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"Idea-Product" Correlation in Iranian Traditional Architecture Evolutionary Construction (The Architecture of Caravanserai)*

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ABSTRACT

In today's modern era, due to the influence of Platonic and Neoplatonic idea-centered achievements, the concept of idea has become of great importance, and greatly attracted the focus of education, profession, and research. However, it is found very well that the idea cannot be assessed alone and it is required to assess the idea and its evolution and processing along with the result and product. This study is applied explanatory-analytical design research which aims to assess the "idea-product" correlation in the evolutionary construction process in historical caravanserais of Iran as a type of old buildings with Iranian architecture and appraise the realization of the idea in the final product according to the opinions of experts. Based on this, the approach governing this research is "applied" and the research has an "explanatory-analytical" nature. To this end, the qualitative content analysis is applied to investigated the evolution of Iran's historical caravanserais. The results indicate that in Iran's historical caravanserais, the idea indicators have been realized in the product indicators to a large extent so that the "material and artificial nature" indicator was realized in the form of the "naturalism and climate-ism" indicators, the "culture" indicator in the form of the "contextualism" indicator, the "planning" and "technical matters and construction method" indicators in the form of the "knowledge-base" indicator, the "psychology and spiritual needs" and "philosophy" indicators in the form of the "semantic-ism" indicator, the "semiotics" indicator in the form of the "symbolism" indicator, the "performance and economic matters" indicator in the form of the "functionalism" indicator, and the "social needs and participation" indicator in the form of the "collectivism" indicator.

Keywords: Design Research, Idea, Product, Evolutionary Construction, Qualitative Content Analysis, Historical Caravanserais of Iran.

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1. INTRODUCTION

Architecture is a platform for manifesting spaces where humans exist throughout history. Its ability to create valuable spaces has been continuously proved and it has helped to reveal the meanings that potentially existed in the environment (Mirghasemi & Bazrafkan, 2014).

In contemporary designs, despite many advantages such as creativity, complexity, beauty, contextual proportionality, and energy saving, there is a great lack that causes closeness and sense of belonging between the architectural work and the audience, that existed in the past, to be less perceived. This problem seems to be arisen due to the divergence and uncorrelation between the idea and the product in the post-modern era.

The production process of a product object is easy to understand, but it is not easy to predict the process of turning an idea into a product. The history of turning ideas into products goes back to the time of living in caves. From those years until today, the initial design idea is formed in the designer's mind when facing the design problem. It is tested many times, and evolves in its unique space and time contexts. In the past, based on the recognition of types and by modelling them, the link between the present and the past was created and turned into a chain of interconnected members that evolved throughout history (Cataldi, 1977).

On the other hand, the relationship between architecture, nature and humans is of great importance, and disregarding it may lead to damage to nature, architecture, and thereby humans. How to record, perceive, and process the information received from nature depends on the human mind. Nature and the environment transmit the information related to the construction to the unconscious mind of the architect. In the past, the unconscious mind was an effective source for the architect's activities and was known as an integrating factor. Despite the presence of simple and primitive tools, the architects were able to establish an unbreakable link between the two basic elements of idea and product through their great perseverance and skill along with their unconscious mind.

In the present study, it has been attempted to assess the "idea-product" correlation in the evolutionary construction process in the traditional Iranian architecture of caravanserais using qualitative content analysis. To this end, the variables related to the idea and the product were investigated in relation to the three elements of human, nature, and architecture. In the field of ideation, the variables include artificial nature, culture, planning and policy making, psychology (in relation to the "human" element), material nature and aesthetics (in relation to the "nature" element), philosophy and semiotics (in relation to the "architecture" element. In the field of product production, the variables include spiritual needs, performance, social needs, planning, participation, and economic matters (in relation to the "human" element), natural environment and climatic conditions (in relation to the "nature" element) and technical matters and construction method (in relation to the "architecture" element).

2. THEORETICAL FOUNDATIONS

To identify and analyze the variables of design, this section discusses the concepts of idea, typology of idea in architecture, the degree of idea-product correlation in experts' opinions, design process, idea in design, design context, design subject, designer-oriented factors, and the human-environment relationship.

2.1. Concepts of Idea

Idea means to see and visible being. The idea was introduced to philosophy for the first time by Plato. According to Plato, the applications of ideas are: a) the appurtenances of intellect versus the appurtenances of sensory perception b) real beings versus the perceptual appurtenances (sense) c) being eternal and everlasting versus the perishable world of changeable beings (Berkun, 2016). According to Descartes, there are three kinds of idea: innate, adventitious, and factitious (Lotfi, 2004). According to John Locke, idea means objectivity that ultimately comes from reflection and sensation (Shahbazi Mahmoodabadi & Mollayousefi, 2019). Spinoza considers "idea" to be a mental form that the ego, in the sense that it is a perceptible being, is its illustration (Upham Pope, 2009). Hume divides human perception into two categories: impressions, which are immediate data of experience, and ideas, which are derived from impressions (Nadimi & Shariat Rad, 2011). Idea (eidos in the Greek language), means something that is seen or intuited. The idea is to start the process of generation and production (Bazrafkan, 2015, p. 64).

2.2. Typology of Ideas in Architecture

Considering the main feature of the idea, which represents the centrality of the design, and the fact that everyone can have different perceptions of different topics, in architecture, idea, with different interpretations, refers to what idea the design will be proceeded based on and what basis the work process will be based on. The types of ideas in architecture can be as follows:

1. Analogical idea: It refers to the modeling of the features of other designs that can help the designer in finding ideas.
2. Metaphorical or allegorical idea: with an abstract and extractive view, it means to be inspired by a specific object or event to emphasize its outstanding characteristic, i.e. you are trying to induce a certain concept by taking inspiration from something and designing according to it. The allegorical dimension of this concept also refers to the fact that you can

apply the similarity between your design and an object to express the concept intended by bringing your design closer to the characteristics of that object.
3. Quintessential idea: This perception of the idea in architecture is known as a meta-program, implying that not only the building design and the collocation of the themes of the program and design are important, but the essence and spirit of the building are also very important in the design.
4. Ideal idea: this concept emphasizes absolute values to stress the idea and values intended by the designer, meaning that he/she can implement his perfectionism (Castano Perea, 2017).

2.3. The Degree of Idea-Product correlation in Experts' Opinions

In general, experts have diverse and different opinions on the objectivity and subjectivity of the idea and the process of turning idea into a product, as categorized in Table 1.

Table 1. The Degree of Idea-Product correlation in the Experts' Opinions

Expert	The Product is the Objective Materialization of the Idea	The Product is the Imperfect Materialization of the Idea	The idea is just the Mental Materialization of the Product
Plato	■		
Aristotle	■		
Thomas Aquinas		■	
Bride Kart		■	
Louis Kahn		■	
Berwyn			■
Robert		■	
Hamilton			■
Kant	■		
Shoumi		■	
Foucault	■		
Spinoza			■

2.4. Design Process

The design process of architecture is a set of activities connecting the goal and the solution. It is a rational and purposeful chain of a number of activities. These phased activities, each of which has its own character and results, are as follows:

2.4.1. Idea in Design

The initial design idea is a reflection of how the designer face with the design problem in his/her mind, and it isn't often obvious. In a research, by analyzing the information obtained from the architects' statements, three main sources of architects' ideation when dealing with the design problem were identified as follows: "context", "subject", and "designer-oriented factors" (Nadimi & Shariat Rad, 2011).

2.4.2. Design Context

The design context is not limited to its material features and includes the special features of the place, how to use them in the design (Mirmoqtadaei, 2004, 35), and historical, social, cultural, and economic features (Nadimi & Shariatrad, 2013). In other words, the features of the ground are specific to the limited area for the design and change from one ground to another. In the identification and examination of the main variables affecting the product and the design process, the design context can be defined as all the factors related to the design problem. So, it provides presuppositions and facts for the design process to define the design problem. Accordingly, the design context is divided into four categories including environmental context, human context, socio-political context, and economic context (Eslami & Dorari Jabarooti, 2012).
According to the abovementioned definitions, the environmental context can be defined as all the material, spatial, and functional factors that affect architectural designs in different scales and contexts, including factors such as adjacency, surrounding uses, climate, concepts, and signs.

2.4.3. Design Subject

The design subject includes all those things that enter the design situation. It is different from the design context. In other words, the subject includes all the information proposed by the problem. According to Shawn, design is a kind of construction. It is a series of predicted movements and discovered consequences, which sometimes lead to the revision of the original order (Nadimi and Shariat Rad, 2011).

2.4.4. Designer-Oriented Factors

After facing the problem, an idea comes to the designer's mind, that is not a direct reflection of any of the factors of the problem. Basically, the idea or the general solution can originate from the mental backgrounds and creativity of the designer and sometimes, it can be a suitable solution to the problem, and sometimes, it can be in conflict with the components of the problem and it is left out (Nadimi & Shariat Rad, 2011). Accordingly, it can be said that the designer-oriented factors are a set of factors that have been brought in the design situation by the designer and along with the design problem, are considered a source for the designer's ideation. According to Eslami and Dorari Jabarooti (2012), it is necessity to make changes in design goals and programs, and designers must identify ways to interact with these changes. So, in the field of architecture, if variables are classified into two main categories of factors and features, by the definition, surrounding factors are variables (Reymen et al., 2006).

The identity formed by the designer is changed in the assessment process under the influence of factors, features, and values to become the final identity suitable for them and to establish optimal interaction with the context and its conditions. Values, sometimes as factors and sometimes as features, influence the design identity. So, the design subjects are classified into aesthetic, cognitive, functional, semantic, structural, economic, and social subjects (Eslami & Dorari Jabarooti, 2013).

Examining all these categorizations makes it possible to provide analysis and classification that are considered variables of analysis and recognition as variables of design and assessment.

2.5. Human and Environment

The "built environment" is a material part of the urban environment and it is closely related to the social environment. Built environments basically include all things created, changed, adjusted, transformed, and preserved by humans. In general, products and processes created by humans in the environment are called built environments (Choudhary & Adane, 2012).

The mutual relationships between "human and the environment" and the "relationships between the components of the environment" are important and fundamental fields that are understood and recognized based on the human-being's cultural and social aspects by them. (Dideban, Pourdihemi, & Rismanchian, 2012).

According to the abovementioned, it can be said that in the present research, the variables related to the idea and the product are related to the three elements of human, nature, and architecture. In the field of ideation, these variables include artificial nature, culture, planning and policy-making, psychology, material nature and aesthetics, philosophy, worldview, and semiotics, and in the field of production, the variable include spiritual needs, performance, social needs, planning, participation and economic matters, natural environment and climatic conditions, and technical matters and construction method.

3. METHODOLOGY

In this section, first, the indicators and variables related to the idea and the product were extracted and the correlation between them was identified. Next, the extracted indicators were converted into measurable indicators in architecture and their sub-indicator were explained using theoretical studies. After explaining the final research indicators and sub-indicators, using the qualitative content analysis, the indicators and sub-indicators were coded to examine the evolution of case studies. After the detailed introduction of Iran's traditional caravanserais and their evolution as case studies, they were analyzed in terms of the coded indicators.

3.1. Qualitative Content Analysis Approach

Considering the steps used in each of the content analysis methods, the conventional content analysis method was used in the present study. Conventional content analysis is usually used in a research design aiming to describe a phenomenon. This type of research design is often suitable when there are limited existing theories or research literature about the phenomenon studied. Using this approach, based on their understanding of the text under study, the researchers start writing the initial analysis and this doing continues until the backgrounds for the emergence of codes are prepared. This often results in the emergence of codes from the text and then, the codes are categorized based on their similarities and differences. Depending on the research objective, researchers decide to establish relationships between categories and subcategories based on mutual agreement, subject background, or hierarchies among the data. The distinct advantage of qualitative content analysis based on the conventional approach is to obtain direct and clear information from the study, without providing an opinion on the category or predetermined theories. However, this method has also been criticized. For example, one can mention its weakness in creating a perfect understanding of

the content of the text, which results in the lack of identification of the main categories and may not provide a true expression of the data. The steps of the conventional content analysis approach are presented in Figure 1.

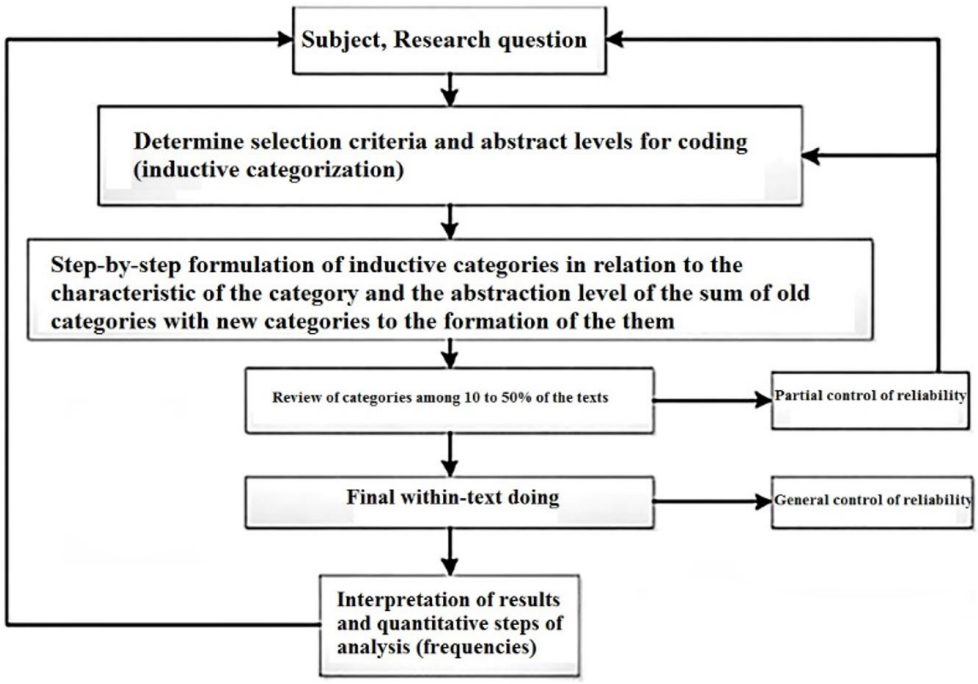


Fig. 1. Steps of Conventional Content Analysis Approach

To analyze the case studies, it is required to define a base unit. Therefore, the indicators related to the idea and product were defined based on architectural principles so that they can be examined in the case study. These indicators and variables were extracted based on theoretical studies conducted in the form of research background and research literature. In these theoretical studies, the studies of 9 people, who were experts in the field of the research topic, were emphasized, and the indicators were documented and verified based on the opinions of these experts. Accordingly, since the extracted variables must be measurable in architectural samples, the variables were converted into architectural indicators. In the following, "artificial and material nature" indicator was considered to be aligned with "naturalism and climate-ism" indicators, "culture" indicator with "contextualism" indicator, "planning" indicator with "knowledge-based" indicator, "psychology and spiritual needs" and "philosophy and worldview" indicators with "semantic-ism" indicator, "semiotics" indicator with "symbolism" indicator, "performance and economic matters" indicator with "functionalism" indicator, "social needs and participation" indicator with "collectivism" indicator, and "technical affairs and construction method" indicator with "knowledge-base" indicator. To validate the final indicators, Table 1 shows the documented indicators of "idea and product" in architecture. Research theorists have proposed and implemented various strategies to assess validity and reliability of qualitative research. One of the most widely used methods is the triangulation method. Triangulation is a suitable approach to research improvement and evaluation, the initial idea of which was proposed in the early 1960s. In this approach, the combination of different quantitative and qualitative methods is used in the research process (Madani Boroujeni & Nasr, 2009).
In the present study, the triangulation of data was used to collect and analyze data. The data were collected using library study, case study, observation, and questionnaire. Next, they were analyzed by reasoning and interpretive and statistical analyses. Figure2 introduce idea-product realization assessment indicators in architectural works obtained in the present study.

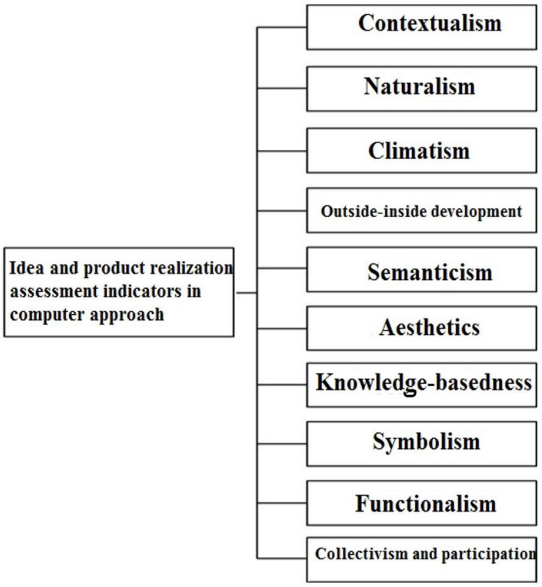


Fig. 2. Idea-Product Realization Assessment in the Computer Approach

Table 2. Indicators and Sub-Indices for Assessing the Idea and Product in Case Studies

Indicators	Idea and Product Indicators in Case Studies	Sub-Indicators
Contextualism	One of the traditional Iranian architectural customs is the reuse of buildings (Pimia, 2006, pp. 162-163). In avoidance of inefficiency, it is tried to achieve maximum efficiency for users (Naghizadeh, 2002, p. 43).	Physical: Texture, type and color of the materials, observance of the hierarchy, scale and building density
	Contextualism seeks to establish more connections between the building and the context in all dimensions and emphasizes the creation of spaces and places related to their contexts and histories (Gharedaghi Tirabadi, 2013, p. 15).	Historical: respect for traditions, use of symbols
	People give meaning to their environment through culture as a set of common values, beliefs, and worldview and turn empty space into a place (Rapoport, 1987).	Sociocultural: use of culture, place identity, creation of socio-cultural interactions
Climatism	Climate is one of the main pillars of the natural environment, which has a great influence on the shape, form, and architecture of the region, and accordingly, the architectural form of each place is organized with the weather and climate conditions of that place (Memarian, 1987, p. 8).	Attention to the site and water, light and natural ventilation, climate-compatible architecture
Naturalism	Designing based on the dos and don'ts of nature and the general system that governs it is a function of the understanding of man and the universe (Bamanian, 2007, p. 6).	Being in harmony with the neighboring environment, connection of space with nature, showing the universe in decorations, materials and building design
Outside-Inside Development	The journey from the surface to the depth of Iranian architecture makes the matter get away from its appearance and get closer to its essence and nature (Necipoglu, 2000). In the universe, beauty is not unidimensional and based on levels of existence, it includes various levels from surface to depth, from material beauty to rational beauty, from celestial beauty to superior beauty, a journey from outside to inside and from matter to meaning (Khorsand & Noqrehkar, 2018, 17).	Considering human-centeredness in building design, using unifying and calming geometry

Indicators	Idea and Product Indicators in Case Studies	Sub-Indicators
Semanticism	"Meaning" is the inner, innate, and non-formal aspect of everything and the carrier of the main intention (Amid, 1992). Paying attention to the symbolic aspects of space and architectural forms to reach meanings, understanding the meanings latent in the appearance and using the sources of religious culture and mystical and philosophical texts are the characteristics of semanticism (Safaeipour, 2007, p. 2). The universe is the manifestation of God's attributes, and light is one of his beautiful attributes. "According to the principle of manifester's obedience to the manifested, the world is full of light, beauty, and proportion." (Balkhari, 2009, p. 395).	Form-function appropriateness, spatial hierarchy, link between architecture, light, and sky, presence of light in space, symbolism
Aesthetics	Beauty and sensory perception related to order and integrity, are known composition, temperance, congruity, balance, proportion, harmony, transparency, determination, and certainty, while having contrast and variety. Beauty is considered in human perception and no independent existence is assumed for it (Rikhtehgaran, 2005, p. 11). Aesthetic understanding is not possible with the senses alone and requires the use of flair, taste, and sensitivity (Henefling, 2001, p. 102).	Urban landscape, integration and density, adjacency, grandeur, hierarchy, physical integrity, simplicity, enclosure, diversity, visual proportions.
Knowledge-Basedness	Scripts, and arabesque traceries all are applied using the science of geometry and derive from it (Makvandi, 2014, 34). In the west, for the construction of a building, attention is paid to the module before anything. The module is a criterion for determining and observing the proportion between building components (Pirnia, 2008, p. 58).	Use of the proportions in the form, considering the process of planning and designing the idea-product creation
Symbolism	A symbol is a concept to make an image tangible and a mental content (Grutter, 2005, 510). A symbol is a whole that has a semantic and spiritually understandable meaning hidden in itself. Every symbol expresses a meaning beyond itself and provides a sense of belonging to a certain society. Since symbols are repeated in everyday life, they also induce a special sense of meaning and identity (Mozayyani, 1996).	Use of shapes and forms, emphasizing the meanings of natural and spiritual elements
Functionalism	Time and space needs are satisfied by architecture in any field (Aivazian, 1997, p. 2). The permanence of a phenomenon, in addition to its characteristics, influences the way it is treated in the following periods and also the surrounding conditions (Aivazian, 2006, p. 6). Permanence means "the timelessness of the work" that affects the user's mind and becomes eternal in his mind (Alexander, 2007, p. 8). Emphasis on permanent architecture is to satisfy time and place needs, pay attention to customs, meaning, and texture (Noqrehkar et al., 2009, p. 42).	Appropriateness of structure, function and materials with space, purposefulness of functions

After determining the criteria, indicators and sub-indices were coded and the final propositions were extracted. Next, the texts related to the evolution of caravanserais were reviewed to perform content analysis.

Table 3. Coding of Research Indicators and Sub-Indicators

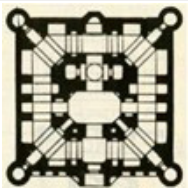
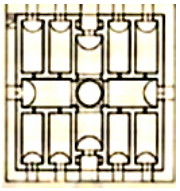
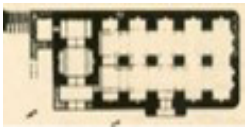
Indicators	Sub-indicators
Contextualism (S_1)	Physical (S_{1-1}), historical (S_{1-2}), sociocultural (S_{1-3})
Climatism (S_2)	Respect for the site (S_{2-1}), respect for water (S_{2-2}), light and natural ventilation (S_{2-3}), climate-compatible architecture (S_{2-4})
Naturalism (S_3)	Being in harmony with the neighboring environment (S_{3-1}), connection of space with nature (S_{3-2}), showing the universe in decorations, materials and building design (S_{3-3})
Outside-Inside Development (S_4)	Considering human-centeredness in building design (S_{4-1}), using unifying and calming geometry (S_{4-2})

Indicators	Sub-Indicators
Semanticism (S_5)	Form-function appropriateness (S_{5-1}), spatial hierarchy (S_{5-2}), link between architecture (S_{5-3}), light, and sky, presence of light in space (S_{5-4}), symbolism (S_{5-5})
Aesthetics (S_6)	Urban landscape (S_{6-1}), integration and density (S_{6-2}), adjacency (S_{6-3}), grandeur (S_{6-4}), visual hierarchy (S_{6-5}), physical integrity (S_{6-6}), simplicity (S_{6-7}), enclosure (S_{6-8}), diversity (S_{6-9}), visual proportions (S_{6-10})
Knowledge-Basedness (S_7)	Use of the proportions in the form (S_{7-1}), considering the process of planning and designing the idea-product creation (S_{7-2})
Symbolism (S_8)	Use of symbolic shapes and forms (S_{8-1}), emphasizing the symbolic meanings of natural and spiritual elements (S_{8-2})
Functionalism (S_9)	Appropriateness of structure, function and materials with space (S_{9-1}), purposefulness of functions (S_{9-2})

3.2. Conceptual Typology of Iranian Caravanserais

Evidences in historic fabrics show that Iranian architects used concepts close to type and typology in the past. It seems that they used a series of models that represented a group in creating buildings of the same group (Memarian & Dehghan Tafti, 2018). A general matter that is true for all the ancient structures in Iran is the adaptation of the buildings to climatic factors in a way that there is a logical coexistence between them and optimal operation of nature. The type of materials, openings, and volume compression are of items that are in full compliance with the climatic conditions.

Table 4. Typology of Caravanserais

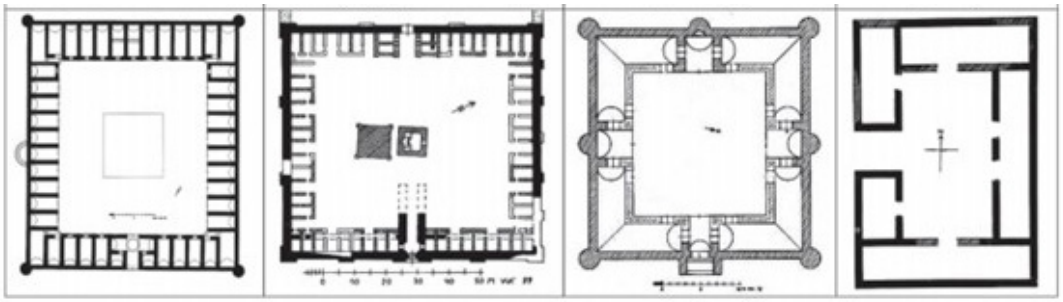
Type	Region	Mental Schemas and Dominant Ideas	Form-Body
1	Mountainous Area	Formation of a closed space based on the climate of the region and lack of construction of open spaces	
2	The Coast of the Persian Gulf	Middle open space, air current, ease of access due to high security	
3	The Southern Coast of the Caspian Sea	Safe space and creation of stable and temporary conditions	
4	The Center of Iran Plateau	A fixed resting place with favorable and stable living conditions, middle closed space	

3.3. Assessment of the "Idea-Product" correlation Indicators in the Evolutionary Construction Process of the Caravanserai

In various resources, caravanserais are mentioned as one of the successful types of Iranian architecture, and according to Pope (2009, 238), the alignment of function and structure is completely present in this building. Despite the fact that caravanserais were one of the essential and applied structures in Iran and had been greatly used by the past society, its forms and diversity have become less demolished in the era of evolution and progress (Nazari, 2006, p. 18). Accordingly, in the present study, considering the age and effectiveness of them, the caravanserais have been selected as case studies to study the research topic. The data were qualitatively analyzed through obtained components and data from relevant books, documents, and references.

3.3.1. Early Patterns in the pre- and Early Islamic Period

The history of the establishment of caravanserais in Iran dates back to the Achaemenid era. In the Achaemenid era, a building named "Postkhaneh (post offices)" was constructed to provide wide and fast communication between different parts of the country (Ayvazian, 1995, p. 584). At the end of the Sasanian era, two types of caravanserais were built in Iran: the first type was composed of a courtyard around which a wide corridor was built for cattle and the second type was composed of rectangular halls around the central courtyard (Kavian & Gholami, 2016).



Zanjiran Caravanserai | Bisotun Caravanserai; Kermanshah, Sasanid era, Early Islamic era | Shahneshin Rabat (Caravanserai); Isfahan, Early Islamic era | Gach Darvazeh; Fars, Pre-Islamic era

Fig. 3. Examples of Caravanserais Constructed in the Pre- and Early Islamic Era
(Kavian & Gholami, 2016)

3.3.2. The Openness of Rooms in the Corners of the Courtyard

In the early model of caravanserais, a narrow corridor was usually constructed between these rooms and the courtyard. To solve this problem, Iranian architects made the rooms in the corners of the courtyard bigger in some caravanserais from the beginning. The openness of the corners has provided architects with good possibilities for designing a wide space or special complex (Farshchi & Haji Zamani, 2018).

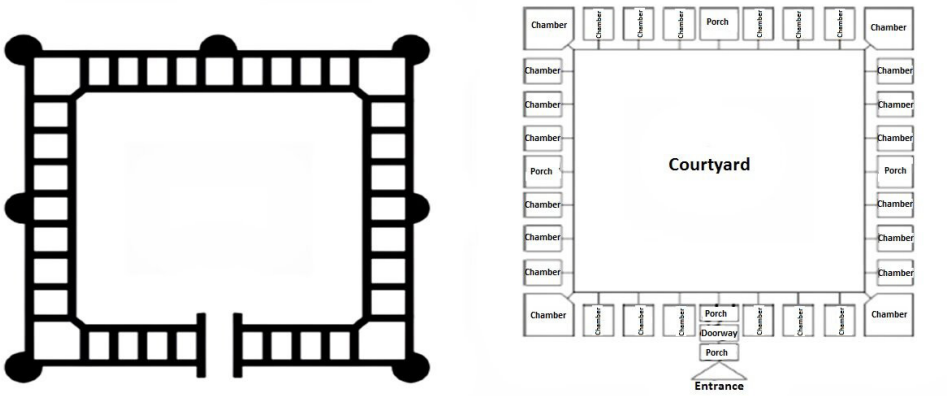


Fig. 4. Spatial Diagram Showing the Openness of the Rooms in the Corners of the Courtyard in the Plan of Seljuk Caravansaries
(Kavian & Gholami, 2016)

3.3.3. Designing Portico around the Courtyard

The construction of porticos in front of the chambers in the caravanserai is one of the changes made in the caravanserais and the frequency of which in Seljuk period indicates that it was common in that era. This structure led to the increased depth of the porches of caravanserais. One of the advantages of this design method is the possibility of ordering the messy view of the courtyard and providing shadows for those who traveled at night and rested in the rooms located in the courtyard during the day (Kavian & Gholami, 2016).

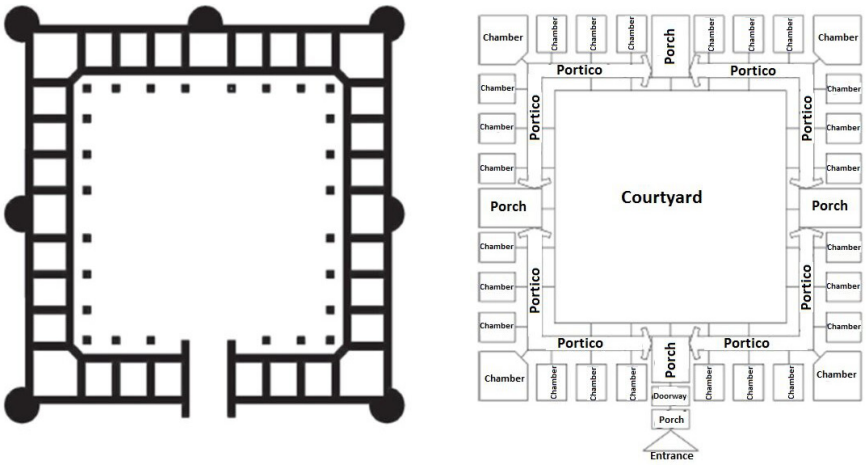


Fig. 5. Spatial Diagram Showing the Changes in the Design of Seljuk Caravanserais, Creating a Portico in Front of the Chambers
(Ibid)

3.3.4. Fundamental Changes in the Plan of the Caravanserai: Design and Implementation of the Stables behind the Chambers

During the Seljuk era, road safety and order increased significantly. As a result, the movement of travelers, merchants, and caravans between the cities increased significantly, and a large number of caravans safely traveled across the vast territory of the Seljuqs for thousands of kilometers (Ehsani, 2002, p. 38).

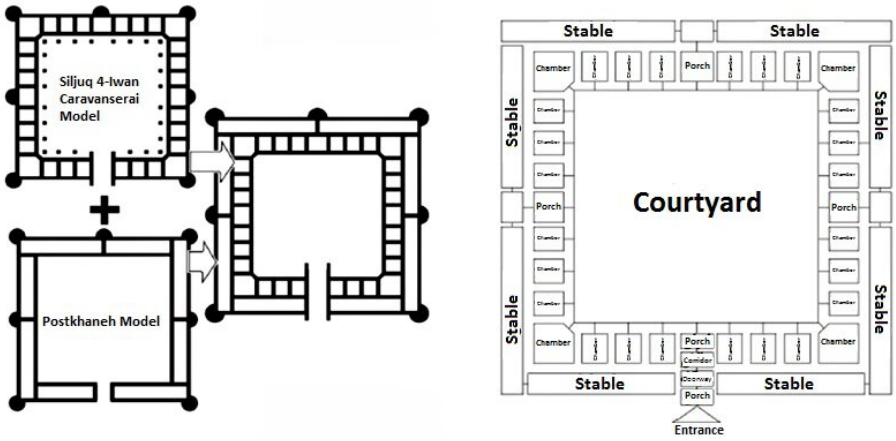


Fig. 6. Spatial Diagram Showing the Fundamental Changes in Seljuk Caravanserais, which was the Combination of Two Models of Caravanserai and Post-Khaneh (Post Office)
(Kavian & Gholami, 2016)

3.3.5. The Evolution of Elements and Changes in the Organization of Spaces

According to narrations and historical reports, Amir Ali Shir Nawai founded and restored 370 to 400 buildings (Karimian, 1999, p. 538). The construction of numerous caravanserais along the road connecting Mashhad to Gorgan (Jorjan or the current Gonbad-e Qabus) shows his interest in the revival of commerce along this road (Wilbur, Golmbek, & Held, 1995, p. 104). According to him, the Safavid era was an important period regarding the construction of

caravanserais in Iran.

As significant changes in caravanserais in the Safavid era, one can mention the expansion of the caravanserais courtyard, the connection between the stables and the courtyard through the chamfered corners of the courtyards, which were in various forms, finishing and decorating most of the Shah-neshin spaces, which were generally located at the far end of the porches, the creation of major spaces in stables, which led to more spatial transparency in more advanced examples, the expansion and extrusion of the Shah-neshin space from the entrance body of the caravanserai in combination with the entrance, the creation of private spaces in some caravanserais, which were built either in the corners of the caravanserais or in the middle of the entrance or on the opposite side of the entrance and leading to the vestibule or courtyard through a corridor, the creation of a transparent space in the corner stables, the removal of towers in many caravanserais, and finally, the similar spatial arrangement of the caravanserais located near each other or on the same route and at a short distance from each other, which shows the extension of a wide range of diverse local styles (Kiani & Clais, 1994, p. 3) .

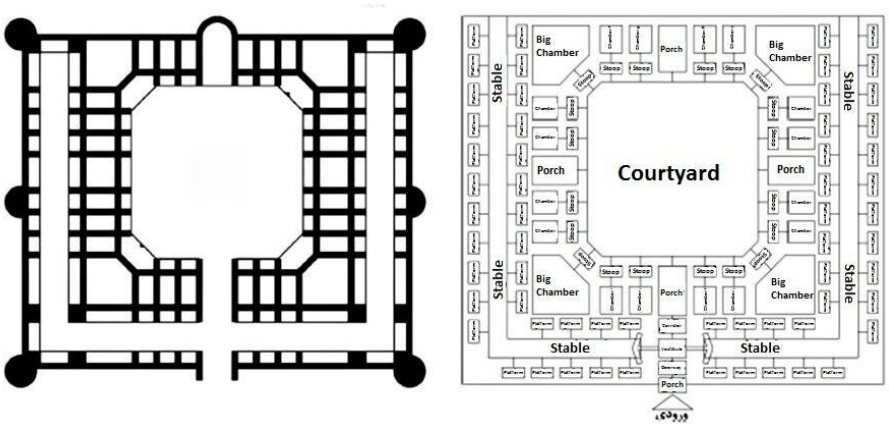


Fig. 7. Spatial Diagram Showing Changes in the Organization of the Stable in relation to the Courtyard
(Kavian & Gholami, 2016)

3.3.6. Openness and Increase of Spaces (Latest Changes)

The Safavid period is one of the era during which each of the spaces in the caravanserai had achieved a suitable evolution. In next eras, the changes in this type of structure were related to one space or a set of spaces inside or outside the caravanserai and they didn't significantly influence the spatial order of the whole building. In the caravanserais built in the late Safavid period, one can see small spaces with many details, and the first changes in the openness of the space, that would be seen later in the Qajar period, occurred at this time (Kavian & Gholami, 2016).

4. THE QUALITATIVE CONTENT ANALYSIS OF THE SAMPLE CARAVANSERAI BASED ON THE IDEA-PRODUCT CORRELATION INDICATORS

As explained in the "method" section, in accordance with the stages of qualitative content analysis, the practical propositions describing the caravanserai construction process in term of the idea-product correlation indicators were extracted from the perspective of the theory of evolutionary construction and in accordance with the introduced codes.

Table 5. Extracted Analytic Propositions and their Relevant Codes

Extracted Prepositions	Related Codes
Constructing caravanserais in the form of a courtyard surrounded by a large carrier for cattle, due to the emphasis on the function of the caravanserais (maintenance of cattle)	S_{9-2}
Constructing the caravanserais in the form of lodges including a strong fence and many rooms around a wide courtyard to accommodate travelers	S_{9-2}
The emergence of Iwan (porch) in the design and construction of caravanserais	S_{9-1}
Considering separate stables in the space behind the rooms	S_{9-2}
Designing stables in a continuous form around the caravanserai	S_{9-2}

Extracted Prepositions	Related Codes
The expansion and enlargement of chambers and niches	S_{9-2}
Creating private spaces in some caravanserais or in the corner or in the middle of the sides of the caravanserai entrance	S_{9-2}
Creating an organized connection between the central courtyard and the stables by eliminating chambers on the sides	S_{9-2}
Converting the portico into the stoop and building a platform in the stables of caravanserais for the accommodation of travelers	S_{9-1}
Constructing caravanserais in the form of rectangular halls around the central courtyard as an emphasis on unity	S_{4-2}
Building a portico in front of the chambers of the caravanserai to increase the depth of the porches	S_{4-1}
Observing the hierarchy of the central courtyard in the formation of caravanserais	S_{5-2}
Considering the hierarchy of the central courtyard in the formation of caravanserais	S_{5-2}
The simplicity of the spaces considered in the caravanserai	S_{5-1}
Applying spiritual decorations in the design of caravanserai decorations	S_{5-5}
Creating spatial transparency in caravanserais	S_{5-5}
Applying order in the design of spaces in caravanserais	S_{5-1}
Considering the rooms in the corners of the courtyard in the caravanserais because the openness of the corners makes it possible for architects to create wide spaces or design a special complex.	S_{7-1}
Construction of open spaces that lead to the central courtyard from the chamfered corners.	S_{7-1}
Emphasizing symmetry and balance and using the proportions of designs related to caravanserais	S_{7-1}/ S_{6-10}
The emergence of porches in caravanserais as one of the important initiatives (4-iwan (four-porch) caravanserais)	S_{7-2}
The combination of two models of the caravanserai with stables and early caravanserais with lodges	S_{7-2}
Making attempts to coherently design the caravanserai	S_{7-2}
Converting the portico into the stoop and building a platform in the stables of caravanserais for the accommodation of travelers	S_{7-2}
Increasing the harmony of the courtyard view by using the porticoes in front of the chambers in the caravanserai	S_{6-6}
Expansion of the caravanserai courtyard	S_{6-1}/ S_{2-4}/ S_{3-2}
Using various shapes of chamfered corners of the courtyards	S_{6-9}
Finishing and decorating most of the Shah-neshin spaces at the end of the porches	S_{6-4}
Using symbolic shapes such as rectangles in the design of caravanserais	S_{8-1}
Using the portico design as a symbol of unity	S_{8-2}
Using octagonal shapes in the design of caravanserais	S_{8-1}
Using the porches in front of the chambers to provide shadows	S_{2-4}
Using the porch in the design and construction of caravanserais to provide proper light and ventilation	S_{2-3}
Designing vestibule and long roofed corridor in different parts of caravanserais according to the indigenous architecture of the region	S_{1-1}
Expanding the vestibule and Shah-neshin spaces above it and the extrusion of the entrance of the caravanserai in combination with the entrance of the fabric	S_{1-1}
Using local materials such as brick, mud, etc.	S_{1-1}
Considering the central courtyard with green space compatible with environmental conditions	S_{3-1}
Considering the private yard behind the axis of the main porches	S_{3-1}

According to the above table, the extracted propositions cover a large number of introduced indicators and sub-indicators, and some indicators can also be attributed to several codes, for example, the propositions of "expansion of the courtyard of caravanserais" and "emphasizing symmetry and balance and taking advantage of the proportions of the designs related to the caravanserai" were attributed to more than one code. In the following, to know the significance of each of the main indicators, the propositions were categorized in the form of main indicators and their frequencies were calculated. It should be noted that to calculate the frequencies listed in Table 4, the number of propositions related to each of the indicators given in the introduction of the sample caravanserai was divided by the total number of propositions.

Table 6. The Frequencies of the Prepositions related to the Main Idea-Product Correlation Indicators in the Evolutionary Construction Process

Main Indicators	Extracted Propositions	Frequency
Functionalism	The emergence of Iwan (porch) in the design and construction of caravanserais	
	Considering separate stables in the space behind the rooms	
	Designing stables in a continuous form around the caravanserai	
	The expansion and enlargement of chambers and niches	
	Creating private spaces in some caravanserais or in the corner or in the middle of the sides of the caravanserai entrance	0.22
	Creating an organized connection between the central courtyard and the stables by eliminating chambers on the sides	
	Converting the portico into the stoop and building a platform in the stables of caravanserais for the accommodation of travelers	
	The emergence of Iwan (porch) in the design and construction of caravanserais	
	Considering separate stables in the space behind the rooms	
Outside-Inside Development	Constructing caravanserais in the form of rectangular halls around the central courtyard as an emphasis on unity	0.05
	Building a portico in front of the chambers of the caravanserai to increase the depth of the porches	
Semanticism	Observing the hierarchy of the central courtyard in the formation of caravanserais	
	Considering the hierarchy of the central courtyard in the formation of caravanserais	
	The simplicity of the spaces considered in the caravanserai	0.15
	Applying spiritual decorations in the design of caravanserai decorations	
	Creating spatial transparency in caravanserais	
	Applying order in the design of spaces in caravanserais	
Knowledge-Basedness	Considering the rooms in the corners of the courtyard in the caravanserais because the openness of the corners makes it possible for architects to create wide spaces or design a special complex.	
	Construction of open spaces that lead to the central courtyard from the chamfered corners.	
	Emphasizing symmetry and balance and using the proportions of designs related to caravanserais	
	The emergence of porches in caravanserais as one of the important initiatives (4-iwan (four-porch) caravanserais)	0.17
	The combination of two models of the caravanserai with stables and early caravanserais with lodges	
	Making attempts to coherently design the caravanserai	
	Converting the portico into the stoop and building a platform in the stables of caravanserais for the accommodation of travelers	

Main Indicators	Extracted Propositions	Frequency
Aesthetics	Increasing the harmony of the courtyard view by using the porticoes in front of the chambers in the caravanserai	
	Expansion of the caravanserai courtyard	
	Using various shapes of chamfered corners of the courtyards	0.12
	Finishing and decorating most of the Shah-neshin spaces at the end of the porches	
	Emphasizing symmetry and balance and using the proportions of designs related to caravanserais	
Symbolism	Emphasizing symmetry and balance and using the proportions of designs related to caravanserais	
	Emphasizing symmetry and balance and using the proportions of designs related to caravanserais	0.07
	Emphasizing symmetry and balance and using the proportions of designs related to caravanserais	
Climateism	Using the porches in front of the chambers to provide shadows	
	Using the porch in the design and construction of caravanserais to provide proper light and ventilation	0.07
	Expansion of the caravanserai courtyard	
Contextualism	Designing vestibule and long roofed corridor in different parts of caravanserais according to the indigenous architecture of the region	
	Expanding the vestibule and Shah-neshin spaces above it and the extrusion of the entrance of the caravanserai in combination with the entrance of the fabric	0.07
	Using local materials such as brick, mud, etc.	
Naturalism	Considering the central courtyard with green space compatible with environmental conditions	
	Considering the private yard behind the axis of the main porches	0.07
	Expansion of the caravanserai courtyard	
Collectivism	Considering the central courtyard with green space compatible with environmental conditions	
	Considering the private yard behind the axis of the main porches	
	Expansion of the caravanserai courtyard	
	Using the porch in the design and construction of caravanserais to provide proper light and ventilation	0.15
	Expansion of the caravanserai courtyard	
	Converting the portico into the stoop and building a platform in the stables of caravanserais for the accommodation of travelers	

The above table shows that in the sample caravanserais, the indicators of functionalism, knowledge-base, semantic-ism, aesthetics, and collectivism have the highest frequencies. So, it can be claimed that these indicators have played the most key role in the idea-product correlation. Although other indicators such as naturalism, contextual-ism, climate-ism, symbolism, and outside- inside development have been realized in these samples to a large extent, they have not been as effective as the indicators of the first category in the idea-product correlation.

5. CONCLUSION

The present study aimed to assess idea-product correlation based on the theory of evolutionary construction in traditional Iranian architecture, with emphasis on the architecture of the Iranian caravanserai. To this end, first, the indicators and variables related to the idea and the product were extracted and the correlations between them were identified. Then, the extracted indicators were converted into measurable indicators in architecture and the sub-indicators of each indicator were

explained using theoretical studies. After explaining the final research indicators and sub-indicators, they were coded through the qualitative content analysis of the evolution of case studies. After the detailed introduction of Iran's historical caravanserais and their evolution as case studies, the coded indicators were examined in them.

In the sample Iranian caravanserais, the indicators of functionalism, knowledge-base, semantic-ism, aesthetics, and collectivism have the highest frequencies. So, it can be claimed that these indicators have played the most key role in the idea-product correlation. Although other indicators such as naturalism, contextual-ism, climate-ism, symbolism, and outside-inside development have been realized in these samples to a large extent, they have not been as successful as the indicators of the first category in the idea-product correlation.

According to the investigations, the results of qualitative content analysis, and the frequencies of propositions, it can be said that the indicators of the idea have been realized in the indicators of the product to a large extent so that the "material and artificial nature" indicator was realized in the form of the "naturalism and climate-ism" indicators, the "culture" indicator in the form of the "contextualism" indicator, the "planning" and "technical matters and construction method" indicators in the form of the "knowledge-base" indicator, the "psychology and spiritual needs" and "philosophy" indicators in the form of the "semantic-ism" indicator, the "semiotics" indicator in the form of the "symbolism" indicator, the "performance and economic matters" indicator in the form of the "functionalism" indicator, and the "social needs and participation" indicator in the form of the "collectivism" indicator.

According to the investigations, it was found that in the past, the Iranian architects' ideas and products were unmediated, due to their mental and unconscious encounter with the design and construction subject, and the separation of education, profession, and research that has been occurred after modernity is not seen in them.

REFERENCES

- Alexander, Ch. (2007). *The Timeless Way of Building. Mehrdad Qayoumi Bidhandi*. Tehran: Shahid Beheshti University.
- Amid, H. (2002). *Amid Dictionary* [Twenty-fifth edition] [Vol. 2]. Tehran: Amir Kabir.
- Ayvazian, S. (1997). *Indigenous architecture* (Ali Mohammad Sadat Afsari). Tehran: Faza Scientific and Cultural Institute.
- Ayvazian, S. (2006). A search to achieve sublime art and architecture. *Architecture and Culture*, 8(25).
- Balkhari Ghahi, H. (2009). *Mystical foundations of Islamic art and architecture* [Book I and II: unity of existence and unity of intuition, alchemy of imagination]. Tehran: Surah Mehr.
- Bazrafkan, K. (2016). [Against] Formalism: Too Far-Too Near. *Architecture*, (101), 64-69.
- Bemanian, M. (2007). The study of God central role in Moslems architecture. *International journal of industrial engineering and production management (IJIE)*, 18(5), 37-44. https://www.sid.ir/fa/journal/ViewPaper.aspx?id=76566
- Berkun, S. (2016). *Why Jargon on Lazy Minds*. Harvard, Business Review.
- Burckhardt, T. (1986). *Art of Islam : language and meaning* (Masoud Rajabnia). Tehran: Soroush.
- Castano Perea, E. E., & Echeverria Valient, E. (2017). *Architectural Draughtsmanship: From Analog - To Digital Narratives*. Ideation Lab at Bryant University, Inc.
- Cataldi, G. (1977). Per una Scienza del Territorio, Firenze, Uniedit.
- Choudhary, P., & Adane V. (2012). Spatial configurations of the urban cores in central India. In *Proceedings from the English International Space Syntax Symposium*, Santiago de Chile: PUC.
- Didehban, M., Purdeihimi, Sh., & Rismanchian, O. (2013). Relation Between Cognitive Properties And Spatial Configuration Of The Built Environment, Experience In Dezful. *Architecture Studies*, 2(4), 37-64. https://www.sid.ir/fa/journal/ViewPaper.aspx?id=214912
- Ehsani, M. (2002). *A reminder of caravanserais, rabats and caravans in Iran*. Tehran: Amirkabir Publications.
- Eslami, S. Gh., & Dorari Jabarooti, E. (2013). Quality improvement of design based on optimal management of effective factors. *Architecture Studies*, 2(3). https://www.sid.ir/fa/journal/ViewPaper.aspx?id=
- Farshchi, H., & Haji Zamani, M. (2019). Study of the Iranian caravanserais and affiliated buildings. *Journal of Architecture, Tehran*, (7).
- Gharedaghi Tirabadi, M. (2013). Field-Orientation, Analysis of Space Dimension and Its Relation with Constructing New Structures in the Historical Fabrics. *Journal of Basic and Applied Scientific Research*, 3(6). https://www.textroad.com/pdf/JBASR/J.%20Basic.%20Appl.%20Sci.%20Res.,%203(6)927-933,%202013.pdf
- Grutter, J. K. (2005). *Aesthetics in architecture* [Fifth Edition] (Translated by Jahanshah Pakzad and Abdul Reza Homayun)
- Hanfling, O. (2002). *The essence of art. Translated by Ali Ramin*. Tehran: Hermes Publications.
- Karimian Sardashti, N. (1999). The history of Rabat in Islam and Iran. Proceedings of the Second Congress of the History of Architecture and Urban Planning of Iran, Bam Citadel [Volume 2]. Tehran: Cultural Heritage Organization of Iran.
- Kiani, M., & Claes, Wolfram. (1994). *Iranian caravanserais*. Tehran: Iran's Cultural Heritage Organization.
- Kiani, M. (2011). *Architecture of Iran during the Islamic period*. Tehran: SAMT Publications.
- Khorsand, R., & Noqrehkar, A. (2018). Explaining The Concept of Beauty from Islamic Cosmological Point of View to Evaluate The Works of Architecture And Urban Planning. *Naqshejahan*, 8(2), 101-110. https://www.sid.ir/fa/journal/ViewPaper.aspx?id=484482
- Kavian, M., & Gholami, Gh. (2017). Study of Architectural Evolution of Caravanserais with A Courtyard in the Center of Iran. *Athar*, (75).
- Kavian, M., & Gholami, Gh. (2016). Factory or Work and House Surveying The Concept Of Business And Production In The Formation Of Historic Persian Houses In Boshruyeh. *Architecture of Hot and Dry Climate*, 5(5), 101-118. https://www.sid.ir/fa/journal/ViewPaper.aspx?id=484827
- Lotfi, M. (2005). *The period of Plato's works* [Vol.2]. Tehran: Khwarazmi.
- Madani Boroujeni, S. A., & Nasr, A. (2009). Triangulation: A Strategy for Innovating In Educational Researches. *Educational Innovations*, 8(30), 53-73. https://www.sid.ir/fa/journal/ViewPaper.aspx?id=101190
- Memarian, Gh., & Dehghani Tafti, M. (2018). Seeking to Find a Novel Concept to Type and Typology in Architecture (Case study: Vernacular Houses in Taft, Type of Tallardar). *JHRE*. 37(162), 21-38. https://www.sid.ir/fa/journal/ViewPaper.aspx?id=360197
- Memarian, Gh. (2009). *The theoretical foundations of architecture* [Ninth edition]. Tehran: Simaye Danesh Pub-

lications.

- Memarian, Gh. (2007). *Familiarity with Iranian residential architecture, introverted typology*. Tehran: Soroush Danesh Publications.
- Mirghasemi, S., & Bazrafkan, K. (2015). *Investigating the lack of meaning and identity in contemporary architecture with the phenomenological approach of place*. International Conference on Architecture, Urbanism, Civil Engineering, Art, and Environment (ICAUCAE), Tehran. https://civilica.com/doc/607556
- Mirmoqtadaei, M. (2004). Criteria for recognizing and evaluating the physical identity of cities. *MEMARI-VA-SHAHRSAZI (HONAR-HA-YE-ZIBA)*, (19), 29-38. https://www.sid.ir/fa/journal/ViewPaper.aspx?id=33687
- Mozayyani, M. (1996). *Cultural and urban aestheticism in public culture*. Tehran: Ministry of Culture and Islamic Guidance.
- Nadimi, H., & Shariat Rad, F. (2011). Sources of architectural ideation, a reflection on the ideation process of eight Iranian professional architects. *MEMARI-VA-SHAHRSAZI (HONAR-HA-YE-ZIBA)*, 17(2), 5-14. https://www.sid.ir/fa/journal/ViewPaper.aspx?id=294800
- Naghizadeh, M. (2011). Cultural foundations of sustainable Iranian architecture. *Housing and Revolution*, (100).
- Nazari, F. (2006). The trick of ideation, the study of the cultural role of caravanserais in Persian literature. *Khyaal*, (18).
- Necipoglu, G. (2000). *Geometry and ornament in Islamic architecture* (The Topkapi Scroll) (Translated by Mehrdad Qayoumi Bidhandi). Tehran: Roozbeh.
- Noqrehkar, A., Hamzenejad, M., & Forouzandeh, A. (2009). Eternity Secret of Architectural Works (In Modernism, Post Modernism And More Inclusive View). *Bagh-e Nazar*, 6(12), 31-44. https://www.sid.ir/fa/journal/ViewPaper.aspx?id=122929
- Pirnia, M. (2007 A). *Introduction of Islamic architecture of Iran*. Tehran: Soroush Danesh Press.
- Pirnia, M. (2008). *Stylistics of Iranian architecture*. Tehran: Soroush Danesh Press.
- Rapoport, A. (1987). *Cultural origin of biological complexes* (Razie Rezazadeh). Tehran: Iran University of Science and Technology, JDM Press.
- Reymen, I., Hammer, D., Kroes, P., Aken, J., Dorst, C., Bax, M., & Basten, T. (2006). A domain-independent Descriptive Design Model and its Application to Structured Reflection on Design Processes. *Research in Engineering Design*, (16). https://www.semanticscholar.org/paper/A-domain-independent-descriptive-design-model-and-Reymen-Hammer/e66453702891604e6214ac35cb3a660f15b0e524
- Rikhtehgaran, M. (2005). *Art from the point of view of Martin Heidegger*. Tehran: Farhangestan Honar.
- Safaeipour, H. (2007). *Study of the quality of the interface*. Shape, structure, and meaning in the architecture of Safavid mosques, First Conference on Structure and Architecture, Tehran. https://civilica.com/doc/17356
- Shahbazi Mahmoudabadi, Z., & Mollayousefi, M. (2019). Human Knowledge of Objects from John Locke and Abd al-Razzaq Lahiji's Viewpoints. *Philosophy*, 47(1), 21-40. https://www.sid.ir/fa/journal/ViewPaper.aspx?id=488754
- Upham Pope, A. (2009). *Persian Architecture* (Gholamhossein Sadri Afshar). Tehran: Akhtaran.
- Wilber, D., Glumbeck, L., & Held, R. (1995). *The Timurid Architecture of Iran and Turan* (translated by Mohammad Yousof Kiani and Keramat Allah Afsar). Tehran: Book Council of Iran's Cultural Heritage Organization.

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