



Methods of Utilizing Nature in Samples of Iranian Contemporary Architecture

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ABSTRACT: This research is going to explore methods of utilizing nature in architecture and use them to evaluate naturalism of the samples of Iranian contemporary architecture, both qualitatively and quantitatively. The use of various aspects of the nature in Iranian contemporary architecture is less than the past. So the main questions in this research are: “Which methods of utilizing nature have influenced on the artistic works of Iranian contemporary architecture?”, and “How and how much are these influences?” In the research process, descriptive-analytic techniques are used. First, the theoretical literature was studied using the archival methods, and then the methods of utilizing nature as evaluation criteria were extracted. Next, using surveying methods, characteristics of case studies were analyzed and their quantitative and qualitative effects were presented. Research results indicated that conceptual, scenery and material techniques have been the most used in the public buildings of Iranian contemporary architecture, and formal, functional and spatial techniques have been neglected. The conclusion is that naturalism has always been on the focal attention in contemporary Iranian architects design process, but there is lack of Iranian architects’ effort to create works that nature is present comprehensively in them. On the other hand, public buildings are architectural patterns of every country, and utilizing the above methods in making such buildings can help to improve the quality of architecture in the country.

Keywords: Nature, Methods of Utilizing Nature, Iranian Contemporary Architecture.

INTRODUCTION

Originality and Significance of Subject

“In animal, plant and mineral climates, there are interesting structures that are undoubtedly the basis of construction projects and innovation in architecture” (Senosiain, 2003, P. 32).

Man during his life on the Earth, has known that nature is a life-giving and mysterious resource, and has always tried to discover all of its dimensions, including

the expression of nature in art. Nature has always been one of the most important sources of human inspiration during the history; from the first art works remaining in caves to date. Aristotle, the ancient philosopher, was one of the first people who wrote on nature as a great source of inspiration. Undoubtedly, some of the best pieces of classical music and paintings have been created in this way (Taghizadeh, 2007, P. 75). In the architectural field, “by understanding and using the laws of nature, man has been able to create beautiful structures with high efficiency, shape and proportions” (Ibid, P. 77).”A all religions over thousands of years have taught man, not only the content or spirit of divine teachings but also the types that God expresses Himself through them, are

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sacred” (Nasr, 2005, P. 360). So nature has been proposed as a source of artists’ inspiration in Islamic art; the inspiration that exists in the content of works in addition of their body (Mahdavinejad, 2003). Expression of God in SuraAraf, verse143, on mountains and in SuraTaha, verses9-12, on trees proves the potential of nature to be a place for God’s expression. Hence, it can be said that “for human, recognition of nature is a kind of self-analysis, and this saying of Monet: “I have not had wishes in life except unifying with the nature” can be known as a subtle interpretation of the recognition of nature beauties” (Zargham, 2008, P.104). In summary, it can be said that “Irano-Islamic view also gives high and important position to the nature; however, divining the nature gives an abstract view to it; an epidemic abstraction of promised paradise” (Hashemnejad *et. al.*, 2010, P.105). This is why some researchers have considered the nature as a basis for the analysis of Islamic architecture wisdom (Mahdavinejad, 2004). The inherent regulations within the nature are full of hints that can be used to create varied and endless combinations of structural forms (Margolius, 2007, P. 6). For example, “snow crystals are fantastic samples of this capability of the nature. Every snow crystal has a six-side, symmetrical and even form, and could create unlimited and non-repetitive patterns” (Pears, 1990). So study of the nature is very significant to understand Iranian architecture. But the question is that how our architecture should interact with the nature? And in which way we should act: Mutuality, contrast, harmony, similarity or another way? (Khakzand & Ahmadi, 2007). It seems that utilizing formal, structural

and climatic methods can be the ways of interaction of the nature and architecture. The innovation of this research in comparison with similar studies is analyzing how to use theoretical principles of subject in Iranian contemporary architecture. In other words, the significance of this research is in its comparative approach in interaction between theory and practice.

Research Goals

This research aimed to explore the methods of utilizing nature and use them to evaluate how Iranian contemporary architecture deals with the nature, both qualitatively and quantitatively. The main questions of the research include: “Which methods of utilizing nature have affected on the works of Iranian contemporary architecture?” and “How and how much are these effects?”

Research Methods

In this analytic research, the data required were collected by archival methods and surveying the cases (GroatandWang, 2005). First, the theoretical literature about the importance of the nature was studied using the archival methods, and then the methods of utilizing nature as evaluation criteria were extracted. Next, by using surveying methods, characteristics of the case studies were analyzed. Thereafter, the results of quantitative calculations and their quantitative and qualitative effects on Iranian contemporary architecture were presented. The process of carrying out research has been shown in figure 1.

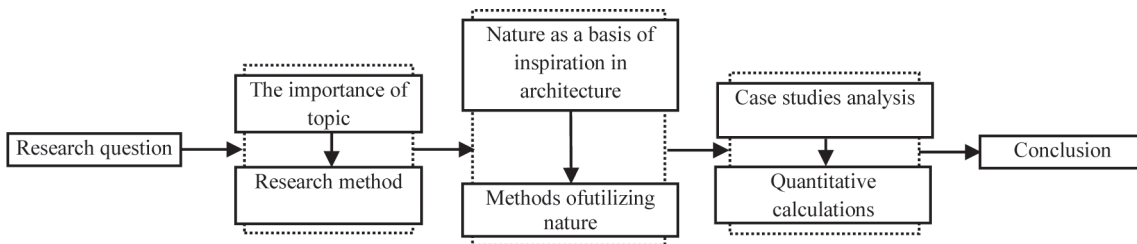


Fig. 1. Research Process



Research Samples

The case studies were selected from the contemporary and nationally famous works of Iranian architecture with public land use and urban scale that have been built by the government. Then they were analyzed by quantitative methods.

NATURE AS A BASIS OF INSPIRATION IN ARCHITECTURE

Interaction of Nature and architecture

Relationship of man and nature was triggered from the very moment he put his feet on the Earth. In addition to influencing the nature, man has also been influenced by it. "Nature, as a proper pattern has always responded many of man's questions and has taught its rules to him. The interaction of architecture and nature was started when man chose cave for living or built a shelter from the foliage of trees and... for protection" (Protoghezi, 2006, P. 33). Nature affects in many of the strategies leading to the architectural creation. Nature is always ubiquitous and unclassifiable, and as a very powerful method for inspiration; its presence in mimicking and variability of form, and material of architecture is obvious (Khakzand & Ahmadi, 2007). So one of the architectural approaches based on the nature, is inspiration from it. Quality of architect's view when he/she is looking at the nature is different from others. Also inspiration from the nature is different among different architects. Here we try to enumerate methods that contemporary Iranian architects have used to inspire from the nature.

Methods of Utilizing Nature in Architecture

Formal Use Method

John Ruskin (1906) expresses his idea about the using form of nature in architecture as: "Do not imitate anything unless the natural forms" (Ruskin, 1906). In nature, what is not strong enough is sentenced to ruin. Hence, only the most efficient and the most flexible natural forms have survived during millions of years (Taghizade, 2007, P. 85). As a result, the nature could be a source of formal inspiration for architect designer to identify the samples of natural organisms regarding the objectives of project and, by considering their natural form, try to understand their proportions, shape, volume and curves. Finally, the potentials of natural form are discovered and used in the architectural work. In this process, the architectural form gets inspiration from the designed natural form.

Designers, from Future Systems Company to Santiago Calatrava, have used a series of natural forms and tested their effect in creating beauty relative to the ugly designs (Edwards, 2010, P. 18). Calatrava has been in search of a new alphabet of form that has formed based on principal technique and know-how; however, his efforts have not always been limited to technique (Jodidio, 2007, P. 12). From this type, many samples could be referred to in the contemporary architecture of the world. For example, to design the building of Lotus Temple (New Delhi, India) the inspiration has been the lotus flower.

Functional Use Method

"From my designer's perspective, I ask: Why can't I design a building like a tree? A building that makes oxygen, fixes nitrogen, sequesters carbon, distills water, builds soil, accrues solar energy as fuel, makes complex sugars and food, creates microclimates, changes colors with the seasons and self-replicates. This is using the nature as a model and a mentor, not as an inconvenience. It is a delightful prospect" (McDonough & Braungart, 1998).

By studying the form and the existing characteristics in the nature, we notice that there are precise reasons for the existence of their forms, which their forms perform the functions (Senosiain, 2003, P.16). Hence, the function in natural organisms is a process that causes production of products. Every natural organism has a specific function, which has found existence for an objective or set of objectives inside it. For example, in the life system of a tree, production of oxygen and carbon dioxide is one of the functions of this organism, and or in parts of a natural organism like the feathers of birds, which are used to protect them against warm and cold. Accordingly, nature has many lessons for human. In this regard, Erich Hofer says: "By learning the internal functions of nature, human has been changed into manufacturer of machines" (Ibid, P. 16). It is obvious that the functions of all organisms have not been discovered yet. In architecture too, the issue of function is known as an important factor: For instance, in designing area, the aim of architect is to form the elements in a way that they accomplish their tasks completely (Ibid, P.11). Though many dimensions of this issue remain vague, by far we have witnessed numerous cases of the issue of function in architecture; either where the function is an anatomical factor or it is considered as an external factor.

Structural Use Method

Whatever exists in the nature has a structure. The nature provides a structure for the elements that are



created and grow in it. All phenomena in the world have been created to achieve their specific objectives and to continue survival, necessary conditions should be realized for these objectives (Margolius, 2007, P. 2). The structure of a natural organism is created in various forms based on its function, and interacts with other themes (such as form and space) that constitute the organism. In some cases, this internal structure is external and, in other cases, structure and other constituting elements of the organism are inseparable, which could be observed for as long as the natural organism exists and has not been analyzed. Like a tree in which there is no separate structure and skin, but in animal organization, there is severability and two different kinds have been made; though none of them exists without the other. "In this process, the architectural and structural designers attempt to accumulate the architectural and structural considerations by various methods and ideas, which the nature is a manifest and special source for presenting efficient ideas in this regard (Nikandish, 2010, P. 27). Therefore, when the architect observes and researches the structure elements of a natural organism in different moods, and analyzes the transfer of forces in it, he/she uses the structure of natural organisms and conforms it with the architecture work based on the type and objective, like design of Westfield commercial project in London.

Spatial Use Method

Space is the essence of architecture and a matter of quality, which is formless in nature but understandable. Lao Tse says: "To make a house, we install the door and windows, but using the door and windows depends to nothing but space; therefore, as we use what exists, we should understand using what does not exist" (Ching, 1994, P. 106). Sometimes, to assure a specific quality of space, the architect searches into nature through specific organism so as to be able to extract spatial quality. As the nature is space making, spatial use could be considered as a method. Natural organisms make a space and a special spatial sense inside themselves or inside the environment, which are understandable for some human beings, e.g. the space that exists under a tree, and guessable for some others, e.g. the space inside the shell of a mollusk. Hence, if we could create the same spatial quality that a natural organism has created in architecture, then the nature has been spatially used.

Conceptual Use Method

Natural symbolism is one of the other ways of dealing with the nature in the buildings, traces of which could be seen in the works of a few contemporary architects

(Hosseini *et.al.*, 2008, P. 70). "The spiritual message of nature is not only in the general aesthetics of forms, moves and generalities, but also in the symbols that are direct reflection of various divine specifications" (Nasr, 2000, P. 205). Hence, this concept is sometimes a reflection of a cultural issue and sometimes a reflection of inherent characteristics of the organism, which is manifested by the architect in the architectural work.

Ornamental Use Method

Regarding that, in human aesthetic, tendencies exist inherently and by acquisition, ornament could satisfy a part of this aesthetic tendency of human. John Berger says: "The aesthetic feeling governing the human being comes from the nature, and this feeling is prior to the aesthetic feeling due to human made products" (Baker, 2002, P. 26). Whereas nature is a beautiful architect who makes his utmost effort to use the attractions of nature and reflect them in its work to create an architectural work for human needs. This issue has always been true throughout the history that one of the levels of using natural aesthetics is ornamental use in nature; as in the architecture of Iran, where natural impressions have been used on bricks, tiles and other products, or in the architecture of the west (e.g. Corinthian column heads), all of these prove this claim that using in the level of ornaments in architectural works by architects and artists will always exist. In the ornamental use method, natural forms and shapes are used only to decorate the architectural elements, which occur mostly in two dimensions and in the surface.

Climatic Use Method

Some architects have considered the compatibility of buildings with the natural environment as the origin of their inspiration from the nature. In natural history, a public rule says: "Only those species are able to survive and live which adapt and match to their environment." This is a known reality that the natural united forces quest materials and forms that have integrated with them for harmony and perfection. "So, for using natural energies, coordinating the environment with its dominated climatic conditions is considered as the first step. In other words, the necessary condition for benefiting from the natural conditions is to match the buildings with climatic conditions" (Aiwazian, 1998, P. 84).

Using Context

Zamani (1999), regarding the interaction of architecture and nature, says: "Architecture is replaced with a point in the context of the nature and joins it.



Architect faces a lot of natural data that affect on its spatial discipline. Such architecture that grows from its surrounding nature, somehow, is developing the nature, and human's existence is converted into an inseparable part of the nature" (Zamani, 1999).

Using Scenery

Hossein Sheikh Zeinoddin in his works limits the nature to the topography position, surrounding view and scenery. Outside nature gives him beautiful scenery and step by step he makes his building on slope in compatability with the nature (Hosseini *et al.*, 2008, P. 73).

Using Material

Expanding nature in architecture can be experienced by using natural elements as a part of the architectural structure. From distant days, various natural materials have been commonly used in architecture. So some architects are trying to be naturalistic by using natural materials such as water, wood, stone, etc. For example, "the movement of water in Jamshidieh Park is the most important element that has been designed by inspiration from the principles of Persian gardening" (Adibi *et al.*, 2005, P. 79).

Table 1. Methods of Utilizing Nature and Their Summary Description

No.	Method	Summary Description
1	Formal	Using the formal potentials of natural organisms by understanding proportions, shape, volume and curves
2	Functional	Making a building that has a function of a natural organism. Any natural organism has a specific function;for example the feathers of birds which are used to protect against warm and cold
3	Structural	Structural using of natural organism through observing and researching the structural elements and analyzing transfer of forces in it
4	Spatial	Simulation of a specific quality of a natural space in architecture
5	Conceptual	Using the symbols of nature that reflect directly the divine or cultural characteristics of a society
6	Ornamental	Using forms and natural shapes only to decorate the architectural elements
7	Climatic	Making a building in compatibility with climatic conditions and green architecture
8	Contextual	Making a building in compatibility with the surrounding natural environment and site
9	Scenery	Making a situation for watching a natural scenery from the building in architecture
10	Material	Using materials the same way that they are in the nature

CASE STUDIES

Methods of utilizing nature as evaluation criteria have already been extracted. Here, by using archival and surveying methods, characteristics of each case study will be analyzed and shown in a table. Thereafter, the results of quantitative calculations and their quantitative and qualitative effects will also be presented. It is necessary to mention that a lot of works of Iranian contemporary architecture were studied, and ten more important works were selected to be presented.

Avicenna's Tomb (HoushangSeyhoun, Hamedan, 1952)

Table 2. Analysis of Avicenna'sTomb Project

1	Formal	-
2	Functional	-
3	Structural	-
4	Spatial	-
5	Conceptual	*
6	Ornamental	-
7	Contextual	-
8	Material	*
9	Scenery	*
10	Climatic	*



The building includes two parts: tomb and tower. Tomb section is an all-closed building and covered in granite. The main entrance, like a veranda with semi-circular thick columns, is located in the east of the tomb. Tomb has an all-stoned stair that goes up through the walls of the same material. Gradual accumulation of tower columns and cone-shaped caponit are pointing

toward the sky directly. Asymmetry of whole building gives an organic appearance to it. Whitespace of tower columns is coordinated with the climatic conditions of Hamedan and its severe winds. The square is the basic shape of this building and is seen anywhere in the plan and views. Eastern view of the building is inscribed in a square and reminds a standing man with open hands.



Fig. 2. Avicenna's Tomb (Photograph by N. Dimari).



Fig. 3. Avicenna's Tomb (Naghsh, 2008).

Nader Shah's Tomb (Houshang Seyhoun, Mashhad, 1956)

Table 3. Analysis of Nader Shah's Tomb Project

1	Formal	-
2	Functional	-
3	Structural	*
4	Spatial	-
5	Conceptual	*
6	Ornamental	*
7	Contextual	-
8	Material	*
9	Scenery	*
10	Climatic	-

This building has been designed based on two original geometrical shapes; square and triangle. The hall of the square-shaped tomb has been made of two closed stony red sides and two open columned sides. Red color of two walls means war, and stony juts with different dimensions show Nader's various battles. The columns around the hall have been carved from granite in an integrated manner. Four big triangle, overlooking columns inside the hall with a special geometric design from thin marble stones, spread a gentle yellow light into the hall. The base tower and total statues embody dynamic state of attack. In the view of the entrance, a pool has been built from integrated granite. Catchments, pools and streams have been designed entirely based on Persian gardening.

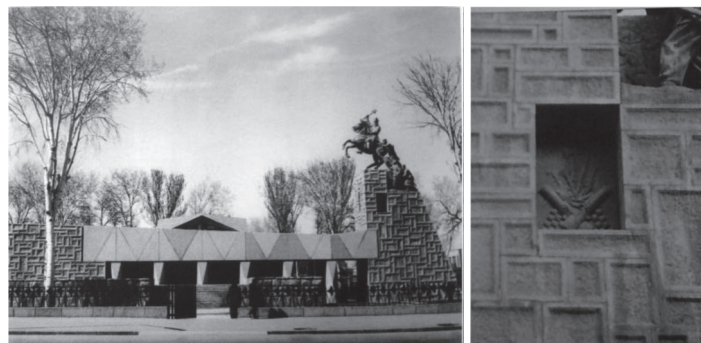


Fig. 4, 5. Nader Shah's Tomb (Bani Masoud, 2009)



Museum of Contemporary Art (DAZ architects, Tehran, 1967-1977)

The building is composed of several low structures that have a 45° turn from the axis of the main avenue. All of these structures are capped with identical skylights, which look toward the Northeast, except from the four on top of the main entrance. The base of the building is made of orange sawn stone blocks, and the top is made of beige concrete that also shapes the skylight protrusions as the volume's points of termination. The curve of the skylights is copper-clad, and their openings have dark-colored glass. The stone base moves back and forth, creating rectangular solids that are headed with half-cylinders and capped with two rows of sky lights. Two glass doors provide access to the inner courtyard from the galleries no. 1 and 5. In harmony with the sinking rhythm of the mass of the building, the courtyard also has

different sinking levels that are connected by stairways. A rectangular pool sits in the middle, within the stairway on the main axis of the courtyard.

Table 4. Analysis of Museum of Contemporary Art Project

1	Formal	-
2	Functional	-
3	Structural	-
4	Spatial	-
5	Conceptual	*
6	Ornamental	-
7	Contextual	*
8	Material	*
9	Scenery	*
10	Climatic	-

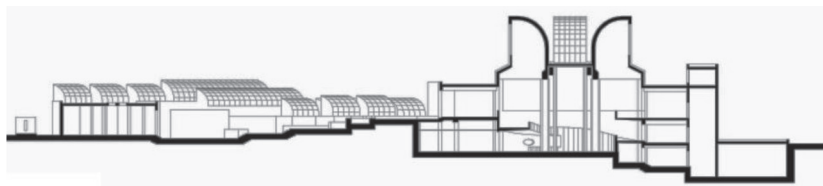


Fig. 6. Museum of Contemporary Art (Navai, 2009)



Fig. 7, 8. Museum of Contemporary Art (Navai, 2009)



Niavaran Cultural Center (DAZ architects, Tehran, 1970-1978)

Table 5. Analysis of Niavaran Cultural Center Project

1	Formal	-
2	Functional	-
3	Structural	-
4	Spatial	-
5	Conceptual	*
6	Ornamental	-
7	Contextual	*
8	Material	-
9	Scenery	*
10	Climatic	-

Niavaran Cultural Center has been built in the south of an old garden. It has been tried to select plant less spaces of the garden for locating the building. The building has a U-shaped volume and has been formed by volumes surrounding a square courtyard. The central courtyard of the Cultural Center has gardens, trees, water, etc. The building seems to be an independent unit because of this central courtyard that all its constitutive pieces face it. The cultural center consists of library, gallery, auditorium for performing arts and cafeteria-restaurant. It has been designed around a plaza, which is connected to a sizeable Persian garden with extensive waterways. This has been programmed as a prototype neighborhood cultural center.



Fig. 9. Niavaran Cultural Center (Kamran Diba – Architect)

Fig. 10. Niavaran Cultural Center (Naghsh, 2008)

Negarestan Cultural Center (Behruz Ahmadi, Tehran, 1974-1998)

Table 6. Analysis of Negarestan Cultural Center Project

1	Formal	-
2	Functional	-
3	Structural	-
4	Spatial	-
5	Conceptual	*
6	Ornamental	-
7	Contextual	*
8	Material	*
9	Scenery	*
10	Climatic	*

The main building of the complex is located entirely underground, and there is no external volume except the entrance courtyards and stairs, and a huge centered skylight. The entrance forecourt of the cultural center is a small and proportional courtyard that has an octagonal plan. The complex has an open amphitheater with a paved area surrounded by old trees. Some materials that have been utilized, such as brick and wood, remember Iranian architecture and some others, such as stone and concrete, remember modern architecture.

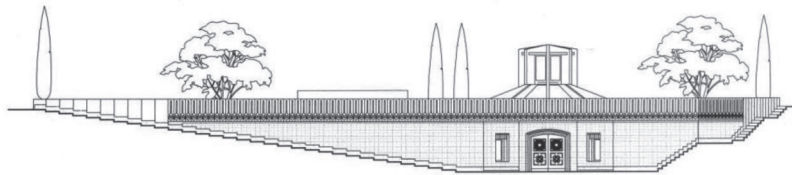


Fig. 11. Negarestan Cultural Center (Naghsh, 2008)



Fig. 12, 13. Negarestan Cultural Center (Naghsh, 2008)

Central Building of Iranian Cultural Heritage and Tourism Organization (H. Amanat, M. Hojjat, B.A. Shirazi, Tehran, 1976-1987)

Table 7. Analysis of Central Building of ICHTO Project

1	Formal	-
2	Functional	-
3	Structural	-
4	Spatial	-
5	Conceptual	*
6	Ornamental	-
7	Contextual	*
8	Material	*
9	Scenery	*
10	Climatic	-

The buildings of this complex with brick facade are located among numerous courtyards. Changing the location of volumes rather than each other causes the building seem fragmented and as part of the urban fabric. The rows of the skylights on the roof will intense this feature. The symmetry is a principle that designer has used it at some points of the facade. The use of repetition and rhythm in the repetition of elements are other principles that the designer has used in the facade of the complex. The bilateral porch of the entrance is a space with an octagonal plan, a fountain in the middle, and a high ceiling that has a skylight.



Fig. 14, 15. Central Building of ICHTO (Naghsh, 2008)



Dezful Cultural Center (FarhadAhmadi, Dezful, 1987)

Musalla of Tehran (Parviz Moayedahd, Tehran, 1988-Present)

Table 8. Analysis of Dezful Cultural Center Project

Table 9. Analysis of Musalla of Tehran Project

1	Formal	-
2	Functional	-
3	Structural	-
4	Spatial	-
5	Conceptual	*
6	Ornamental	-
7	Contextual	*
8	Material	*
9	Scenery	-
10	Climatic	*

1	Formal	-
2	Functional	-
3	Structural	-
4	Spatial	-
5	Conceptual	*
6	Ornamental	*
7	Contextual	-
8	Material	-
9	Scenery	*
10	Climatic	-

The continuous motion of water can be observed in the axis and center of the spaces in two horizontal (moving water from one courtyard to other ones) and vertical (moving water from a glass cone to a pool below) levels. Dealing with the context, going underground or being above it and using such natural elements as light and sky are considerable. The octagonal courtyard of the complex is surrounded by pavilions that face it in two levels. Load bearing vaults for covering spans and tent membrane structures for creating veranda have been used. Semicircle forms and organic route of water on floors are considerable too. Brick is the main material used in the complex. Stone in various sizes and shapes has been used in the floor too.

In the design of Musalla, it has been tried to combine Iranian four-porched mosques' design and Persian gardening. Hence, numerous courtyards are seen in the design. Also axes of water and plant are appeared in the courtyards of Musalla. Porches have become a place to observe the nature. In the building design, natural forms, arches and domes have been used repeatedly. Materials used to cover the building are brick and concrete outside, and plaster inside. Using natural patterns and arabesque designs in the ornaments and covering the interior spaces of Musalla draw design to the naturalism.



Fig. 16. Dezful Cultural Center (Photograph by M.F. Khodarahmi)

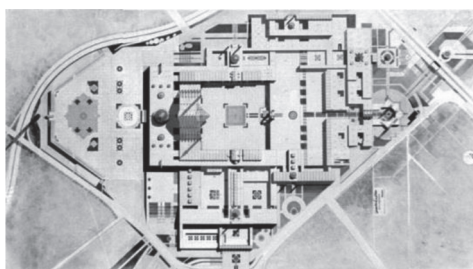


Fig. 17. Site Plan of Musalla (Musalla of Tehran)



Fig. 18. Interior Space of Musalla (Photograph by M. Mirhosseini)

National Library of Iran (Piraazconsulting, Tehran, 1993-2003)

Table 10. Analysis of National Library of Iran Project

1	Formal	-
2	Functional	-
3	Structural	-
4	Spatial	-
5	Conceptual	*
6	Ornamental	-
7	Contextual	*
8	Material	*
9	Scenery	*
10	Climatic	-

The new building of National Library of Iran is located at Abbass-abad lands in the North of Tehran. The structure is an organic whole, which has created an intimate and inviting atmosphere. A single, solid, compact and, at the same time, horizontally-stretched structure, furnishes great flexibility and allows for smooth workflow. The building is technically outstanding. Using up-to-minute technologies of librarianship and considering local and global standards, an Iranian contemporary architecture has been created, which coordinates the complex work and high standards of construction and detailing.



Fig. 19, 20. National Library of Iran (Piraaz, Consulting, Planners, Architects & Engineers)



Central Post Office (Tehran)

Table 11. Analysis of Central Post Office Project

1	Formal	*
2	Functional	-
3	Structural	*
4	Spatial	-
5	Conceptual	*
6	Ornamental	-
7	Contextual	-
8	Material	-
9	Scenery	-
10	Climatic	-



Fig. 21. Central Post Office (Hamshahrionline)

This building is the central post office of Tehran located in South Kargar Avenue. Utilizing the pattern of bee hive is evident in the facade of the building. This pattern has been repeated in all four facades of the building. The main material of the building is brut concrete. The facade has a structural function too. In other words, the geometry of bee hive has been used to transfer the weight force of the facade.

Results and Data Analysis

Based on the reviews done and the data obtained (Table 12), and considering the research purposes, the following points can be made. It is worth mentioning that the frequencies in table 12 are approximate, and only emphasize on the value of the use of methods of utilizing nature in Iranian contemporary architecture.

Table 12. Quantitative Calculations

	Formal	Functional	Structural	Spatial	Conceptual	Ornamental	Contextual	Material	Scenery	Climatic	Frequency (%)
Avicenna's Tomb	-	-	-	-	*	-	-	*	*	*	40
Nader Shah's Tomb	-	-	*	-	*	*	-	*	*	-	50
Museum of Contemporary Art	-	-	-	-	*	-	*	*	*	-	40
Niavaran Cultural Center	-	-	-	-	*	-	*	-	*	-	30
Negarestan Cultural Center	-	-	-	-	*	-	*	*	*	*	50
Central Building of ICHTO	-	-	-	-	*	-	*	*	*	-	40
Dezful Cultural Center	-	-	-	-	*	-	*	*	-	*	40
Musalla of Tehran	-	-	-	-	*	*	-	-	*	-	30
National Library of Iran	-	-	-	-	*	-	*	*	*	-	40
Central Post Office	*	-	*	-	*	-	-	-	-	-	30
Frequency (%)	10	0	20	0	100	20	60	70	80	30	

100% of the studied samples have used the symbols of nature that reflect directly the divine or cultural characteristics of a society. This shows the importance of using conceptual method in order to utilize nature

in Iranian contemporary architecture. Scenery method is in the second place (80% frequency). It means that constructing a building in natural scenery or watching natural scenery from the building has been in the core



attention of Iranian architects. 70% of the studied samples have used materials the same way as in the nature, such as types of stones, bricks and woods; this shows the importance and plurality of using them in Iranian

contemporary architecture. Green architecture trends are trying to utilize this method in order to naturalize their architecture.

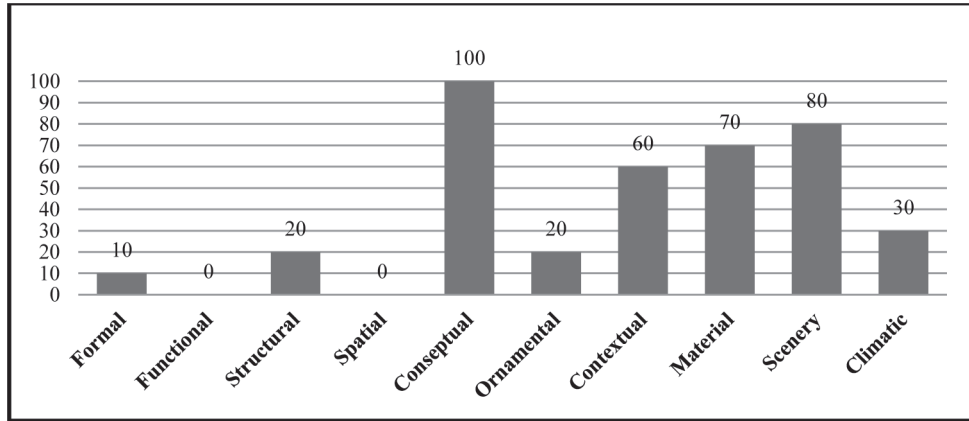


Fig. 22. Comparison of the Methods of Utilizing Nature in Samples of Iranian Contemporary Architecture

30% frequency of using climatic methods in Iranian contemporary architecture can be an alarm for Persian designers; this is because, although the issue of building compatibility with the climatic conditions and green architecture has been warned constantly by scientific community in recent decades, yet it has not been taken as the main idea of design. 20 and 10% frequencies of

using structural and formal methods, respectively show that these methods of utilizing nature have been neglected in Iran, though they are so important abroad. Zero percent frequency of using functional and spatial methods shows that there is no influence of this method on Iranian contemporary architecture.

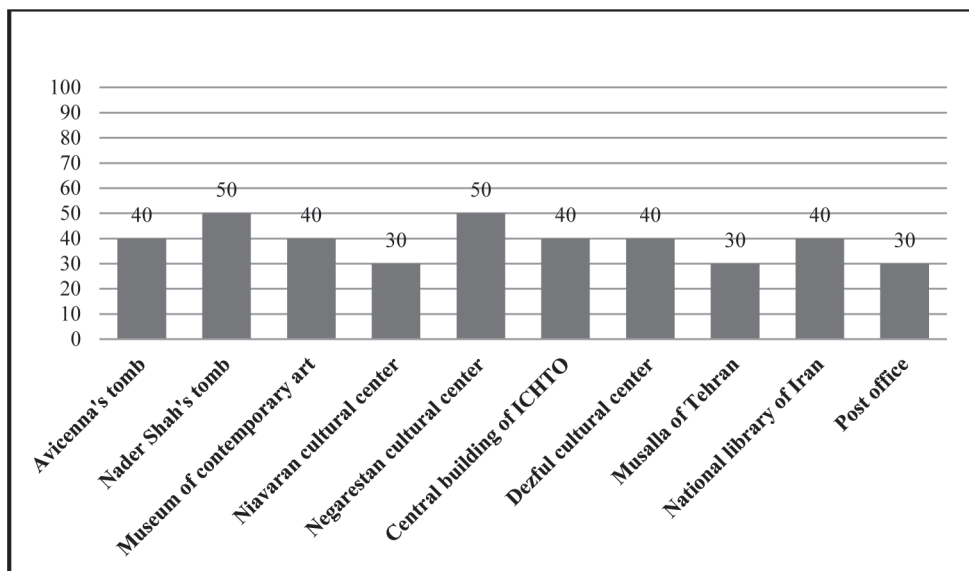




Fig. 23. Comparison of Naturalism in Samples of Iranian Contemporary Architecture

Nader Shah's Tomb, designed by Houshang Seyhoun, and Negarestan Cultural Center, designed by Behrouz Ahmadi, are two sample works that have made more effort to consider nature in their design, as explained in the theoretical principles of the research.

DISCUSSION

As mentioned in introduction section, generally, this research aimed to explore the methods of utilizing nature and use them to evaluate how Iranian contemporary architecture deals with the nature, both qualitatively and quantitatively. In order to pass from theory to practice, this question was proposed that how our architecture should interact with the nature? And in which way we should act? So, the methods of utilizing nature as evaluation criteria were extracted by archival methods they include: formal, functional, structural, spatial, conceptual, ornamental, contextual, material, scenery, climatic. Next, by using surveying methods, characteristics of the case studies were gathered and analyzed in previous section in order to evaluating the research questions. In response to the first question, which methods of utilizing nature have affected on the works of Iranian contemporary architecture, results show that all of the methods except functional and spatial methods have affected them (Fig. 21). In response to the question of how and how much are these methods effects, results show that naturalism in samples of Iranian contemporary architecture has appeared mostly in these methods: conceptual (100%), scenery (80%), material (70%) and contextual (60%) (Fig. 21). As noted before, the frequencies are approximate, and they only emphasize the value of the use of methods of utilizing nature in Iranian contemporary architecture.

It is worth mentioning that there were some confounding variables that could effect on the results. Most of them are scale, landuse and construction time. So, for controlling these variables, case studies were selected from the contemporary and nationally famous works of Iranian architecture in different decades with public landuse and urban scale that have been built by the government.

As mentioned at the beginning of the research, nowadays, architects around the world have paid due attention to using formal, functional and spatial methods. However, our quantitative results showed that these methods have no place in Iranian architectural works, except in few prominent works of Iranian contemporary architecture. The possible reason behind this seems to be

the lack of required technology in the country.

CONCLUSION

Frequency of 30% and higher for all the studied samples in this research indicates this point that naturalism has always been on the core attention in contemporary Iranian architect's design process (Fig. 22). On the other hand, there is no frequency higher than 50% among the samples, and this indicates lack of Iranian architects' effort to create works that nature is comprehensively present in them.

Based on the results of data analysis, it can be said that conceptual, scenery and material methods have had effective role in the naturalistic design of public buildings of Iranian contemporary architecture. Nowadays, architects around the world have paid due attention to using formal, functional and spatial methods but, our quantitative results showed that these methods have no place in Iranian contemporary architectural works. The possible reason behind this seems to be the lack of required technology in the country. The results of this study showed that utilizing structural and climatic methods is very weak in the public buildings of Iranian contemporary architecture, while these methods can have some useful consequences such as energy efficiency, sustainability, etc. On the other hand, public buildings are architectural patterns of every country, and utilizing the above methods in making such buildings can help to improve the quality of architecture in the country.

According to what was said, it can be mentioned that the nature has various and valuable lessons for architecture. So, it is necessary to study the developed methods including formal, functional, structural, etc. deeply, in order to use the nature in architecture more usefully and more intuitively; and explore their technical and practical principals in the nature. To achieve this goal, teaching the nature and its mechanisms in academic courses can improve the tendency of utilizing the nature in architecture and architect's designs.



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