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Physical Evaluation of Sustainable Architecture and Urbanization; in viewpoint of Modern Technologies

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Abstract

There are many different definitions about sustainable architecture and most scholars believe that in sustainable architecture, creation of man-made environment and strategic management of it is the basis of such architecture. In regard with sustainable architecture, ecological issues should be considered in regard with balanced and co-existence relationship between architecture and environment. The present study has considered physical evaluation of sustainable architecture, in which the study has also considered effective modern technologies in sustainable architecture and urbanization. Obtained results from the study have indicated that there is a significant relationship between using sustainable architecture technologies and improvement of sustainable urbanization. According to other results from the study, one can also refer to role of environmental conditions and self-informed tendencies in adjustment with environment and providing sustainable architecture.

Keywords: Sustainable architecture, sustainable urbanization, modern technologies, environmental conditions, physic advancement, architecture, urbanization, identity, performance, form, aesthetic.

Introduction

Ghaem Maghami et al have investigated principles of sustainability in residential complexes in viewpoint of Iranian scholars and experts[1]. In the mentioned study, sustainability principles of residential complexes has been investigated in terms of social dimensions including justice, aesthetic, facility, welfare, security, growth of children, social identity, and other similar issues. For this purpose, social sustainability of residential complexes was investigated in viewpoint of scholars, so that effective factors in sustainability principles could be identified[2]. The first factor was comfort within the home (physical); second factor was playability of open and multipurpose spaces for children; third factor was social identity; and forth factor was social regulation[3].

Zarghami has also investigated sustainability principles of residential complexes such as aesthetic; welfare; rest; security; growth of children; social identity; and other similar issues in Iranian-Islamic cities[4]. In this regard, social sustainability of residential complexes was investigated in viewpoint of scholars, so that effective factors in principles of sustainability could be explored through analyzing their ideas and opinions[5].

Technology means maximum use of the least facilities. Technology has been formed of two Greek words ”tekhne” and “logia” that they would refer to art and knowledge respectively[6]. Ancient Greeks did not find any different points between art and knowledge, so that two different words have not been used for defining these two terms[7]. Technology means using knowledge and other information to do practical duties[8]. In summary, technology is the making, modification, usage, and knowledge of tools and techniques in order to achieve a goal and help humans to achieve his/her goals which it influence the most humans in their life[9]. Technology is a human activity and in light of this, it is prioritized over knowledge and engineering. Along this, the term “technology” refers to innovations originated of modern processes and techniques. Even so old innovations like wheel are from samples of innovation[10]. Martin Heidegger believes that human in technology age could have a reasonable interaction with others and the community, so he adds we could use technical instruments which with using them in a correct way, we could achieve our goals, meaning that with access to technology and modern instruments we could get everything which is needed for us at a particular time[11].

Sustainable Architecture

In viewpoint of scholars, there are different definitions for sustainable architecture as follows: Charles Kibert has stated that sustainable architecture refers to creation of manmade environment and managing it based on principles of ecological adaptation and resource output[12]. The principles are as follows: minimizing consumption of nonrenewable resources, improving conditions of natural environment, and minimizing ecological damages on environment[13].

Hagan believes also that determining balanced relationship between environment and architecture, which is based on awareness actions of effects of architecture, can be considered

as properties of sustainable architecture[14]. Vender Vin is another scholar in this domain and believes that sustainable architecture can refer to internal and basic concept of space. It would be considered as a process, which considers recovery more important than damaging. In fact, science and art can provide balanced relationship between human environment and natural environment[15].

According to the mentioned definitions and other similar definitions, one can define sustainable architecture as follows: sustainable architecture is active against environmental and spatial properties and would also apply capabilities of ecology optimally in order to provide an optimum and desired environment. Hence, sustainable architecture includes ecological adaptation; it means that it can cause minimum damages in environment. In addition, this kind of architecture is adaptable against changes, needs, and conditions. Hence, it can be separable in terms of different spatial properties. Sustainable architecture includes a combination of values including aesthetic, environmental, social, ethical, and political values. Sustainable designation refers to an internal and basic concept of space[16]. It would also refer to a process that can lead to recovery more than damaging. In fact, science and art can cause desired relationship between human environment and natural environment[17].

Objective of descriptive statistic is calculating the parameters in the statistical society using demographic variables[18]. Descriptive research is entitled to Non-experimental research dealing with the relations between variables, hypotheses, principles and/or theories within accuracy. It is expected that if variable of 'x' relates to variable of 'y', the probability of predicting such a phenomenon would be possible reporting that obtained results could come useful for representing a new hypothesis. In contrast with empirical project, researcher does not bring about any change in variables for representing a descriptive research type which no condition is necessary for occurrence of events. In fact, in case of no analysis or observation, events observed or described would occur. Descriptive research includes events occurred previously which they might associated to situation at present time[19]. Researcher searches for the issues including data collection to test hypothesis to give a response to the questions represented about current situation. Actually, descriptive researches have both basic and applied aspects which in applied perspective, planning, decision making processes and policies are used.

According to all mentioned above, study about principles of sustainability of residential complexes would be significant in order to achieve sustainable development and architecture. Hence, the present study has been conducted in order to assess position of cooperation orientation in Iranian residential complexes in viewpoint of sustainable. Through this, it can investigate sustainability concepts, sustainable design, architecture concepts, and role of cooperation of residential complexes in order to provide such sustainability.

The main questions of the study are as follows: what is sustainability and what are its criteria in residential complexes? How cooperation in residential complexes can have role in such sustainability? How is sustainability of residential complexes in view of sustainable architecture? Initially, the main assumption would be as follows: cooperation and interaction in residential complexes of Iran include sustainability significantly. The present study has been conducted initially through defining concepts and then review of literature in regard with sustainable architecture and sustainable residential complexes. The study has investigated also role of cooperation and interaction in residential complexes in viewpoint of sustainable architecture.

Impact of Technology on Performance in Modern Architecture

Perusing outcomes of technology in this domain relates to the issues playing important role in voiding physical needs particularly for human's convenience, e.g., use of electronic and communication technology and advancement of technology in architecture scope could be mentioned. An attitude gained of multimedia and computer technology paves the way to design intellectual buildings, in way that interior side in the building is controlled via automatic systems providing convenient environment for residents. With these systems, relation and office works in a building could be devolved upon intellectual management via a computer network[18]. In fact, intellectual building constantly reacts toward varied conditions by which information is exchanged rapidly and work atmosphere is controlled as well- consequently economic saving is realized with increase of exploitation and decrease of costs In industrial revolution age and also with emergence of modern architecture, some architects as Marcuse mentioned building and house as machine of life which in a word, intellectual buildings generated of information revolution and communication technology could be known as tools of life[19]. Impacts of technology on architecture are mainly aimed at meeting physical needs of humans, but mental needs of humans would not be responded ever. In other words, use of technological tools in most cases has not came useful in saving energy and controlling environmental conditions, which also damages in environment have been appeared and serious crises like energy crisis, Global warming, Thinning of the ozone layer, and etc. have been appeared as well.

Sustainable Design

Sustainable design is a kind of design that designers of internal designation of building have the main role in it. In fact, sustainable design is an effort in order to provide sufficient facility for individuals through enhancing life quality and causing minimum damages in natural environment. Hence, providing comfort in sustainable design would be possible through providing minimum pollution in environment and through using natural factors. Rogers has defined sustainable design as follows: "sustainable design is a kind of design that tends to meet current needs without damaging resources of

future generation. In sustainable design, social and economic sustainability should be considered as much as energy consumption and environmental effects of buildings and cities[20]." Principle of sustainable design is focused on this issue that building is a component of surrounding environment and should be considered as a part of ecosystem in life cycle.

In viewpoint of Vender Vin, sustainable design refers to internal and basic concept of space. It would also refer to a process that considers recovery more important than damaging. In fact, science and art would provide desired relationship between human environment and natural environment.

Sustainable Architecture

Sustainable architecture is in fact subcategory of sustainable design that in order to achieve it one should decrease consumption of nonrenewable resources and also enrich natural environment. Architecture would come close to sustainability when it achieves high efficiency in a regular and integrated management system in regard with using renewable energy sources, removing pollution, and adaptation with environment[21]. In order to consider a building sustainable, 6 principles should be provided including: energy saving; adaptation with climate; reducing consumption of new sources; meeting needs of residents; adaptation with site; and holism. Sustainable architecture can provide efficiency of sources; protection of nonrenewable sources; reduction of renewable energies; and enhancement of environmental quality[22].

Impact of aesthetic technology in modern architecture: Advancements in electronic science and innovations of it in media technology have had very important effects on Aesthetics, idea and creativity of architects in creating buildings. Image and conveying concepts via media are the most important trait in communication era and information world. There are over measure images in human's surrounding area which this trait has been found in architecture as Aesthetics emphasizing on a point that images come useful for body of buildings. However, experiences show use of images useful in building, some problems in this relation have been mentioned as well. Modern Aesthetics are found devoid of any tradition and culture in architecture, in which physiological brainstem responses mentioning older than civilization in 23 thousand years ago, are considered as criterion[23].

Figure-1
Dome of Reichstag building (New German Parliament), work of Norman Robert Foster, a sample of using technology for gaining performance interests of building

Figure-2
National art center and Centre Georges Pompidou, work of Renzo Piano and Richard Rogers, a sample of using technology for getting the best performance in architectural spaces

Today, architecture has been transformed to a matter for showing the world which it could be perceived within technology and new science. Generally, it could be stated that rapid changes have been appeared in multimedia technology in recent years which this trend would go on up to the time while high volume of images get replete in any place-through this, architects and designers would gain great deal of information striving to represent their ideas and projects in accordance with the time they live in it[24].

Impacts of technology in 20th urbanization

Up to middle decades of 19th century, most cities had forts, but since this decade all walls as a hedge for physical development in cities, were collapsed for the main purpose of developing city. In most cities, another new restricted area was applied instead of fort which this area was a zone, in which cities were under siege in this zone.

In a short analysis about plans for physical expansion of industrial cities in Europe particularly in 19th century, this point is highly important that based on physical expansion in light of population concentration in industrialized cities and acts done in these cities as issuing some rules and regulations regarding municipal authority, majority of people in early years of 20th century found that urbanization has to be in accordance with law. Industrialization came useful to bring about changes in cities for both developing them and increasing quality of them resulting in population concentration, annihilation of texture of cities, qualitative and quantitative problems associated to housing, emergence of in pertinent housing, and finally increase of social crimes. With expansion of industry in cities and emergence of problems caused by industry in urban centers, new theories were appeared to work. Emergences of new theories were found with lack of population concentration in case while there is the structural evolution in cities. In fact, with emergence of industrial revolution, urbanization theories and projects represented for cities were found as a new trend of industrial revolution technology like Railway and Tram as the urbanization theories. For this, it could be referred to La Chaux de Fonds, Wright, Otto Wagener and many others. Principles of urbanization in industrial theory granted by Toni Garnier were from the principles used by theorists the most. Now, it could be observed that with advent of technologies, development of city would be absolute[25]. In fact, with development of monorails, Light Rail Transit in Europe, new theories like smart growth, Transit Oriented Development, compact city and sustainable development and many other theories were found in urbanization literature[26].

Development of city in the world's successful cities has been along with achieving objectives of sustainable development which for this purpose, total adaptation with transport system is essential and it is in a way that access to center areas in the city has come easy. Today, with rapid advancement in domain of communication technology, new activities like remote purchase, remote occupation and many others are seen being formed in the cities. Therefore, technology due to less coming and going in the cities might influence physical form of city, networks and body of buildings, thus we have to wait for new theories in the scope of urbanization[27].

Conclusion

Converse about issue of technology and over measure use of it are caused we stay away from the reality of technology. Correct use of technology for evolution of architecture is a pertinent strategy which causes the negative effects of technology on architecture and human societies get decreased. If architecture be considered as the mixture of sustainability, aesthetics and performance, then outcomes of technology in each domain could be seen in evolution or descent of architecture. As seen in many samples, use of technology for meeting the needs and lack of perception about capabilities in architecture would have negative outcomes. Hence, considering the use of various tools in technology, avoiding from relevancy of various processes with the tools and capability of tools and emphasis on analytic aspects are mentioned essential.

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