to the Central Bank of the Islamic Republic of Iran for house hold budget of the urban areas in 2010, 12%of the household workers are working in the construction sector. However, it has been 10.5percent, in 2001 which was in the fourth class of professions or works. Among Iran urban areas Households, the highest numbers of people who are able to read and write have been 0.5, which are working at construction sector. different types of materials used in the construction of the buildings show that 9.9% of households live in the ferroconcrete buildings, 23.6 in the steel structure buildings, 3.7 in the building, 5% in the brick and beam block building, 48.6% in the brick with beam buildings, 4.9% in the brick with woody beam, 2.6 %in the adobe and mud buildings, and 1.7%livein the building spade of wood and other materials.

According to the report of Iran's statistic agency, the number of permits which are issued for construction in urban areas have been increased from116,984 cases in 1991 to 246, 823 casesin2007, of which 218, 966 cases in 2007 have been for residential buildings (Statistical enter of Iran, in http://amar.sci.org). Nearly 2 decades ago, Concept of sustainable development was introduced and promoted in the world in order to respond to environmental concern about capacity of natural systems and social challenges facing humanity.

The overall purposes of sustainable buildings:

- Appropriate utilization of resources and energy.
- Prevent from air pollution.
- Compatible with Environment.

Goshen Home is an example of sustainable architecture for design of its yard fit to needs. Considering qualitative structure, this building is consisted of main section and a services section. Its main section is a rectangular courtyard restricted with enclosed space with the height equal to two floors house. The nearer spaces to the yard the more important they are. Middle spaces in each side of the yard have height equal to two floors and also have special spaces for different season and guests. Addition to its educational role, many seminars have been held in this building. First important point of this building's design is that it is divided in to two sections: big yard is the center of the main section; small west yard is the center of smaller section of the building and each yard has its own special function (Figure 4, 5 & 6). However, there is not an agreement in a standard definition for terms such as sustainable construction and buildings with high efficiency, sustainable construction in buildings is defined in seven principles by the International Council for Research and Innovation:

1- Resource consumption reduces
2- Resource reuse
3- A renewable resource using
4- Nature protection
5- Toxins removing
6- Life Cycle using
7- Cost and focus on quality

Constructions Materials and the Environment:

Environmental construction materials lead to high value of construction projects and it reduce the negative impacts of the environment. These construction materials usually have one or more benefits, including efficiency of resource use (energy, water and natural resources conservation), improving residents and public health. Raw materials extraction, processing and transportation of material for conducting a construction project have significant environmental impacts on the environment. Some of these impacts are including damage to ecological systems, energy and water use, emissions of air pollutants and greenhouse gases. Construction materials also have important impacts on the building occupants. For example, the poor interior air quality can reduce employee productivity of an organization. By increasing the efficiency of the constructing process, recycling and reducing or eliminating harmful compounds, green building materials clearly reduce short and long term environmental impacts. Harmless particles also contribute to the residents' health so that their productivity will progress. Besides this, any construction materials which are compatible with the environment have considerable stability (Marandi et al., 2006). Environmental Protection Agency (EPA) has estimated that more than 30 percent of the buildings have poor air quality in their structures. Poor interior air quality has led to reduce in employee productivity of an organization which results in a significant economic impact. Studies show that, the economic loss of organization by each employee after a period of 30 years is 98% of their salary. Some achievement in the use of materials compatible with the environment are including life cycle assessments (LCA), life cycle costing (LCC), Building management systems (BMS) such as smart buildings, a building that have a dynamic environment by integrating the four main elements: system, structure, service, management and the

relationship between them (Jafari et al., 2006).

At the seventies, sustainability age began by starting energy crisis in the world and three important aspects "Social values, environment also sources and designing skills development" were entered in the development. Designing skills and technical knowledge with respect to three key themes of energy, environment and ecology were redefined and were studied in sustainable development from urban to buildings scale. The architecture as a large system, has undertaken an important task because 50% of world energy consumption is spent or wasted in these areas. For improving life quality in sustainable development, architecture as well as reducing energy use and environmental pollution should harmonize its elements for sustainable development goals smaller systems. Today in urban areas, 80-90 percent of people spend their time inside buildings while doing different activities. Therefore, it is necessary to having a good air quality inside buildings and controlling the air volume which is replaced the existing air through the ventilation systems. The air conditioning systems should be designed and used in a way that with the least amount of energy uses create the best indoor air quality. Experiences show that most of indoors problems are due to wrong decisions in the design and construction of buildings. Although these problems can be partially removed by later corrective action, it should be considered that Prevention and correction of errors in the design phase are more effective and more cost effective. Different infection source has led to different controls measures. Today the building's design includes a variety of specialties, such as architecture, engineering, interior design and etc. Therefore, the identification of various factors that may cause the reduction or elimination of potential problems due to poor quality air is important in this step. These factors include:1-Location selection.2-Architecture Design.3-Building Material. 4-air conditioning used to control indoor air. The World's Best Green Buildings. There are successful examples of green buildings in the world, for example:

- Big Boiler House building in Lexington, Massachusetts, where it has been constructed from construction waste of large construction projects built in Massachusetts.
- San Francisco State Building, the first tower of America, which 70 percent of it does not have any air conditioning system. Exterior of the building is controlled by a computer which is susceptible to climate change and harmonize the building with the environment. There are Natural ventilation systems in the whole building. The Interior Ministry building in Wales has been made from renewable local materials and natural ventilation. While commonly wall is used in construction of the government buildings, the glass wall is used instead in this building.
- Glenn House building in Santa Monica is another well-known example of green building in the world. This building is the best example of environmentally friendly structures. The building generates its own electricity and water consumption, and the emphasis is on energy efficiency.
- Building with high performance can be interpreted as the end product of sustainable construction. As an integral part of the process of creating high-performance buildings, environmental Building performance's assessment systems have developed during the past decade and have been effective in successful evaluating of sustainable building. These systems have emphasized on evaluating the use of natural resources, ecological load, health and comfort of individual building and are trying to reduce environmental stress on natural systems.

Sustainable Architecture and Its Principle

Considering environmental issues at the global level have been started after the industrial development in the 1950s and 1960s in Europe and the environmental aspects were taken into account from the 1960s (Maleki, 2010). With emphasized on the United Nations Conference statement about the Human Environment which was adopted in Stockholm in 1972, a statement with 27 articles was set out after Twenty years in the Rio Conference. Its aims were establishing a new global cooperation through the creation of new levels of collaboration between government, key sectors of societies, people and nations by trying to reach international agreements which respect the interests of the whole and protect the integrity of the global environment and development system.

Some of its achievements associated with the preventing the creations of harmful environmental effects are including:

- Introduction of human as the center of sustainable development goals.
- Evaluating the needs of present and future generations in the context of sustainable development and environmental protection.
- Protection of the environment as an integral part of the development process.
- Appropriate levels of citizen participation in solving environmental problems.
- Effective for cement of environmental laws by the government.
- Applying preventive measures for environmental protection by the government.
- Environmental impact assessment of activities that may have harmful effects on the environment.

Support the identity, culture and interests of indigenous people and their communities and other local communities due to Knowledge and customs. Application of sustain ability principles to reduce energy loss and environmental pollution in architecture has created (sustainable architecture). Sustainable architecture is an approach that emphasis on the building places in relation with the local ecosystem and global scope. Increasing the Total energy efficiency of the building’s construction is the main goal of the sustainable construction. Principles of sustainable architecture are reduced energy consumption, buildings design consistent with the climate, use of the environmental factors

for creating comfort and relaxation, and the use of renewable energy sources in the buildings, designing in consistent with the site, focus on the minimum changes in land, nature conservation and the reduction of pesticide. By this view, the building is like a cover on the human body against natural factor and can be alive as a part of nature, effects on the environment (Mahmoudi et al., 2008).

Application Of Building Materials

Buildings are part of complex industrial systems. To insure this, we should reduce renew able waste and try to achieve closed material cycle. Energy use reduction and negative environmental effects should be considered in the choice of material. About the choice of materials, second life cycle assessment (ICA) is appropriate for determining the optimal use of resources, preventing of pollution in the life cycle of a building, and finding a solution with the least degradation environmental impact. For example, the use of indigenous materials selection, low prices and high-quality local materials, reuse of renewable materials and selection of contiguous material at the material selections stage are very important. Considering stained material can help to absorbing or not absorbing solar energy and choosing an appropriate interior cover for buildings is important. Coatings which are difficult to clean need strong cleansers leading increasing in costs and environmental impact (I bid, 17).

Proper use of materials not only helps to quickly and easily implement but also causes optimal use of their technical characteristics in resistance to heat transfer. For example, in conventional methods, for implementation of cement blocks such as bricks, their surfaces are covered with mortar, if the mortar implemented in two parallel tapes in the outer edge of the block, the thermal bridges that previously were created by the mortar will cut and provide the thermal barrier (Golabchi, 2007).

Since brick forms most of the buildings material we should consider Applying the thermal resistance. In addition to prevention of energy loss it helps to the stability of the building. Its conditions are described in the following table 1.

Table 1: Classification of Building Bricks Thermal Resistance According to The Thickness

Bricks Type	Thickness (cm)	Thermal Resistance
Brick plaque (arrow)	3-4	0.03
Solid brick (wall)	5	0.05
	10	0.09
	22	0.20
Perforated bricks	35	0.42
Ceramic block	10	0.20
	20	0.39
	40	0.78
Concrete Beaman block	25	0.35

As indicated in the above table, thermal resistance of the building by increasing the thickness and changing in the type of materials they will be increased. Therefore, the materials can be used in any environment condition that in addition to preventing environmental pollution, Cost reduction and energy saving, become a goal in reaching sustainable development.

Planning In the Buildings Architecture

In the building development planning we should consider the economic, social and functional aspects and constructing buildings that are suitable for different classes of the society. Buildings selection should be based on local capabilities to respond to future needs, micro and macro accessing routes and network and the existing natural effects. Surveying of the area is necessary in terms of soil type, household drainage and waste disposal procedures to prevent necessary pollution and we should be careful that developments not cause damage to nature. Also, when planning for green space and trees protection plan, we must consider existing vegetation of the area.

Constructions Rule

To coordinate urban planning programs for creating a better environment for the people, regarding to the different architectural styles, traditional and national standards and offer original aspect with regard to scientific and technical methods and thus finding an appropriate construction technique in different areas with considering the location and lifestyle should be considered. So, with the coordination of the Environmental Organizations and Supreme Council of Urban Planning and Architectures law, macroeconomic policies and objectives can be achieved and finally constructs buildings which have the best quality and efficiency with maintaining the content.

Buildings Heat Transfer Coefficient

Buildings Heat Transfer Coefficient is in fact the rate of heat transfer in time unit from exterior part of the building for per cubic meter of useful space and each degree of temperature difference between inside and outside space should not be more than a certain amount. This amount is the difference between constructions group and its rate between the groups is as follow:

Groups 1: less than 0.7 watts per cubic meter of degree.
Groups 2: less than 1.1 watts per cubic meter of degree.
Groups 3: less than 1.4 watts per cubic meter of degree.

Energy Consumption Criteria

It is one of the most important parts of optimizing energy performance and a reference point for determining the buildings efficiency and amount of savings achieved in energy consumption by application of the optimization procedure. It is a process that compares a building (or groups of buildings) with a building (or groups of buildings) and evaluates changes energy consumption. It has internal, external, quality and quantity criteria.

Hazardous Materials in The Construction Industry

We can divide dangerous pollutants associated with construction into two main groups: The first groups are construction materials and their harmful effects on the environment and health have been approved. The use of these materials, depending on the rules and regulations of any country has been completely banned or is allowed under certain conditions and special monitoring. For example, lead-based paint and materials containing lead, silica. (ACM) could be mentioned as asbestos-free crystallized and fiberglass samples. The second group sare those substances which are present in some of the equipment used in construction and do not make any problem till present naturally in the prediction area, but as soon as they enter the environment (e.g. container breaking and entering them into the water and air) they will become hazardous to human health or the environment. Materials containing mercury such as thermostats, electronic cell and PCB (Poly Chloride Bi Finley) are a well-known group of substances in this.

Energy Efficiency

Buildings heating forms major part of energy used for buildings. Buildings through a combination of coverage, penetration and the environment lose heat transfer and through internal resources (people, lights and equipment) gain solar and purchased heat energy. Purchased energy is the building the amount of energy hat is used to dealing with their mallards and calculated by the following equation: Where(E) is the annual fuel consumption in forms of a kilowatt hour of electricity, gas, UA is marginal rate of heat loss (Coverage - penetration -transfer heat environment), DD is days what moderate mean temperatures, AFUE is seasonal energy utilization in percent and V is the value of seasonal thermal energy. Buildings with high efficiency should at first have strategies for reducing heat, light, air, and so on. Amount of the building loads are effective in reducing annual fuel consumption and, therefore, more energy consumption. This strategy could be useful in the efficiency design of different buildings coverage, in other words to reduce the heat transfer coefficient (U-value). By buildings solar passive design such as choosing proper side of buildings construction, shadowing and appropriate use of thermal mass and polished surfaces of the remains loads from the building, after loads reducing, they collide to each other in the place by using renewable energy sources such as wind, solar and geothermal.

REFERENCES

[1] Alajgrdy A., 1987. Optimum housing (Tabriz city), Master's thesis Tabriz Faculty of Humanities Social Sciences University: 161.
[2] Curtis J.R., 2003. Modern Architecture, Interpreters: 313. Golabchi M., 2007. Reasons of lack of sustainable of rural residential buildings against earthquakes and build a model based on the ability of local. Art Journal, 30: 42.
[3] Jafari V., Tavassoli H., and Zeinal I., 2006. Energy optimization in intelligent building, Najaf Abad Azad University: 7.
[4] Mahmoudi M. and Mehdi N., 2008. Reduce environmental pollution caused by housing development with architectural design strategy, fine arts magazine,35:4-9.
[5] Maleki S., 2010. An introduction to sustainable urban development, Shahid Chamran University of Ahvaz Press:2-7.
[6] Marandi A. and Ali M., 2006. Environmentally friendly building materials, energy use optimization in buildings Conference: 3.
[7] Mavadat E, 2010. Scanning of housing in city of Yazd, Yazd University: 97.
[8] Moitlabi G. 2006. Recognition of form and function in architecture, 25: 32-35.
[9] Motavaf S., 1987. Methods evaluation of reconstruction of Hoveyze, Master's thesis, Faculty of Fine Arts of Tehran University: 41.
[10] Papoli Yazdi M., 2001. Housing the Kurds in northern Khorasan housing, Geographical Research Quarterly, 3:6.
[11] Shemirani S.M. and Ofidi M.H., 2007. Atrium an architectural symbol of sustainable, Sixth National energy Conference, University of Science and Technology: 4.