INVESTIGATION OF TECHNOLOGY SYMBOL IN MOSHIR-OL DOLEH HOUSE OF QAJAR ARCHITECTURE

[1]REIHANEH ARAM, [2]HALIL ZAFER ALIBABA

[1,2]Faculty of Architecture, Department of Architecture, Eastern Mediterranean University, Gazimagusa, Northern Cyprus
E-mail: [1]aireen1371@gmail.com, [2]halil.alibaba@emu.edu.tr

Abstract -
This paper explores the technological aspects of Qajar architecture in 1995 Iran using the case of the Moshir- ol- Dole residential house. The Qajar period existed at the same time as both Western and Iranian civilizational development, and was an especially important era in the field of technology combination. Modern Iranian architecture is based on modern, as well as traditional, Iranian symbols. The theoretical framework used in this paper has been developed based on a literature survey, which highlighted the features and technological symbols of Iranian architecture. As a way of distinguishing between the Iranian patterns during the Qajar period and defining the technological elements used in the case-study, this study utilizes both descriptive and analytic research methodologies. Although the study primarily involves theoretical research, it also includes collecting information about the Moshir-ol Doleh Pirnia House, which is a prime example of Iranian architecture during the Qajar period in the 19th century. The Moshir ol dole House has different categories of technological symbols that were used in its design; the materials, decoration elements, plan, and other features display a combination of technology unique to Qajar architecture.

Keywords - Symbol, Technology, Qajar, House

I. INTRODUCTION

Iran, as an ancient country, Qajar is one of the more significant modern periods in Iran that has generated welfare architecture. The buildings that were built during Qajar are full of characters and symbols. One of the concentration points about the architecture from this period is the symbols' meaning, which illustrates the symbols absence in the architectural modern (Alford, 1955). Various definitions of symbols agree on the central point that symbols explain and transfer expression of a concept (Rapoport, 1974). This perspective has given rise to a new approach in architecture known as "architectural language", which depicts forms and their relations. Generally, it is vital to learn about architectural language in order to understand the meaning of architecture and characters (Radford, 1994). Qajar was a time during which western and eastern architecture was combined together. Technology has the potential to change and affect the environment and society and the network society emerging as a result of globalization has motivated architects to rethink about relationship between their work and new issues, such as contemporary production, patterns,
construction, settlement, and culture (Braham & Hale, 2006). Architectural point of view, technology it is not just about the materials, structure or building systems but is also a new factor that helps defining social living (Mackenzie & Wajcman, 1999). Technology can be examined in different aspects, including the social, scientific, cultural, philosophical and political dimensions of the contemporary world. This revelation in philosophic thought produced what is known as "philosophy of technology", which only existed for the first time in the modernity period (Feyzi & Esmaeldokht, 2015). However, technology used as meaningful symbol features which is defined in the various scholars (Sani & Shotorbani, 2013). The architectural symbolic pattern produces the architectural language as new method attitude (Sani, 2009).
Technology has important and inseparable place in the architecture especially in the contemporary architecture (Fryer & Collin, 1980). Nowadays Technology is inseparable theory from the architecture so it causes strong combination with these two fields.
This paper tried to define the technological features in the one of the Qajar houses which was located in Tehran, Iran in 1995 and explained the reason of these development elements in the architecture. The main principles of Iranian architecture can include as; transparency, meritocracy, answering material and spiritual needs and human proportion. In addition, during time by used the technology in different aspects cause new approaches in the society and lifestyle. The conjunction of the vernacular architecture and traditional forms with development technology produced lots of functional advantages.

II. METHODOLOGY

The methodology of this paper is qualitative which is data analysis based on the reasoning method. The data collection of this research was gathered by the exploration of the wide array of the relevant documents, personal observation and interview. The case study sample is Moshir-ol Doleh Pirnia House which is built based on the Qajar architecture. The Qajar architecture of this building has various symbolic elements. So, by categorizing Moshir-ol Doleh house elements as key factors for analyzing

data, then generating reliable result. In the literature part try to distinguished Iranian architecture characters and explained the semiotic meaning, Qajar architecture and technology then in the analysis parts try to define the technological symbols of the case study elements. The residential Moshir-ol Doleh Pirnia House of Qajar period. The Moshir-ol Doleh Pirnia House is located in Lalezar Street, Tehran, Iran which is built in Qajar periods during the 19th century. This house is registered in the national heritage organization, furthermore, for the first time the History of Ancient Persia, the CSP international law and the most important a commandment of the constitution in the Persian language was written in this house. This house consists of the three stories which it has a basement, and other two stories located about 1.5 meters above the garden ground.

III. SYMBOLIC MEANING IN ARCHITECTURE

One of the definitions of the symbol as a sign is there are main characters of the object which is a result of the relation of the culture, social values, personal attitude and habitude (Erman, 2004). According to Pierce view "sign is defined as something that it can stand to something else with capacity or respect" (Eco, 1976). However, some other views about symbols depict that symbols can transfer the situation as the status symbol, for example, it can be a symbol of the richness or luxuriance (Blumberg, 1974). The meaning of the signs according to build environment approach can be studied with signifier and also signified. Furthermore, signifier conveys the functional means, however, signified transfer beyond of instruments and convey the meaning or thought so by investigating the buildings can be seen the various symbolic characters which illustrate the meaning or the concept (Erman, 2004).

IV. IRANIAN ARCHITECTURE OF QAJAR PERIOD AND FEATURES IN 19TH

Iranian modern architecture started to developed during the Qajar period which is happened consequently of the improvement in the public law, public welfare, international politics and education by intellectuals, authorities and princess for instance; Mirza Taghi Khan Amir Kabir, Abbas Mirza, Mirza Malcolm Khan and Mirza Fath Ali Khan Akhondzadeh however dramatically development in the economic with the other countries cause new communication between Iran and Europe generating the new face of the Iranian architecture during 1800 – 1925. This sort of newly born relation produced new acquaintance with the European architecture and art style which became used in the Iranian famous monuments (Diba & Dehbashi 2004). As result of the combination architecture and technology was generating new group of materials which were start to use in the Iranian architecture project, the new materials generation that were newborn in 19th century was glass, cast iron and plaster for producing the new aspect in the design and also started to use technological tools for interior and exterior decoration and façade, aesthetics, and combination with vernacular architecture (Yekta, 2015).

Qajar architecture shaped according to the different reasons. These reasons separated into the two categories as; inner reasons (in the country reasons) and outer reasons (out of country reasons). The inner reason for shaping Qajar architecture is a combination of traditional characters into the Iranian modern architecture. And the outer reasons for shaping Qajar architecture comes from the western countries and Russia which can be included as; massive traveling of governing people to the European countries, educating architects in foreign countries, the European presence teacher in Dar-Ol-Fonoun school (one of the important and famous schools in Iran), the arrival of the car and coach into the transportation system (Kamali 2009). The modernism which it happened in Qajar period caused because of the various reasons such as: Europe and America democratic revolution, rapid development of technology, worldwide trading and advanced economic system (Roshanfekr, J. M., Roshanfekr, J. S., & Najafgholi, 2016).

The Iranian architecture during Qajar periods has different characters such as the traditional and cultural thoughts, spiritual beliefs and values which been faced with other civilization thoughts, values and beliefs consequently that been architecture which doesn't have any limitation in time and place just according to the place, function, technology and sources it was shaped and changed (Asefi, 2014). By investigating Iranian houses in the Qajar periods found that main houses' components are including; courtyard, entrance, patio, Ivan (Ivan can define as semi-open space which is separate the inside and outside space and its being tool for having a shadow in front of the building and having nature) (Eiraji, Gollar, & Bukani, 2012), three or five doors, deflector hall, sash, chamber, hall, roofing, summer stay, decorative, earrings, alcove, winter stay, spring house, terrace, deflector room (Fakhabi, Parvizi, & Memarian, 2016). Among other things, the general house elements which were changed and developed because of the technology during Qajar dynasty involving; relationship with Europe as result advancement decoration and painting with modern materials, the new shape of urbanization, established Tehran architecture school, produced new generation of the architecture, cinema and literature (Hamid & Sajad, 2014).

In the Qajar architecture, house buildings are categories as; 1. Open spaces: Mahtabi, Bahar Khab, Posht e Bam and court, 2. Semi open space: Ivan, 3. Closed spaces: Shah Neshin, Talar, Gooshvareh,

Pastoo, Konj and Balakhaneh (Hasani, Borazjani, & Salami, 2017).

Aesthetics	For decoration used realistic image of animals and plants, geometric lines of Greece and Rome style, and various forms of sculpture on the building.
Buildings elements	The Roman arch, pediment, Greek columns and capitals, fence with Serahy style, balcony. The Santouri the quite European symbols, however without any decorations and sculpture. Also, Semicircular arc spiral and straight columns with Mogharnas columns head and sloping roofs (covered with thatch) are being common building elements.
Facade	Combination of the traditional Iranian style with neo-classic and classic European style, and Copy of the neoclassical Europe façade on the whole of the building elevation. Convex arches and wishbone or zigzag shaped arcs.
Material	White iron for covering the roof, Cast iron for columns and fence. Wooden boards for buildings' body and wooden beams. Furthermore plaster, stone, brick and thatch are mainly used in facade.
Plan	Staircase as a central place in the building, balcony in the middle as the center point, extraversion style.
Section	Central staircase, extraversion style, balcony axially. The Bearing walls.

Table 1. Architectural features of Qajar period because of the technology (Roshanfekr, Roshanfekr, & Najafgholi, 2016).

In the Qajar architecture, there were huge attention and used of the various decorations and aesthetics symbol especially in the houses (Fakhabi, Parvizi, & Memarian, 2016). Some peoples believe that Qajar period was a time of destruction however other believes it was a time of the efflorescence in the Iranian architecture. The main issues in this period were the various themes and decoration style which were conveyed from the Europe. This point is used obviously in the different buildings such as Turquoise Palace and residential houses. In the Qajar period, the interior areas of the building architecture have full and different wonderful decorations in comparison with other building elements. The main reasons of this sort of professional decoration generated by the conveyed development technology in the Qajar architecture furthermore by trained the new generation of architecture in the western countries and brought the new tools, machine, and material. The main important unit in the architecture is housing which is a place that has a majority of users (Kamali, 2009).

The main Qajar architecture features	The Qajar period decoration and colors	Common elements and space in Qajar architecture and the colors
Orsi which was the vertical lattice window with colored (Yekta 2015).	The seven color tiles and the colorful glazes (Yekta 2015).	The wind catcher: one of the Iranian architecture elements for natural ventilation which was built as common place in Qajar (Kamali 2009).
Seven colors brick tile based on the purple or red (Yekta 2015).	Tiles and stucco work in the interior façade (Yekta 2015).	Sash Window (Orsi): The lattice shaped, wind, and wind- open window to the top, which is commonly used in forums and colored cupboards Arrangement can be made of one or more chains (Vahdat Talab & nikramam 2017).
The London flower shape as tiles (Yekta 2015).	The wooden array (Yekta 2015).	Santouri: The triangles above the entrance gate are called Santouri architecture.
The ornate alongside of the palace roof (Yekta 2015).	The colored glasses (Yekta 2015).	Court
The Persepolis pictures (Yekta 2015).	The London art pieces painting (Yekta 2015).	Ivan (Hasani, Borazjani & Salami 2017).
The western decorative elements in the facade work.	The brick and the specific lathe template (Yekta 2015).	Jam- Khaneh: The sort of a window over some of the covers Domes, especially baths and some other types of buildings used (Kamali 2009).
The high and large Ivan In the entrance spaces (Yekta 2015).	The mirror work (Yekta 2015).	Konj (in residential building)
The building's columns and pillars were as midpoint (Yekta 2015).	The court and also ancient mythological painting (Yekta 2015).	Balakhaneh (in residential building)
Used contemporary material as cement, stone and iron (Yekta 2015).	The cut brick configuration for decorating the religious places (Yekta 2015).	Pastoo (in residential building)
Used staircase in main axis (Yekta 2015).	Used the Rasmi-bandi and the kar-bandi (Yekta 2015): Iranian geometry which is used for decoration.	Ghoshvareh (in residential building): Facilitating the installation of a circular dome on a square plan, also it used as decoration.
Changing the three doors of the rooms to the two doors of the room (Yekta 2015).	The yellow color (Yekta 2015).	Shah Neshin (in residential building)
Used the Gable roof (Yekta 2015).	The orange color (Yekta 2015).	Talar
Creating more squares (Yekta 2015).		

Table 2. The Qajar architectural features (according to Iranian architecture).

V. MOSHIR-OL DOLEH PIRNIA HOUSE TECHNOLOGICAL SYMBOLIC ANALYSIS

For understanding the quality of the Iranian style in combination technology and architecture investigating the houses can be a useful unit. Beyond the architecture, during the time of human experience, the building can influence the users and also the users affect the building. Thus, for the complete understanding of building it is vital to have attention to the structure too as technological view (Qelichkhani, 2012).

The owner of Moshir-ol Doleh Pirnia House is Hassan Pirnia who's been a famous person in political, social, history and literature. The remarkable point of this building is when Hassan Pirnia had a trip to France, designed the Moshir-ol Doleh Pirnia House. So, it depicted that this house is obvious Qajar architecture which is shown the combination of the east features and west features via advanced technology symbols.

- **Aesthetics Analysis**

In the Moshir-ol Doleh house, decorating the interior spaces and exterior surfaces were simplicity and homogeneous, there were the simple and joining the plaster, brick with the building is mostly smooth. North Portico (Ivan) of the basement rooms with tiling work bed and bowls decorated them regarding the cultural symbols which were shaped because of the new technology. Tiles were made by the clay and used in the basement with a large painted image of mythological and historical figures.

The production of the culture is the garden therefore that garden composed of the structure, materials and forms beyond of these elements the gardens consists of the various human phenomenas factors and social life (Abbas, Y.Nafisi, & N.Nafisi, 2016). The garden of the Moshir-ol Doleh House was built based on the Iranian style and belief but with the new material such as; stone and some primary sort of cement with the different geometry and proportion in compare with other Iranian gardens according to the microclimate of the Iran.

Features of Pirnia House	Moshir-ol Doleh Pirnia House	The symbolic features of technology
head Column		The columns which are used just for aesthetics. The head column part has decorating according eastern style and tools. So, it illustrated the symbol of technology.
North facade		The brick working facade is the common Iranian style but in this elevation the brick working used via plaster bondage. Technology caused this facade working.
entrance yard view		The iron framework in the Ivan as decorating rail is technology symbol in this period.
Interior view of fire room		In the fireplace there are tiles and large painted about historical and mythological beliefs. The advanced technical tools used, so it can show the place of technology in decorating work.

Table 3. Aesthetics elements analysis.

- **Building Elements Analysis**

As one of the important and noticeable building elements is the entrance space. In the modern architecture the entrance of the building has three different rolls; 1.as functional role, 2. protective role, 3. semantic role. In Moshir-ol Doleh house has main entrance of the building with the technological symbol of the Europe without any connection room between the outside and inside areas also the main role of this entrance is functional and with the symbolic meaning of the owner's level. Furthermore, after the entrance area in the Iranian architecture especially traditional residential areas, there are two main separations that; enclosed spaces and open spaces so the noticeable point of the residential houses is how to design the area with combination this two areas (Hasani, Borazjani & Salami, 2017).

Features of Pirnia House	Moshir-ol Doleh Pirnia House	The symbolic features of the technology into the case
Window Arch		The form of the windows' arch that been used by bricks is the symbol of Iranian architecture (Jenaghi Kond arch). However, the iron frame is the advanced elements of Qajar period. The detail of the other arch which is used was the Greece arch and Art Nouveau style for the decoration by the development tools as result of the technology in this time period.
Balcony view		As Qajar main feature used the columns with western symbols in this architectural style period. Accordingly, the columns were used as symbolic meaning.
garden		Used the duck bug in the courtyard was a regular symbol of Iranian architecture with advanced material.
basement		Truss structure which was used in the basement was the first time in the Iranian architecture that brought meaning the using the lightweight structure.
stair		The staircase with Iranian modular however the Curvature which was used by the Art Nouveau school as a symbol of nature. Used the cement with stone also cement was new technological material that conveyed from Europe to the Iranian architecture.

Table 4. Building elements analysis.

- **Material Analysis**

The material that been used in Moshir-ol Doleh House mainly are bricks with Lime mud mortar and also plaster, actually using plaster as one the technology symbol has various meanings that been used in the residential house, for example, it used for the most luxury room for decoration the interior roof, corners or columns. The primary material of the basement was brick and limestone which were used by the Roman and multiplicative structure and details, in the ground floor beam wooden structure with a combination of the furring and Tirrizi structure which

were act as sort of heating isolation thus decoration. In the second floor, because of the huge areas for ceiling the truss structure were used, consequently these structures which were used in this house caused new generation of the light structure which was based on the light materials as the first time in the Iranian architecture and this system turn to be symbolic characters of technology in the Qajar period.

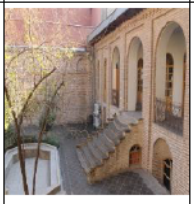
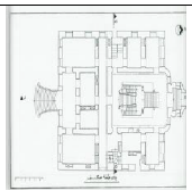
Features of Pirnia House	Moshir-ol Doleh Pirnia House	The symbolic features of the technology into the case
Basement window		Used cement, stone and the iron frame were the Qajar achievement (Yekta 2015). Used the Glass, cast iron, as a new generation of materials and combination of these materials with bricks as development decorative frameworks were the main symbols of technology which is the iron framework as Art Nova style.
Window		The Iranian windows form with the wood as the primary material of the Iranian style.
Balcony		Using Plaster more than other time for decorative and used plaster in this format as a symbol of the technology. Also, columns function used for the decorative.
Indoor courtyard		Pool was a new style, the way of the isolation and material in Qajar period which were depicted the technology development.

Table 5. Materials analysis.

- **Facade, Plan and Section Analysis**

Moreover, during a time the lifestyle changed, because of the new innovation of the technology, it influenced the society. Also, the symbolic features of technology and being more familiar with foreign countries societies affect the people thoughts, as an example in the Moshir-ol Doleh house there is not any intermediate space for privacy in compare with Iranian architecture which it has Islamic beliefs. In addition to between the main entrance from the street side to the building, there is not any intermediate close space just a garden is the connection space, in order to it depicted that people's thought changed when technology brought the development instruments as result society influenced by them.

In the Iranian architecture, there are variety elements which are having depicted different semiotics of technology and architecture style. For instance, light has an important role in the buildings and specifically in the dwelling areas light turn to be a symbol that transfer the life and the contrast between day and night consequently in the architecture its means as opening or windows (Arjmandi, et.al, 2011). According to these thought the proportion and numbers of windows were noticeable points in the design the areas for the architects. In the Moshir-ol Doleh House the number of windows was more than other residential houses, for instance; in the south elevation, there were about 20 windows with larger scales than other windows which were used. On the other side, the reason for using the large proportion and numbers of windows in south façade because of the local microclimate, opening in the south façade caused warm area during winter and maximum used of the daylight hour in the winter thus with suitable daylight without annoy able radiance in the summer it was generated the thermal comfort for the users during year. As can be seen in Moshir-ol Doleh House plan the staircase is the central point and as a connectional symbol of these areas also as technological view, the structure which was used in the Qajar periods caused this plan organization. In addition to, the structure which is used was load bearing walls with central staircase and used non-load bearing walls just for separation spaces. In addition, the columns that are used on the first floor were just for decoration and as symbolic characters of modernity however for transferring the meaning of richness.

Features of Pirnia House	Moshir-ol Doleh Pirnia House	The symbolic features of the technology into the case
Site plan		The yard has role of the combination layers which is separate the private space with the public area (Hasani, Borazjani, & Salami, 2017). Used the square pattern as main shape also the Gable, and sloping roof as noticeable technological element of this period (Yekta 2015).
Ground Floor		The placement of the staircase as central area in the plan organization as a result of the new style of the Qajar architecture and technology symbol. Actually, the previous Houses the staircase was built as corner in the plan organization. Also using the large and massive Ivan in the house entrance was the new Qajar contemporary architecture symbol. However, the building structure is barrier wall.
South Elevation		In the south elevation the variety of windows used for transferring light into the inner spaces and having maximum thermal comfort for users during a year. As technological semiotic view the windows detail and the window's proportion in height generated as symbols of advanced technology which were excited in that period.

West Elevation		In the west elevation, the windows number and proportion is less than other facades because of the microclimate. However, the window style is a combination of eastern plasterwork and wooden Iranian frame, which are designed according to advance technology of Qajar period.

Table 6. Facade, Plan and section elements analysis.

VI. CONCLUSION

Interaction between countries is inevitable and the transfer of technology, style, and culture as a result of this consequently affects each society. The Qajar period was a bold time of new relationships between Iranian society and other developing countries, which affected Iranian architecture. The Qajar architects used traditional patterns in a new way and promoted these patterns by using innovative technology to create more powerful spaces. By investigating Iranian architecture and its symbolic used of technology in the Qajar period (19th – 20th century), it can be found that the creation of space had better features and was of a more powerful quality than in other periods. The development of the building structure used lightweight materials common in the Qajar period to generate a variety of valuable spaces. Furthermore, areas had more open spaces using Iranian architecture patterns, which were built to maximize light with clear spaces. The Moshir-ol Doleh house is one of the symbols that depict the changes in Iranian society as a result of the development of technology. The luxury lifestyle changed people's thoughts and as a consequence, generated a different style for use in house areas. One noteworthy aspect of the case analysis is the combination of Iranian architecture features with foreign architecture features. This means that Iranian patterns were generated via advanced technology, materials and styles for use in the Qajar buildings. In regards to the material approach in this period, there was a huge number of wooden beams used in the interior roof, which had two main functions: as a decoration and to provide heating insulation. According to its climate-based design, the main entrance in the south façade is useful for controlling the cold west wind. While in Iranian architecture the courtyard was private and provided solace for the users, in the Qajar period, the function of the courtyard changed and their dominant form became semi-closed areas. This is because during that time, the urban plan changed and streets were built. As a result, the courtyard turned into a connecting external area between the main building and urban circulation areas. Some other building elements' functions also changed during this period. For instance, using columns in the balcony as symbolic and decorative elements with a western head illustrates the advanced technology that was used in the building.

REFERENCES

[1] Rapoport, A. "Symbolism and Environmental Design", Journal of Architectural Education, 27(4), 58-63.1974.

[2] Radford, A. D. "Local architectural language and contextualism", In Design Review (pp. 165-174). Springer US, 1994.

[3] Braham, W. W. and Hale, J. A. (Eds.). "Rethinking technology: A reader in architectural theory", Routledge, 2006.

[4] Mackenzie, D., and Wajcman, J. "The social shaping of technology", Open university press, 1999.

[5] Feyzi, M., and Esmaeldokht, M. "Genealogy Analytical Technology for the Identification of New Construction Buildings Architecture with Field-Oriented Approach", URBAN MANAGEMENT SPRING, 14(38), 173-195, 2015.

[6] Sani, R. M., and Shotorbani, P. M. "SYMBOLIC USE OF WIND-CATCHERS IN IRAN", Open House International, 38(2), 2013.

[7] Fryer, J. E., and Collin, B. T. "25 Year Index to Pennsylvania Folklife (Including the Pennsylvania Dutchman and the Dutchman)", Pennsylvania Folklife Society Collection, Volumes 1-25, 1949-1976, 1980.

[8] Erman, O. K. "The analysis of symbolic performance in mass housing settlements", Building and environment, 39(4), 449-457, 2004.

[9] Eco, U. "A theory of semiotics", Indiana University Press, (Vol. 217), 1976.

[10] Blumberg, P. "The decline and fall of the status symbol: Some thoughts on status in a post-industrial society", Social problems, 21(4), 480-498, 1974.

[11] Diba, D., and Dehbashi, M. "Trends in modern Iranian architecture. Iran: architecture for changing societies", Umberto Allemandi and C, Torino, 31-41, 2004.

[12] Yekta, Zinat Azimi. "Architecture of Iran in Qajar Era", International Journal of Academic Research in Business and Social Sciences, Vol. 5, No. 5 ISSN: 2222-6990, May 2015.

[13] Kamali. Mohamad Reza. "Investigating the Qajar era architecture", The Journal of restoration and heritage. 4(5), 47-54, 2009.

[14] Roshanfekr, J. M., Roshanfekr, J. S., and Najafgholi, P. K. N. STUDYING THE EFFECTS OF MODERNITY ON DEVELOPMENT OF IRANIAN ARCHITECTURE IN THE QAJAR ERA. Indian Journal of Fundamental and Applied Life Sciences ISSN: 2231– 6345, 2016.

[15] Asefi, M., Maziar, and faith. "The recognition of the building's architectural past roots and the spirit of the time, primacy of the past, just now", The identity of the city, 8 (19), 63-76, 2014.

[16] Eiraji, J., Gollar, P. J., and Bukani, A. N. "Ivan: Creator of Sustainability in Iranian Old Houses", Na, 2012.

[17] Fakhabi, A. G., Parvizi, R., and Memarian, G. H. "Enjoying the pattern of Tehran's historic houses in Qajar and Pahlavi periods in residential architecture of city", Journal of Current Research in Science, (2), 771, 2016.

[18] Hamid reza, S., Sajad memar D. "Comparative Review of Contemporary Iranian Architecture Tendencies: Recognition of Designing Theories among Three Generations of Architects", Naghsh E Jahan Journal, 2014.

[19] Hasani, K., Borazjani, V. N., and Salami, M. N. "Re-read of Court's Form and Related Spaces with Shape Grammar Case Study: 100 Houses of Qajar Dynasty in Kashan City", The Scientific Journal of NAZAR research center (Nrc) for Art, Architecture & Urbanism, 13 (44):71-80, 2017.

[20] Vahdat Talab, M., and Nikmaram, A. "Investigation of the Importance, Frequency and Distribution of Red Color in the Historical Houses of Iran. Case Study: 22 Crowns of Qajar Houses in Tabriz", Journal of Fine Arts, Architecture and Urban Development, 22 (2), 87-97, 2017.

[21] Qelichkhani, B. "Historical Evolution of Qajar House of Baqeri in Gorgan", International Journal of Architecture and Urban Development, 2(2), 15-24, 2012.

[22] Abbas, M. Y., Nafisi, N., and Nafisi, S. "Persian Garden, Cultural Sustainability and Environmental Design Case Study Shazdeh Garden", Procedia-Social and Behavioral Sciences, 222, 510-517, 2016.

[23] Arjmandi, H., Tahir, M. M., Shabankareh, H., Shabani, M. M., and Mazaheri, F. "Psychological and spiritual effects of light and color from Iranian traditional houses on dwellers", e-BANGI, 6(2), 288, 2011.

★★★