Analysis of Creativity in Architectural Design after the Islamic Revolution; Case Study: The Selected Award Winning Architectural Works[*]

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ABSTRACT: This research focuses on the analysis of creativity in the process of architectural design works of the Islamic revolution in Iran. The research methodology is "descriptive-analytic" in the stage of theoretical literature and "content analysis" in the operational stage. The statistical population is composed of four architectural works chosen from "Memar" award winning architectural works in 2001-2017 based on the indices derived from theoretical foundations, i.e. "a. value exhibition, b. creation of ambiguity, c. creation of tension, d. form transformability and deconstruction, e. use of tangible and intangible metaphors, and f. use of paradox and metaphysics". This study tries to evaluate the creativity indices in the selected samples and seeks to see whether there is any significant relationship between the indices of creativity and the effectiveness of the works and the process of their selection as the superior sample. At the end, the analyses suggest that there is no significant relationship between the effectiveness of these indices in the totality of works and the process of selection as creative works; it seems that the referees of the competition did not have any unique procedure for their selection. Moreover, it is concluded that the ambiguity in the process of design has been against the creation of value; because the effects with higher mean marks in value exhibition, contradiction, order and chaos, fullness and emptiness, lightness and heaviness, natural and artificial, new and old offer lower marks in "creation of ambiguity". Paradox and metaphysics were of the highest degrees and the factor of "new and old" had the lowest ranks. Given the types of architectural styles of revolution, in terms of form, modern materials and technologies, unique examples of creativity have taken form proportionate to the growth of technology and the relationship of the context and background of the monument.

Keywords: Creativity, Design Process of Architecture, Indices of Creative Design.

INTRODUCTION

Today, creativity in architecture and design is of ever-increasing importance; in so far as creativity is considered as one of the major pillars of human civilization development in all ages and in all types of art including architecture. Although this phenomenon has been argued frequently by the pioneers of the movements of the revival of historical architecture and theoreticians of typological architecture, the reality is that a revise of the notion of architecture is needed for its denial. In other words, we need to make it clear if we consider architecture as one of the liberal arts or as a vocation. The current notion in Iran is very similar to Layman's point

of view in the nineteenth century Europe. Naturally, in a vocation, continuation is more important than invention and practicality it is more important than art and by the same token rules and regulations, it is more valuable than theory. Having referred to the traditional architecture, we should also remind that not only creativity, but also "heresy" do not cause problem. According to Venturi, although the artist revolts against the tradition, s/he also takes part in the tradition (Afshar Naderi, 2005, p. 64). On the other hand, in dealing with the category of philosophical roots of the formation of creation and sometimes invention in architecture, one should say that in an analytical approach, three major perspectives can be distinguished: a. "comparative study of epistemological methods" [in invention and creativity in architecture], b."comparative study of cosmological views", c."study of ideologies".

Mc Kenin, a psychologist, in his book Personality Relations of Creativity: Case Study of American Architects has studied the process of creativity in American architecture and has derived three basic conditions for identification of creative work. Firstly, creative thinking emerges in "response to a new idea" and one can say that, statistically speaking, the work should not be repetitive; secondly, creative work should be relatively "correspondent to reality and realizable" in the sense that it should be able to solve a problem in certain conditions; and thirdly, apart from innovation, a creative work should also have "authenticity". The question is that in which indices and conceptual aspects should the creativity in the process of design of architectural works be crystallized and what has been the manifestation of creative architectural work after Islamic Revolution? This essay studies these indices and aspects and also looks into some relevant points in this regard. Among the hypotheses that the current research seeks to accept or reject, the followings can be referred:

a. First Hypothesis: There is no significant relationship between the effectiveness of creativity indices in the process of design in the totality of works and the process of their selection as creative works.

b. Second Hypothesis: Ambiguity in the process of design stands against creation of value.

METHODOLOGY

Method

The method used in the current essay is compatible with the hypotheses and is of "analytic-descriptive" type. Thus, the theoretical foundations of the research including the data related to creativity and its indices have been collected through library based and descriptive methods. Then, using Delphi method, every derived index has been scored by 10 experts of art and architecture and then, the data have been analyzed and compared through the tables representing the scale of creativity of cases.

Statistical Population and Sample Size

In this research, the samples in contemporary Iranian architecture are restricted to the monuments that have been constructed from 2001 to 2017. Then, the monuments that have been mentioned by the critics of contemporary Iranian architecture in the professional journals of architecture have taken part in the evaluation. After the scrutiny and categorization, 70 buildings were selected based on the extracted indices that were presented by 15 architectural experts through a questionnaire. accordingly, the sample size was selected to be four architectural works based on the notion of creativity and the views of experts.

THEORETICAL FOUNDATION

With regard to the levels of creativity in architecture, Noqrekar alludes to the infinity of creativity and continues as follows: "Knowledge and creativity are two hierarchical states which never come to end while many schools have restricted them to the most superficial layer. What is proposed by the majority of schools and theoreticians of art and architecture is a vertical and historical hierarchy. Contemporary man does not have access to essential knowledge because he is not in presence at all and for this reason the children have deeper understanding than the adults. This is due to letting the carnal whims free and undoubtedly this factor leads to the obstruction of internal perceptions. Thus, no absolute judgment can be offered of historical knowledge and we can only say that human epistemic tools have become relatively perfect in the course of history" (Noqrekar, 2006, p. 34).

As to measure and allocate a criterion for creativity in architecture one should say that "the majority of skeptics and relativists do not have any concern of truth and do not believe in any measure or criterion for veracity of knowledge and creativity. At the same time, many of contemporary schools have turned to posteriori criteria and consider the practical efficient results as the measure of veracity of knowledge. Although correct premises always lead to correct results its contrary is not verifiable and there are numerous examples that falsify it.

It seems that the correct path is that both posteriori and priori measures should be taken into account regarding the

knowledge and creativity. However, the most important factor in knowledge is harmony with initial self-evident truths both the acquired and the present ones. This plays a

significant role in practical creativity, veracity, justice and perfection" (Noqrekar, 2006, p. 34).
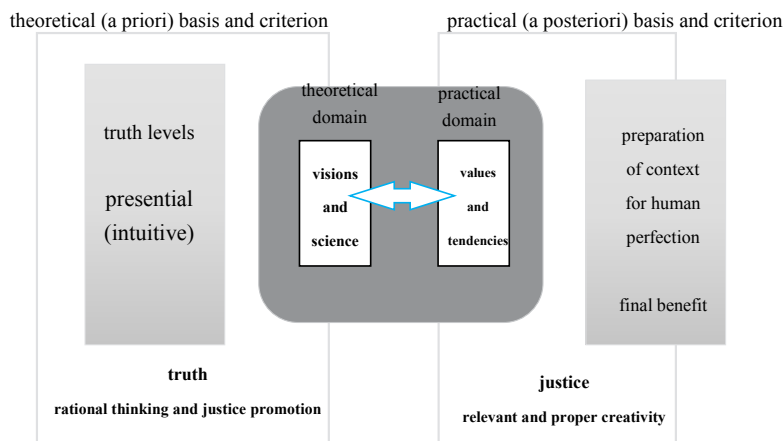

theoretical (a priori) basis and criterion

practical (a posteriori) basis and criterion

truth levels

presential (intuitive)

theoretical domain

visions and science

practical domain

values and tendencies

preparation of context for human perfection

final benefit

truth

rational thinking and justice promotion

justice

relevant and proper creativity

Fig. 1. Practical and Theoretical Structure of Creativity
(Thesis based on Noqrekar, 2006, p. 34)

Creativity and Invention In Architecture

Art in the course of history has always been associated with creativity, insofar as most of thinkers and scholars have interpreted art as creativity and innovation. On the other hand, art and architecture are closely affiliated to creativity and invention and this is the most effective concept in architectural creation and art (Naderi & Ardalani, 2018). Regarding the ideas of thinkers regarding the concept of creativity and invention in architecture, one can refer to the following points:

Mozayani describes the "value and place of creativity" in art and architecture in his article Art, Architecture and Urbanization writes: "Innovation is one of the chief features of artistic works whether in the form of painting or in the form of architecture" (Mozayani, 2000, p. 22). Mirmiran in his article entitled Sepahsalar Mosque in the category of "creativity; existential requirement of the concept of architecture" alludes to the point that: "in all architectural works there is one shared aspect and it is always creativity. This creativity reveals itself in two forms in architecture: firstly, in "theoretical creativity", i.e., the intellectual basis upon which the architectural work is grounded; and secondly, in "spatial creativity" that constitutes "architectural aspect" of that work " (Mirmiran, 1996, p. 56). Diba in his article entitled "Acquisition of a Language for Architecture of Contemporary Iran" considers creativity as the requirement of architecture: "Design in Iran needs research, love, existential authenticity, intelligence, innovation and creativity. For

having access to this language and expression in modern architecture we need to establish a conceptual structure in which expressional elements and words are the levels and surfaces that transfer this combinational totality (Diba, 1999, p. 31). Le Corbusier in his book entitled Modern Architecture: A New Approach to Architecture alludes to the concept of "pure creation of mind" and writes: "design and profile is not the criterion of the architect. It is in this point that architect shows himself as an artist or an engineer who designs freely and not out of emergency; there is no longer any question and doubt regarding the traditions and there is no need. Design and profile are the pure creations of mind. They emerge out of the mind of an imaginative artist… Whenever there is a specific harmony, we become infatuated with the work. Architecture means the creation of pure spirit (Le Corbusier, 2007, pp. 3-12). Nasr in Creativity in Iranian Architecture comments on the "denial of epochal sources" and continues as follows: "traditional style of Iranian architecture is not the product of any era or age rather it is resulted from the encounter of specific religious and spiritual methods with the taste of its followers. Then, as long as a certain religion or tribe exists, this style will continue to be. Islamic architecture of Iran is a significant example of this reality. Our Iranian ancestors were engaged with an eternal artistic creation which was related to the eternity. Due to this relation, it found an immortal value and credit" (Nasr, 1987, p. 53). Antoniades in his brilliant Poetics of Architecture notes that creativity becomes revealed in the following factors and strategies:
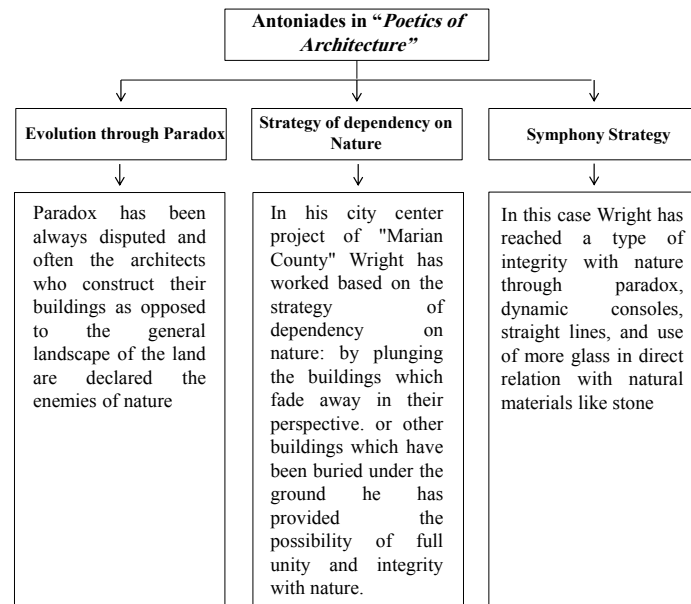
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│Evolution through │ │Strategy of       │ │Symphony Strategy │
│Paradox           │ │dependency on     │ │                  │
│                  │ │Nature            │ │                  │
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| Paradox has been always disputed and often the architects who construct their buildings as opposed to the general landscape of the land are declared the enemies of nature | In his city center project of "Marian County" Wright has worked based on the strategy of dependency on nature: by plunging the buildings which fade away in their perspective. or other buildings which have been buried under the ground he has provided the possibility of full unity and integrity with nature. | In this case Wright has reached a type of integrity with nature through paradox, dynamic consoles, straight lines, and use of more glass in direct relation with natural materials like stone |

Fig. 2. Creativity Factors and Strategies According to Antoniades
(Antoniades, 2006, p. 415)

Architectural Approaches after Islamic Revolution

The works of architects after Islamic Revolution include an extensive range of artistic approaches and movements and struggle to lead Iranian architecture towards a free identity. The main approach of Iranian architects in the two decades after Revolution has been in line with the cultural heritage and Iranian traditional architecture and at least in the buildings which were constructed under the supervision of the government. These architects tried to offer an Iranian expression to architectural works in Iran under the influence of postmodernism and classicism. During this time, the style which was supported by the government was close to Iranian-Islamic architecture. The second period ,that is the time of stabilization and reconstruction of the country, starts from the end of war and continues to present. Two subjects have jointly created a new era of architecture in Iran:
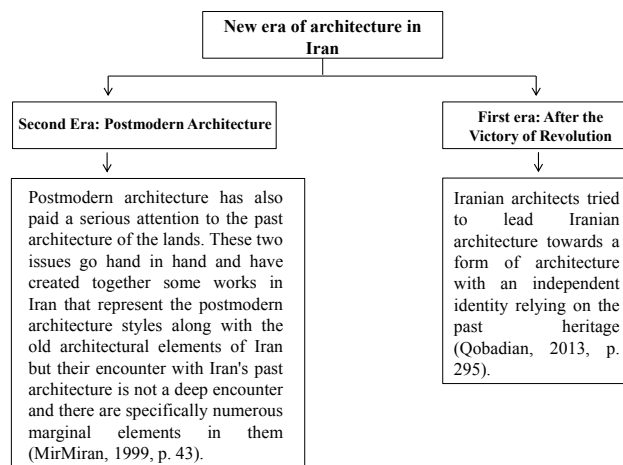
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│Second Era: Postmodern│           │First era: After the  │
│Architecture          │           │Victory of Revolution │
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| Postmodern architecture has also paid a serious attention to the past architecture of the lands. These two issues go hand in hand and have created together some works in Iran that represent the postmodern architecture styles along with the old architectural elements of Iran but their encounter with Iran's past architecture is not a deep encounter and there are specifically numerous marginal elements in them (MirMiran, 1999, p. 43). | Iranian architects tried to lead Iranian architecture towards a form of architecture with an independent identity relying on the past heritage (Qobadian, 2013, p. 295). |

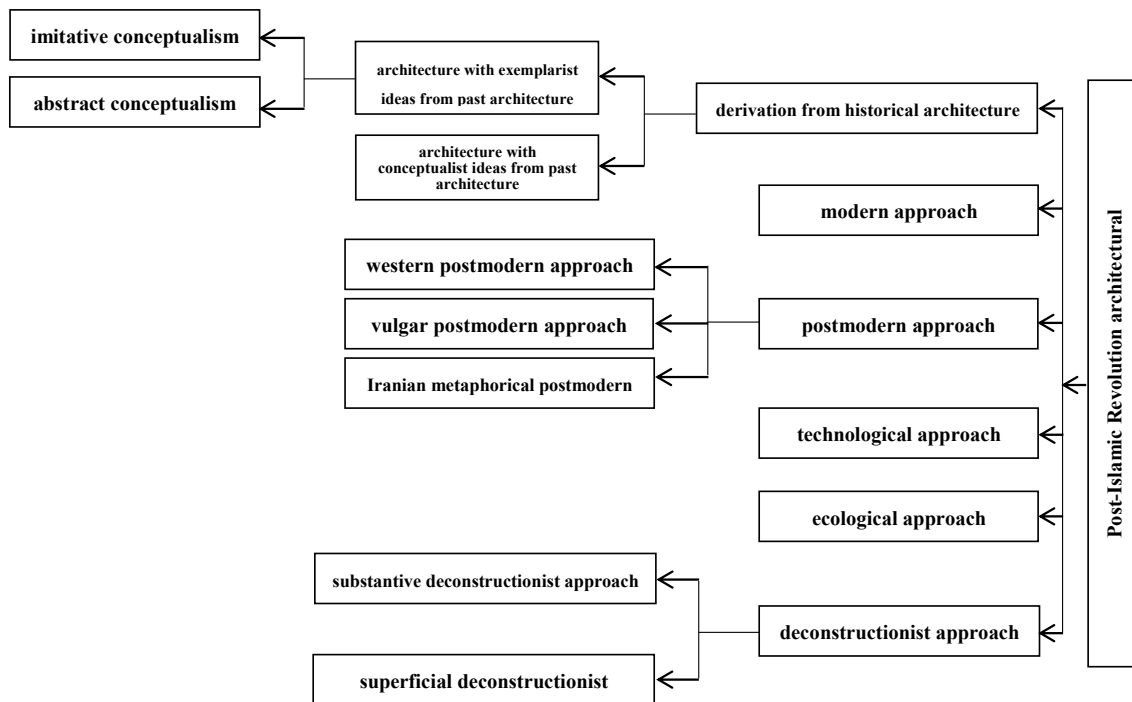**Fig. 3. Two Subjects have Jointly Created a New Era of Architecture in Iran**

Fig. 4. Approaches of Iranian Architecture after Islamic Revolution

Derivation of Ideas from Historical Architecture

The architects of this group focused on the revival and promotion of Islamic and Iranian culture, value and identity through an exact emulation of the historical architecture. In this method, the spatial structure and form of the building is completely similar to the historical architecture. The difference is just a matter of using steel and concrete instead of historical materials like bricks, cement or tiles. Therefore, a meaningful relationship is not visible between the form and structure of this group of buildings. Moreover, similarity to historical architecture has also been observed in details and ornaments as well as the totality of the building, e.g., using forked arcs, ornamented vaulting, ribbed dome, Quranic epigraphs.

In this field there are two approaches:

Repetition in relation to the building function (Fig. 5. mosque of Sharif University of Technology) (Hojjat, 1996).

Repetition without paying attention to the building function (Fig. 6, Khavaran Culture House) (Technical Office of Khavaran Culture House, 1996).
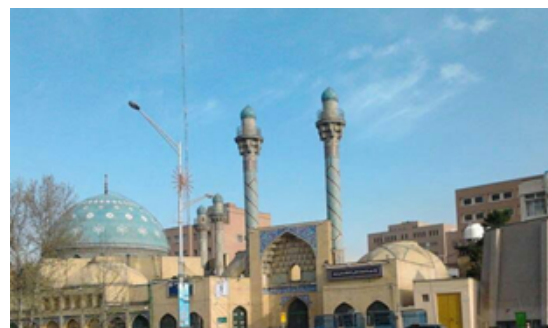

Fig. 5. Mosque of Sharif University of Technology; Fig. 6. Khavaran Culture House
(Hojjat, 1996)

Architecture with Exemplarist Ideas from Past Architecture: The ideas organizing form and space in Iranian past architecture are based on the use of geometry, balance, naturalism, hierarchy and unity; all of which have been the source of inspiration in creation of architectural works after Islamic Revolution. Exeplarist ideas of past architecture have become reflected in various forms in the buildings of this era:
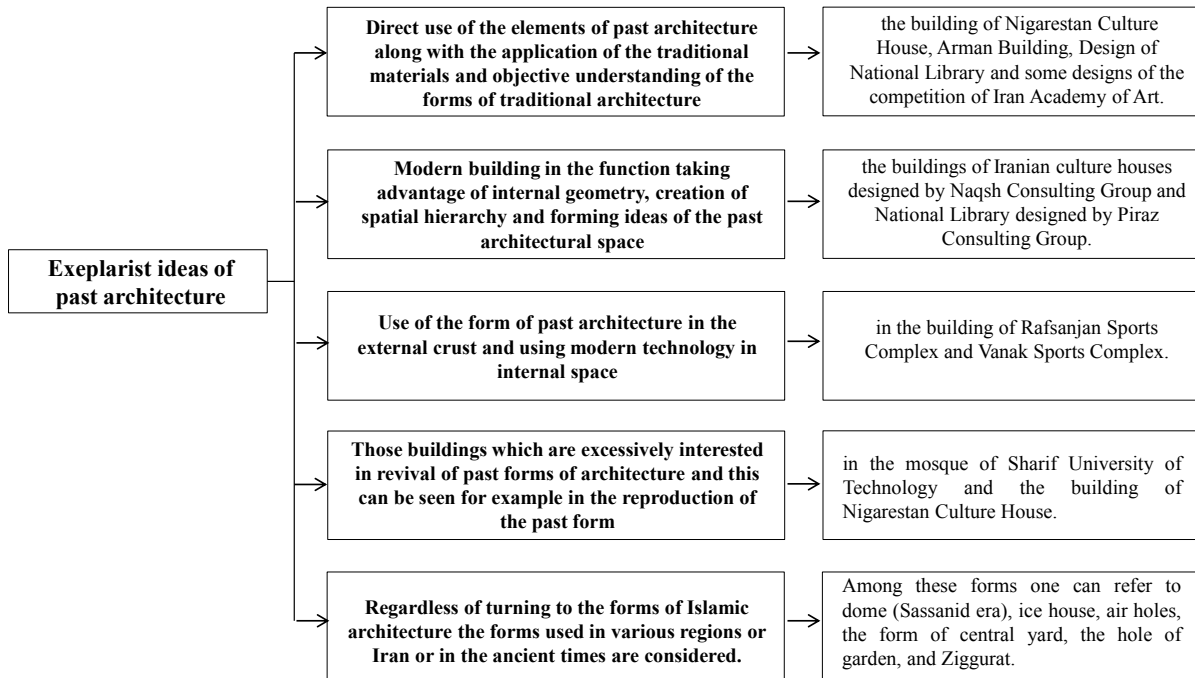
Exeplarist ideas of past architecture		
	Direct use of the elements of past architecture along with the application of the traditional materials and objective understanding of the forms of traditional architecture	the building of Nigarestan Culture House, Arman Building, Design of National Library and some designs of the competition of Iran Academy of Art.
	Modern building in the function taking advantage of internal geometry, creation of spatial hierarchy and forming ideas of the past architectural space	the buildings of Iranian culture houses designed by Naqsh Consulting Group and National Library designed by Piraz Consulting Group.
	Use of the form of past architecture in the external crust and using modern technology in internal space	in the building of Rafsanjan Sports Complex and Vanak Sports Complex.
	Those buildings which are excessively interested in revival of past forms of architecture and this can be seen for example in the reproduction of the past form	in the mosque of Sharif University of Technology and the building of Nigarestan Culture House.
	Regardless of turning to the forms of Islamic architecture the forms used in various regions or Iran or in the ancient times are considered.	Among these forms one can refer to dome (Sassanid era), ice house, air holes, the form of central yard, the hole of garden, and Ziggurat.

Fig. 7. Exeplarist ideas of Past Architecture
(Banimasoud, 2009, p. 377)

Fig. 8. Dezful Cultural Center
(Shojaei, 2015)

Fig. 9. Rafsanjan Sports Center
(Moeini & Khoshbin, 2016)

Architecture with Conceptualist Ideas of Past Architecture: Conceptualist ideas of past architecture based on the use of concepts such as introspection, ambiguity, reflection, continuation and so on and so forth has been followed in the creation of conceptualist architectural works. Conceptualist ideas of past architecture have been applied in two ways in the buildings of this era: Firstly, the concepts of past have been directly used in the modern and postmodern buildings. Secondly, the architects of this style used these concepts in an abstract or a new global form.
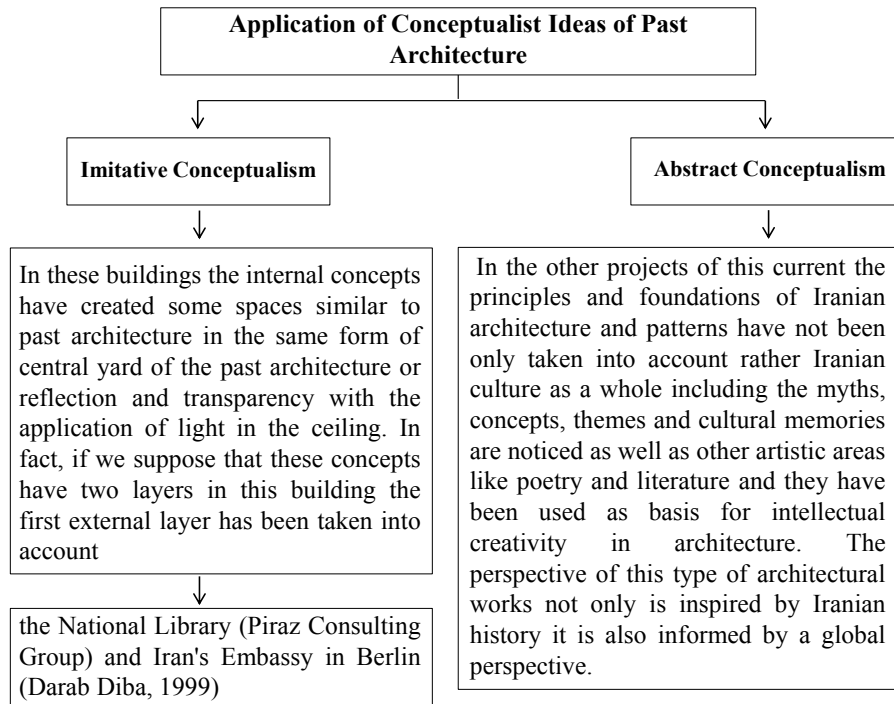
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│ Imitative Conceptualism │  │ Abstract Conceptualism │
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In these buildings the internal concepts have created some spaces similar to past architecture in the same form of central yard of the past architecture or reflection and transparency with the application of light in the ceiling. In fact, if we suppose that these concepts have two layers in this building the first external layer has been taken into account	In the other projects of this current the principles and foundations of Iranian architecture and patterns have not been only taken into account rather Iranian culture as a whole including the myths, concepts, themes and cultural memories are noticed as well as other artistic areas like poetry and literature and they have been used as basis for intellectual creativity in architecture. The perspective of this type of architectural works not only is inspired by Iranian history it is also informed by a global perspective.

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the National Library (Piraz Consulting Group) and Iran's Embassy in Berlin (Darab Diba, 1999)

Fig. 10. Conceptualist Ideas of Past Architecture has been Applied in Two Ways in the Buildings of this Era
(Qobadian, 2013, p. 141)

Architectural forms and spaces, despite their being created for embodiment of certain concepts, can be easily used for expression of other concepts due to the property that exists in general in the existing form and space (particularly in that part of spatial creativity that is basically outside the control and consciousness of the designer) (Mirmiran, 2006, p. 27).

There are three alternatives proposed designs for the prominent buildings including Iran National Library by Hadi Mirmiran, Kamran Safamanesh and Farhad Ahmadi, terminal of Imam Khomeini International Airport designed by Bahram Shirdel, Jahan Nama Garden of Shiraz designed by Mohammad Reza Nasrin, National Museum of Water jointly designed by Hadi Mirmiran and Bahram Shirdel, Isfahan Museum of Holy Defense designed by Sheikh Zeyn al-Din and some other projects (Banimasoud, 2009, p. 15).

Figs. 11, 12 and 13. Islam Abad Center of Documents and Manuscripts
(Moeini & Khoshbin, 2016; Safamanesh & Monadizadeh, 1999; Academies of Isalmic Republic of Iran, A Study of Civil Engineering and Contemporary Architecture of Iran)

Modern Approach

The approaches of modern architecture after Revolution have been reflected in various ways. In a group of combinational buildings, one can find modern and traditional materials like brick as well as brutalism and deconstruction. Afshar House designed by Shariatzadeh is one of these buildings. Some buildings not only follow the fundamental principles of western modern architecture like functionalism and observation of simplicity with the application of numerous glasses in the external surfaces of building by diverse colorful materials, but also are distinguishable from the previous modernist buildings.

In this regard one can refer to communication office of Yusifabad in Tehran (1996) and many of commercial and administrative high-rises in Tehran like Shahrvand chain stores. In buildings such as the Car Center the modern architecture has approached postmodern spaces by application of brick materials in the building as well as colorful materials. This nearness to postmodernism in some buildings is the product of the combination of rationalistic and postmodern architectural forms. In buildings such as Rahahan Book City, the designer has reached a brutal quality of materials by combinational use of steel and glass in his design (Hosseinzadeh & Golinezhad, 2010).

Fig. 14. Technical Car Center
(Contemporary Architecture Research Group, 2006)

Fig. 15. Isfahan Great Librar
(Moeini & Khoshbin, 2016)

Fig. 16. House of Shariatzadeh
(Moeini & Khoshbin, 2016)

Fig. 17. Afshar House
(Moeini & Khoshbin, 2016)

During these years we have witnessed the emergence of buildings such as National Library (1996), Bahonar University of Kerman (1997) in which designers have sought to reach high quality modern architecture. In National Library designed by Shariatzadeh, although Iranian Islamic geometry and brick ornaments are dominant and the prevailing approach is from the past, modern technologies and spirit are still used in their creation.

Fig. 18. Bahonar University of Kerman
(Shojaei, 2015)

Fig. 19. Telecommunication Center of Yusifabad
(Hosseinzadeh & Qolinezhad, 2010)

Fig. 20. Central Site of National Library;

Postmodern Approach

In early decades after Islamic Revolution following the emergence of postmodern architectural style and the publication of forms and symbols of this era in journals many of the constructors and designers of public and private domains took advantage of the new forms in order to improve their modern cubes (Hosseinzadeh & Qolinezhad, 2010, p. 21). The features of postmodern architecture in this era are as follows (Qobadian, 2013, pp. 311-314): a. Updating the methods of Isfahan and Tehran and the indigenous style in general; b. combination of past architecture with modern architecture for modern functions; c. use of traditional materials in the façade like brick, tile and timber as well as traditional ornaments; d. use of modern materials in façade like stone, concrete and steel; and e. use of modern technologies and possibilities.

The emergence of postmodern era in Iran can be traced back to 1980s. In this period, despite the presence of great renowned architects one can see a type of postmodern eclecticism in other popular works of this era. The growing tendency of the young architects to intellectual movements which were not consistent with the national cultural structure led to valueless imitations from postmodern styles and in a completely procedural form that finally ended up in the formal deconstructed works (Qarehbaghi, 2008, p. 34).

Western Postmodern Approach

Many buildings in Iran have been built based on postmodern style of the western postmodern trend. Among the features of the architecture of this group one can refer to color, relation of a mass inside another mass, rotation of masses (Armita Administrative Skyscraper), use of asymmetry, rotation in external crust, and use of combinations of European architecture by means of historical materials like brick. The majority of postmodern works have not remained loyal even to fundamental principles of postmodern architecture. As for example, the harmony of building with texture is one of the principles of western postmodern architecture; however, Iranian postmodern buildings are in conflict with the urban environment due to their specific use of certain materials, masses, colors and structures (Ahmadi, 2004).

Fig. 21. Armita Administrative Skyscraper
(Ahmadi, 2004)

In the beginning of 1990s we come across a type of completely emulative postmodern architectural style. Among the features of this style we can refer to the use of color, use of the relationship between the internal volume and external mass or rotation of masses as well as capitalist monumentalism. In this regard, we can refer to many of residential, commercial and administrative buildings in Tehran and other cities.

Fig. 22. Building OCE.
(Contemporary Architecture Research Group, 2006)

Fig. 23. Sadeghiyeh High-rise
(AfsharAhmadi, 2005)

The computer center building in Tehran on Mirdamad Street and the administrative-commercial high-rise of Sadeqyah Square are two examples of such buildings. Another group of buildings are semi-postmodern since their external appearances are merely imitations of similar works in west. In these buildings, the façade is usually decorated by different stones and colors and they usually have a twofold quality and the combination of colors is repulsive (Forutan, 2006, p. 34).
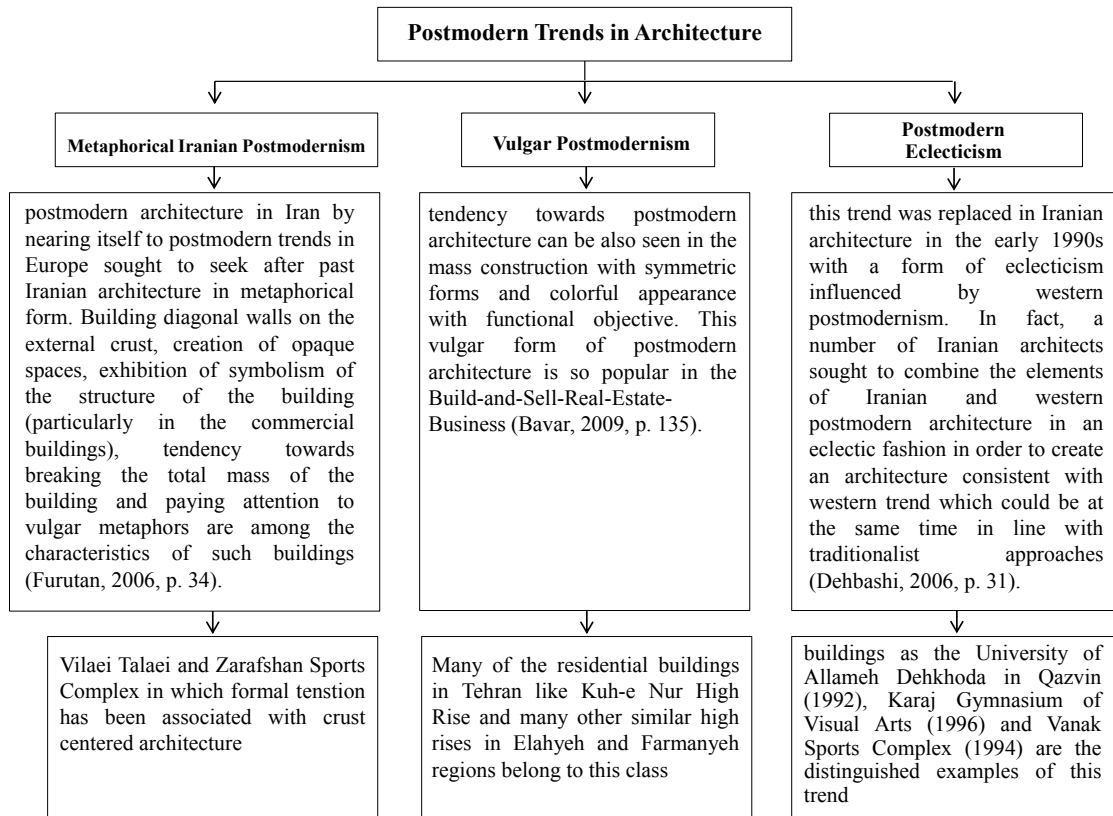
Postmodern Trends in Architecture

Metaphorical Iranian Postmodernism

postmodern architecture in Iran by nearing itself to postmodern trends in Europe sought to seek after past Iranian architecture in metaphorical form. Building diagonal walls on the external crust, creation of opaque spaces, exhibition of symbolism of the structure of the building (particularly in the commercial buildings), tendency towards breaking the total mass of the building and paying attention to vulgar metaphors are among the characteristics of such buildings (Furutan, 2006, p. 34).

Vilaei Talaei and Zarafshan Sports Complex in which formal tension has been associated with crust centered architecture

Vulgar Postmodernism

tendency towards postmodern architecture can be also seen in the mass construction with symmetric forms and colorful appearance with functional objective. This vulgar form of postmodern architecture is so popular in the Build-and-Sell-Real-Estate-Business (Bavar, 2009, p. 135).

Many of the residential buildings in Tehran like Kuh-e Nur High Rise and many other similar high rises in Elahyeh and Farmanyeh regions belong to this class

Postmodern Eclecticism

this trend was replaced in Iranian architecture in the early 1990s with a form of eclecticism influenced by western postmodernism. In fact, a number of Iranian architects sought to combine the elements of Iranian and western postmodern architecture in an eclectic fashion in order to create an architecture consistent with western trend which could be at the same time in line with traditionalist approaches (Dehbashi, 2006, p. 31).

buildings as the University of Allameh Dehkhoda in Qazvin (1992), Karaj Gymnasium of Visual Arts (1996) and Vanak Sports Complex (1994) are the distinguished examples of this trend

Fig. 24. Postmodern Trends in Architecture

Fig. 25. Book City of Arzhantin St.
(Moeini & Khoshbin, 2016)

Technological Approach

One of the approaches based on which numerous buildings have been built is the technological architecture approach. This approach emerged in west after technological developments in all areas including construction. Nonetheless, in Iran in most cases technology was used in an artificial trend only for commercial use. This approach was promoted during two presidential periods of Akbar Hashemi Rafsanjani in Islamic Republic of Iran.

TECH ARCHITECTURES AND ECOTECH ARCHITECTURE

The tech and eco-tech architecture were two main approaches of this period based on which numerous buildings were constructed. This approach emerged in west after technological developments in the field of construction. However, it is used mostly for commercial causes in Iran. The features of eco-tech styles in this era can be outlined as follows (Qobadian, 2013, p. 365): a. exhibition of structure, facilities and circulative system; b. transparency of the physical body and elements of the building; c. application of bright steel or concrete materials in building surfaces; d. use of elastic light elements; e. refusal of using historical symbols and ornaments.

Fundamental Technological Approach: In some of these buildings, technology has been used in the most internal aspects of the project and become closer to the origin of this style of architecture (Fig. 26 & 27. Mellat Cinema). Limited technological possibilities in Iran have brought about numerous restrictions for the architects of this style (Vemir, 2005).

Superficial Technological Approach

In most buildings which are recognized as works of technological architecture, the spatial structure of the plan is of a modern, practical and sometimes even historical structure and the façade has been technologically decorated with the metal pipes, rafter and structural appearances (Ahmadi, 2004).

Figs. 26 & 27. Mellat Cinema, Supreme Audit Court
(Moeini & Khoshbin, 2016)

Although almost four decades have passed since the emergence of tech-architecture, there are a few buildings which are constructed in this style in Iran; most of which are located in Tehran. The reason for this could have been the lack of necessary technologies for construction of such buildings. The other reason would be the high cost of construction and maintenance of such buildings. The first tech-style building in Iran is Farahabad-Takhti Sports Complex which is located in Qasr-e Firuzeh, southeast Tehran. This building is the first complex in which extensive networks of cables have been used (Bavar, 2009, p. 140).

Ecological Architecture

The features of ecological architecture in Iran in this era are as follows (Qobadian, 2013, p. 377): a. Use of ecology for providing the conditions of human welfare inside the building; b. Reduction of energy consumption particularly fossil energy inside the building; c. Reduction of pollution and waste in environment; d. Updating traditional elements and functions for providing human welfare; e. Use of green and optimized materials, technology and facilities.

In these nostalgic buildings, which look alike Pahlavi II buildings, a type of traditional materials like brick, timber or adobe are used in these buildings. The difference between these buildings after the era of Islamic Revolution and before this period lies in the use of elements and patterns of Iranian architecture associated with the manifestations of Islamic architecture of Iran. Elahyeh residential complex designed by Behruz Bayat, using the idea of central yard and adobe materials along with wooden cornices, is one of the examples of such approach.

Deconstructionist Approach

Following the emergence of western architectural approaches in the final years of this era, the philosophical-theoretical approaches were discussed in architecture more than anything else. In Iran, in line with modern currents of architecture and other approaches, this key discourse was reflected in the translation of a number of books or articles as well as a number of architectural projects whether in professional environment or in academic environments.

Fig. 28. Azhe Nab Management Building, Designed by Rashid Khumarlu
(Moeini & Khoshbin, 2016)

Fig. 29. Presidential Office of Technological Cooperation
(Shojaei, 2015)

The features of this style in Iran can be outlined as follows (Qobadian, 2013, p. 387): a. creation of the sense of suspension, instability and dynamicity; b. use of diagonal and curved surfaces; c. juxtaposition of irrelevant symbols; d. concomitance of suspended masses and surfaces in an artistic combination.

The general architectural movement of this era could be evaluated in two domains of tendency towards Iranian architecture and tendency towards global architecture. The architecture of this era has moved in the direction of reaching Iranian architectural ideas through exempalarist, conceptualist, and ecological ideas.

Substantive Deconstructionist Approach: Deconstructionist approach can be in the form of deconstruction of all surfaces of the building including the totality of mass, spatial structure and façade (Dastvar & Ahmadi, 2016).

Deconstructionist architecture can also be seen in the form of features of diagonal walls on external crust, curved surfaces (vague and edged spaces), symbolic exhibition of wonders of structure, and tendency towards analysis of compartmentalization of the masses (picture, Zafaranyah Multipurpose Complex). It is also observable in tendency towards use of tension in façade (Wimmer, & Dominick, 2005).

Superficial Deconstructionist Approach: In this type of buildings the spatial structure is functionalist and completely modern and the façade has a deconstructionist form and the tendency is towards deconstructionist architecture just in external form. In fact, in this method a modern cube is depicted and then with certain structural changes like making diagonal surfaces and using different colors in materials, the façade is deconstructed in a modern form.
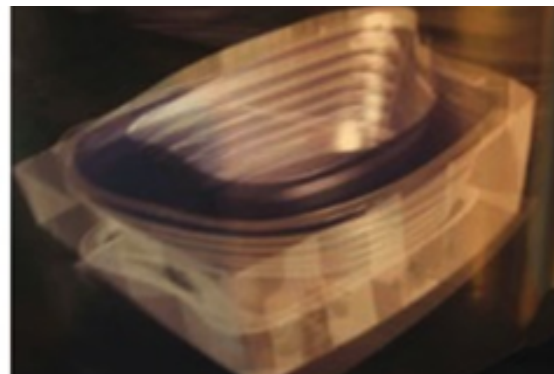
Fig. 30. Zafaranyah Multipurpose Complex
(Country Festival of Building Engineering, 1998)

ANALYSIS OF RESEARCH DATA

The research has been conducted in four stages:
First stage: definition of creativity and the derived indices, i.e., a. value exhibition; b. creation of ambiguity; c. creation of tension; d. formal transformation and deconstruction; e. use of tangible and intangible metaphors; f. use of paradox and metaphysics. In this stage of research with insistence on the background of existing definition we sought to recognize the main factors of these six indices. The evaluation criteria of buildings in next stage were determined based on these six indices. Second stage: a)

selection of case samples and their descriptions; these samples are selected is a completely conscious manner based on works of the award winning architectural works by Memar magazine as the most prominent architectural award of Iran; b) separate definition of the indices of creativity for studying the case samples. Third stage: analysis of relevant data of creativity based on the table 1; fourth stage: conclusion and demonstration of research hypotheses based on the data collected in previous stages.

Operational Variables

According to Piaget, "creativity is indeed the preservation of part of one's childhood". A child's thoughts are creative because the child acquires the solutions of his own problems not out of experience or further information rather he solves his problems based on creative methods (Gavin, 1990). Creativity, like every other productive process which results in an unprecedented product, has its own techniques and requires certain preparations. These techniques lead to the emergence of a creative form; insofar as one needs to take it into account that: "In the history of architecture rarely any factor is invented that changes the method of acquisition of form" (Naderi & Ardalani, 2018). These factors include: 1. value exhibition; 2. creation of ambiguity; 3. creation of tension; 4. formal transformation and deconstruction; 5. Use of tangible and intangible metaphors; 6. use of paradox and metaphysics"

Table 1. Factors of Creativity in the Process of Architectural Design (Research data based on Jawdat, 1999; Antoniades, 2002; Afshar Naderi, 2005)

	Operational Variables	
Value Exhibition	Creation of Ambiguity	Creation of Tension
Formal Transformation and Deconstruction	Use of tangible and intangible metaphors	Use of paradox and metaphysics

The operational definition of these variables are as follows:

a. Value exhibition: this variable is composed of factors such as contradiction, order and disorder, full and empty, light and heavy, natural and artificeal, new and old; 1. Contradiction: This variable is seen in Ziggurats of Mesopotamia that seem like artificial mountains in a plain. Minarets in Iran plateau break the horizon line of wilderness and bright and dark colors in the carpets and clothes of people are in contradiction with the surrounding nature. 2. Order and disorder: a kind of disorder is brought into the order so that a new form is created; the deconstructionist architects as well as the modern aesthetics make use of this method (Afshar Naderi, 2005, p.6); 3. Full and empty: another method for creation of contradiction and value exhibition is the use of full and empty spaces; 4. Light and heavy: another type of value exhibition is the value of light and heavy contradiction in architectural form; 5. Natural versus artificial: this form of contradiction is made by materials; i.e. by using concrete and brick and so on and as well as the use of artificial materials like wood and stone with its natural form; 6. New and old: this method was used first in the restoration of historical works (Naderi, 2018, p. 10). We defined creativity as mental process. This process in the mind of a creative architect necessarily needs two prerequisites, i.e., imagination and conception (Salahi & Asefi, 2015).

b. "Creation of ambiguity": The opposite of value exhibition is creation of ambiguity. By setting similar materials alongside each other with a little difference we can show this state in the form of exhibition" (Afshar Naderi, 2005, p. 12).

c. "Creation of tension": Complicated buildings like cable forms and structures with rafters suggest the beholder that they do not follow the gravity laws. This was done by vaulting which represented heavy volumes with very light masses (Gavin, 1990, p. 12).

d. "Formal transformation and deconstruction": this method is based on separation and reunion of the forms that result in the creation of new forms according to the architect's capability. This method is also called "growth of form" (Antoniades, 2006, p. 127).

e. "Tangible and Intangible Metaphors": Picture of an idea in an architect's mind which can be the background of the creation of a creative form is under the influence of concepts such as individuality, culture, tradition and material and visual features which are described as metaphors. If this metaphor includes human states it will be intangible. However, if it includes visual or material features the metaphor will be tangible (Gavin, 1990, p. 12).

f. Paradox and Metaphysics: In this method the architect uses contradicted features in order to reach an innovative idea based on the main form. This is why this form of contradiction is called paradox (Antoniades, 2006, p. 109).

RESEARCH FINDINGS

Mellat Cinematic Elysium; this building is located in Valiasr Street alongside Tehran Mellat Park in a green and peaceful space. The project details are as follows: a. Consulting Group: Harakat Sayyal Consulting Company; b. Architect: Catherine Speridonov, Reza Daneshmir; c. Design assistants: Bizhan Vaziri, Arash Jawadi, Amir Badiei, Akram Lolaei, Elaheh Najafi, Iman Nedaei, Mohammad Mehrabani, Majid Ahmadi, Iman Daneshwarnezhad; d. Structure Consult: Hamid Parizi (Noandishan Sakhteman Ltd.); e. Mechanical facilities consult: Badri Rahimzadeh; f. Electrical facilities consult: Amir Shabanzadeh; g. Structure and building contractor: Nikan Niru Company; h. Facilities contractor: Arkan Arzesh; I. Total area: 15000 square meters (land area: 6000 square meters).

Sharifiha House

The key feature of this project is flexibility and indeterminateness; insofar as by moving the rotating rooms the quality of internal spaces and external form are continuously changing and the project turns open and close – introversion and extraversion of the project. These changes in various seasons or functional scenarios can be used. Sharifiha House has been designed in 7 stores and the underground store has been allocated to sports and recreational activities, the ground floor is a parking lot and janitorial area, first and second floors are for public affairs

of the family and finally the third and fourth floors are for private spaces. The use of the spaces can provide different possibilities for the residents. For example, guest rooms in the second floor can have different functions with the presence or absence of the guest or the workrooms and breakfast eating space (rotating rooms in third and first floors) can change according to the needs of the residents.

Domicile for Orphan Girls

In 1991 Maleki donated his father's land which was located in a prestigious region for construction of a medical center in order to pursue his own advocacy career. After 19 years, in 2010, he was unhappy of the project's delay and canceled his donation and referred to ZAV Consulting Group and asked the group to provide their proposals for the application of this land. The ZCG offered him to build a domicile for orphans in this area because this prestigious region could give prestige to people who do not have it.

Nazhvan Residential Garden in Isfahan

Some of the details of this work are as follows. Location: Iran, Isfahan, Nazhvan; Architect: Elham Geramizadeh, Ehsan Hosseini; Design Team: Mohammad Hossein Monshei; Year: 2011- 2013; Site Area: 450 square meters; Building Area: 1300 square meters; Structure Consult: Engineer Mohammad Najafi; Mechanical Consult: Engineer Hamidi; Electricity Consult: Engineer Khosh Nazar.

Table 2. Mellat Cinematic Elysium; Work analysis based on Creativity Factors (Criterion of Emergence of Variable/factor of Creativity): from Minimum* to Maximum *

Ratio Scale		Factor	Picture	Work
***	Contradiction	Value	Prize of Architect Award 2008 Mellat Cinematic Elysium; Harakat Sayyal Consulting Company; Cathrine Spidonov and Reza Daneshmir; Taskmaster: Tehran Municipality	Mellat Cinematic Elysium
*****	Order and Disorder			
*****	Full and Empty			
*****	Light and Heavy			
***	Natural and Artificial			
*	New and Old			
**		Capacity for Ambiguity		
*****		Capacity for Tension		
****		Capacity for Formal Transformation		
***		Tangible and Intangible Metaphors		
*****		Paradox and Metaphysics		

(For completing this table, the authors used the interviews with the architects who criticized "Mellat Cinematic Elasyium" in Journal of Urbanization Studies, Summer 2010, pp. 70-81)

Table 3. Sharifiha House; Work Analysis based on Creativity Factors (Criterion of Emergence of Variable/factor of Creativity): from Minimum * to Maximum *

Ratio Scale		Factor	Picture	Work
*	Contradiction	Value		Sharifiha House
*	Order and Disorder			
*****	Full and Empty			
*****	Light and Heavy			
*****	Natural and Artificial			
*	New and Old			
**		Capacity for Ambiguity	Awardee of Architect Award, 2013 Sharifiha House, Daftar Digar, Alireza Taghabuni	
****		Capacity for Tension		
***		Capacity for Formal Transformation		
**		Tangible and Intangible Metaphors		
****		Paradox and Metaphysics		

(For completing the following table, the authors used the interviews of the architect published on Miandisham website in summer 2014)

Table 4. Domicile for Orphan Girls; Work Analysis based on Creativity Factors (Criterion of Emergence of Variable/factor of Creativity): from Minimum * to Maximum *

Ratio Scale		Factor	Picture	Work
*****	Contradiction	Value		
*****	Order and Disorder			
**	Full and Empty			
**	Light and Heavy			
***	Natural and Artificial			
*****	New and Old			
**		Capacity for Ambiguity	Awardee of Architect Award, 2014 Domicile for Orphan Girls, ZAV, Mohammad Reza Qodusi, Parsa Ardam, Fatimah Rezaei	
*		Capacity for Tension		
**		Capacity for Formal Transformation		
*****		Tangible and Intangible Metaphors		
****		Paradox and Metaphysics		

(For completing the following table, the authors used the interviews with the architect published on Miandisham website in summer 2014)

Table 5. Nazhvan Residential Garden; Work analysis based on Creativity Factors (Criterion of Emergence of Variable/factor of Creativity): from Minimum * to Maximum *

Ratio Scale		Factor	Picture	work
***	Contradiction	Value		
**	Order and Disorder			
**	Full and Empty			
**	Light and Heavy			
***	Natural and Artificial			
**	New and Old			
*		Capacity for Ambiguity	Awardee of Architect Award 2013; Nazhvan Residential Garden, Farayand-e Manteqi CG, Ehsan Hosseini, Elham Germizadeh	Nazhvan Residential Garden
*		Capacity for Tension		
*		Capacity for Formal Transformation		
***		Tangible and Intangible Metaphors		
**		Paradox and Metaphysics		

(For completing the following table, the authors used Khat-e Memar Website)

A table of relative and cumulative frequencies and the significance of their relationship are presented.

Table 6. Frequency, Relative Frequency, Rate of Relative Frequency; Rate of Evolution; (Research Findings (Rate of Evolution Refers to the Relation between Acquired Scores and the Total Scores. Since Ambiguity Contradicts Value, then with 10 Factors of 5 Scores the Maximum Score 50 has been Reached))

	Frequency	Rate of Evolution	Rate of Frequency	Rank
Contradiction	12	%24	%10	4
Order and disorder	13	%26	%11	3
Full and empty	14	%28	%12	2
Light and heavy	14	%28	%12	2
Natural and artificial	14	%28	%12	2
New and old	9	%18	%7	7
Capacity for ambiguity	7	%14	%6	8
Capacity for tension	11	%22	%9	5
Capacity for formal transformation and deconstruction	10	%20	%8	6
Tangible and intangible metaphors	13	%26	%11	3
Paradox and metaphysics	15	%30	%13	1
Cumulative total	118	------------	------------	--------

Based on the above table, it can be declared that the factor of paradox and metaphysics is of first rank in the process of creative design. After that, the factors of "natural and artificial, light and heavy and full and empty" are of the second rank. Meanwhile, the factor of new and old is of the lowest rank. Given the definitions of operational variables in the architecture of creative works after the Islamic Revolution, this analysis shows that metaphysics have played a key role in the event of perception of environment, while the factors of new

and old were more related to the combination of old buildings and forms in old regions with modern forms and new materials. The reason for this could have been the insufficient consideration of the architects to use creativity in the complementary design or restoration of old buildings in historical regions and old houses.

CONCLUSION

In the era after Islamic Revolution various architects provided innovative architectural designs taking advantage of different themes which are replete of innovation and creativity in architecture. Meanwhile, taking advantage of the notions of traditional architecture in Iran along with allusion to various architectural styles after Islamic Revolution led to the emergence of a new type of application of traditional themes in architecture. Moreover, given various styles that emerged after Islamic Revolution in terms of form (architectural form and relevant masses), new materials and structural technologies, and the existing facilities and backgrounds, innovative architectural designs emerged after Islamic Revolution. The following table presents the features of architecture after Islamic Revolution.

Table 7. Features of the Buildings after Islamic Revolution

Era	Architectural and Design-centered Features
Derivation from Historical Architecture	laminated turquoise tiles with Arabesque figures as well as Khataei and Chinese Girih; the roof is often convex or dome shaped; structure with load-bearing wall or steel and traditional skeleton and often with façades in Isfahan school of style; the plans of religious buildings are introversive; plan of building with modern function is in extroversive form; brick façade along with tile ornaments; attention to concepts and symbols of architecture in Islamic era in Iran; Dominant façade and symbols in plans in Isfahan school of style; façade with brick and laminated turquoise tiles; use of Arabesque ornaments and Chinese Girih; Application of modern technology; Structure of the building based on steel or concrete skeleton
Modern Architecture	Not using traditional ornaments; façade with stone, glass, steel plates and sometimes in rectangular form; use of modern materials, structure and technology; form based on Euclidean Geometry – often in the form of cuboids; use of straight surfaces and lines; flat roof; exhibition of modern materials in façade like concrete, steel and extensive glass
Postmodern Architecture	use of traditional materials in façade like brick, tile and wood as well as traditional ornaments; use of modern materials in façade like stone, concrete and steel; application of modern technologies and facilities; updating Isfahan and Tehran school of style; combination of ancient architecture and modern architecture
Technological Architecture	exhibition of structure and rotating facilities and system; making the body and elements of the building transparent; application of bright metal materials or concrete in surfaces of building; use of light elements; not using historical symbols or ornaments
Ecological Approach	Use of ecology for providing the conditions of human welfare inside the building; Reduction of energy use particularly fossil energy in building; reduction of production of pollution and waste in the environment; Updating the traditional elements and functions for providing human comfort; Use of materials, technology and green and optimized facilities.
Deconstructionist Architecture	creation of the sense of suspension, instability and dynamicity; use of diagonal and curved surfaces and lines; juxtaposition of irrelevant symbols; overlap of suspended masses and surfaces in an artistic combination
Folding Architecture	Influence of surrounding and internal conditions of the project on the form of building; use of curved and flexible lines; insistence on horizontal lines and divisions in façade, fluidity of body, surfaces and lines; soft and flexible movement of body of the building in the site.

The results of analyses of the works under study show that the highest scores in the field of creativity indices are related to Mellat Cinematic Elysium. Sharifiha House has earned highest scores in the of index of full and empty, light and heavy, natural and artificial and paradox. The Domicile for Orphan Girls has earned highest scores in the indices of order and disorder, new and old as well as tangible and intangible metaphors. Moreover, one can say that there is no significant relationship between the effectiveness of these indices in the totality of works and the process of their selection as creative works; it seems that the referees in the competition did not have any fixed

criteria. Furthermore, it was concluded that ambiguity in the process of design has been raised versus value creation insofar as the works with average high scores in exhibition of value a. contradiction, b. order and disorder, c. full and empty, d. light and heavy, e. natural and artificial, f. new and old has earned lower scores. Also, paradox and metaphysics own the highest rank while the factor of new and old has the lowest average. This analysis shows that given the definition of operational variables in the architecture of creative works after Islamic Revolution conceptual metaphysics has played a key role in the event of environmental perceptional. Moreover, the factors of new and old which is related to the combination of old buildings and forms in old contexts with modern forms and materials is not observed. This is perhaps due to the insufficient consideration of architects to using creativity in design or restoration of old buildings in historical textures and old houses.

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