

A Comparative Study of Social Behavior in the Windows of the Traditional and Modern Houses (Case Study: Sari)

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ABSTRACT

Window is one of the factors which have influential role in shaping of buildings in Iranian architecture. Windows guide light to the interior space, create a view from the inside out, create a visual connection between the inside and adjacent spaces and create a natural ventilation in space. Window has a special position in traditional Iranian architecture and has a rich history. With the advent of technology, thousands of years of traditional experience, have been at odds with the new method in construction of buildings. This study aims to evaluate social behavior in the past and present, in order to analyze the role of differences in the behavior of the windows in the traditional and modern houses. Therefore, four houses from historic homes in the city of Sari, located in the alley Ab Anbare No (one of the streets of the historic urban) and four houses of modern houses in the alley Peyvand 8 (one of the streets of the modern urban) have been chosen in order to study the role of social behavior in window of the house in terms of factors such as size, position, okb and orientation of windows. Thus, after providing a definition of the meaning of window and a brief talk about the history of window, we will examine the role, position and performance of window. Then, we will study social behaviors of past and present, in shaping up traditional and modern house windows and examine their effects in selected homes. Finally we compare modern and traditional homes windows with each other.

KEYWORDS: The concept of window; The history of the window; The role and position of the window; Social behavior; The role of social behavior in the window

1. INTRODUCTION

Agricultural development during thousands of years has resulted in emergence of the first cities, because ability in food production at-site facilitated the possibility of permanent residence in a place. However, in history the population spread all around the habitable parts of the globe, but it was only in the 20th century that the process of population distribution planning got the attention in every country. During 20th century and through emergence of metropolises and regions with high population rates, the need for knowledge of population distribution and its analysis were felt, because highly populated regions require more accurate planning of public services and more attention toward long – term environmental Strategies [1]. As a result it could be stated that, by increase in population, the impact of social relations on environment and habitat is increasing.

In addition to social developments like increase in population rates and emigration that have influenced the organization of urban and rural habitats. There were other social developments that have been influential on the internal structure of houses. The impact of social factors on habitat could be divided in to quantitative and qualitative parts, from quantitative point of view, quantitative indices like, congestion, family size, facilities, services and from qualitative point of view, characteristics like type and time of communication between family members, the way people visit each other, presence of women in the community and the relationship between men and women in the society and at home, determine the way houses are formed in every historical period [2].

The architecture of every territory and culture possesses special features which define the architectural identity of that territory. Factors that convey the architectural features of a territory, include a wide spectrum of members and elements of a building which encompass the spatial organization and the overall establishment of the building up to the way that those architectural elements are implemented, also include details ,design and utilization of those elements.

Among those elements, the element of window because of importance of the roles that it takes in relation to the life itself, has a relatively greater share in conveying the message of those features [3].

In the architecture of different ethnicities, the window has a significant share in forming the view of residential buildings and thus in transfer of architectural features, and when containing environmental and cultural characteristics that the building belongs to, it expresses the architectural identity of its place. Cultural features are clearly observable in the structure of traditional windows.

modern age developments and unlimited freedom in deformation of building elements have produced a kind of disturbance and sometimes a uniform homomorphism, for the window, that is unrelated to the culture. This issue has diminished the role of window in human life and it still could not be a messenger of the culture it belongs to.

On the other hand, in most communities the many types of traditional windows have been distanced from the concept and functionality once they possessed.

It seems that re-identification of existential aspects of the window in every culture is too beneficial in comprehending the architectural concepts of that culture, because knowledge and practical experiments of mankind are stored and transferred from a generation to the next generation [3].

With changes in the life style, interactions and social relationships, the physical spaces particularly the habitats and residential complexes have gone through drastic transformation [4]. The form and organization of window is affected by the house, i.e. the position of the window in a house. As construction of a house is itself a cultural issue, its form and organization is naturally influenced by the culture which the house is its product [2]. It is a reality that the perspective of various communities and cultures toward the window has been sometimes different and its concept also has gone through transformation in the history. Along with developments in construction and materials, there has emerged unimaginable freedom in deformability of buildings as a whole and in their components, and this freedom especially has produced uniformity in windows which is unrelated to the culture and that in itself has lessened the role of window in the life of mankind, Now windows could not be accounted as the messengers of the culture they belong to, this issue has strengthened this notion that an all- encompassing recognition of concepts of architecture culture is necessary [5].

Among important functions of window one could mention its positive impact in provision of lighting for space, maintaining vision from interior to exterior space, noise trapping, direct ventilation for sanitation of the interior space and its contribution in maintaining natural cooling and heating [6]. New era developments and unlimited freedom in deformation of building elements have produced a kind of disturbance and sometimes a uniform homomorphism, for the window, that is unrelated to the culture. This issue has diminished the role of window in human life and it still could not be a messenger of the culture it belongs to [3].

2- Definition of window

Window is one of the vital elements in traditional architecture of every ethnicity and culture, which contributes significantly in the external form of a building and transfer of architectural features of that particular culture and expresses the architectural identity of its building.

But new era developments of architecture and unlimited freedom in the shape and form of windows have produced a kind of disturbance and occasionally uniformity in the buildings that have lessened that identity that was perceived in mind of people concerning the role of window.

In Persian language, various types of lattices, installed with Rozans and openings were called windows. The word window is used mainly for houses and in public and religious spaces the word “Rozan” is used. In the past architecture, various types of windows together with their names were related to the type of the space they were used in, which indicated the effect of social, cultural and functional relations on the shape and form of the window. In Persian language and Iranian literature, the often used words for window are concerned with light and shining [7].

Window had many derivatives in architecture culture and Persian language and the reason for it was, the different relations each had with spiritual thinking and notions of mankind. In Persian language the word “panjareh” is derived from the word “Panjara” in Sanskrit, meaning “cage”. In Ordu language it has the same meaning [8]. This word means a lattice opening that is entered Persian language from the fourth century on, and apparently later got a more general meaning and was applied for any opening latticed or non – latticed with any kind of material [9], Pirnia also defines “Panjareh” as lattice or something with holes in it, he too calls lattice doors as door and “Panjareh” [10].

The history of the word “Panjareh” is also understood from the literature texts.

As thou can't listen and can't see by heart

The ears can only hear the songs of minstrels, and thy eyes see the ridiculous

Having a desire to see amazement,

Thou has sat on a scene looking at the window waiting for that (Naser Khosro)

Fakhredin Asaad Gorgani, poet and raconteur of first half of the fifth Hijra century in “Veis and Ramin” has used the word “Panjareh” as a lattice fence, a lattice installed in front of an opening and Rozan.

They were ordered to enclose the house with fence, steely walls and hedge

Anywhere was a light space, there was a steely window around it (Asaad Gorgani)

These verses show that “Rozan”, “Daricheh” and “Panjareh” were three different things. If we call “Daricheh” a small door which could be opened or closed, it would be the same window as is used today, Thus “Rozan” is a hole that is often open to let the air in, and window is a lattice fence in front of it. Also Sheikh Bahae, the mystic and scholar of Safavieh era, has a poem as this:

Blaming Bahae's own heart ended the story;

Ridiculed the logic in the love assembly

Tore the formal scientific books

And made them waste papers for the windows (Sheikh Bahae)

3- History of the window

In primitive cottages only a small “Rozan” had the Role of inlet and provided a source for light and ventilation, occasionally one or two smaller Rozans would also have been added. Today the most used traditional window provided in masonry walls is the vertical window, which till 20th century was accounted as the main window

pattern [11]. In the past, windows were in fact lattices with no ability of being opened or closed, and what we now term 'window', was called "Rozan". In the past window was in the form of metal, steel, brazen or copper lattices like the metal lattices of holy shrines [12].

Perhaps the oldest examples of doors and windows in Iran's architecture are found in the figures of Median fortresses. There are no doors and windows remained from the Achaemenian, Sassanian and Persian and Parthian periods to see how they were built. Only we know that Achaemenian kings would bring hard woods to construct doors and windows in addition to cedars and pines that were appropriate for being used as cover. Even gold, silver and ivory were used for decoration of doors and windows [13].

Old and traditional windows were mostly in rectangular and sometimes square shapes ,also occasionally windows or door / windows were comprised of an opening in the form of an area having quadrant angles and a fixed part with ogee arch khalil, etc. seldom circular or semicircular arches were used . (Soltanzadeh,1996,pg.40)

The most important element used in a window is glass, its genesis goes back to Sumerians and Egyptians. Some sources site the Mesopotamia as the origin of it [14]. Glass manufacturing industry in Iran also has a long history, it is said the Elamites about 13th century B.C had been familiar with this industry, So that glass paste tubes were found at Choghazanbil Temple having a length of 75cm and an external diameter of 3/10 cm. Too, it is said that glass was used in the lattice of the windows [15].

4- The role and place of the window

Window is an important element of architecture, that was and is in various forms and shapes and has a special place in Iranian architecture, so considering various functions of glass as an important architectural element, the role and place of window could be investigated as follows:

- Every built space, is separated and distinguished from the open and natural space by elements such as walls and roofs. The size and limits of this differentiation and confinement is not always the same, so the built spaces could be divided in to three categories: First Enclosed spaces, second Semi-enclosed spaces and the third semi open spaces.

Enclosed spaces are spaces that are separated and differentiated with open spaces and only an entrance in the most simple form using one or more Rozans, to maintain the least light, connects them to the exterior space. Semi-enclosed spaces are spaces ,that on average, a front of them is connected to the open space via a row of doors, windows or door/windows and their opening in proper times could create a relatively extended connection between the built space and the open space. Open spaces like terraces and porches lack windows, because they are directly in contact with the open space and simply get enough light [7].

The amount of light needed for every space is dependent upon various factors including function, depth and height of that space. In the past the light-entrapping area was chosen proportional to the factors involved so that sufficient light be provided. Provision of light is the main function of a window, because a space without light is not good for human life [7].

- A built space without proper ventilation is not good for living. The volume and amount of ventilation needed for various built spaces are not the same but are dependent upon various factors like temperature, moisture, and other characteristics of natural environment. In hot and arid areas there is need for ventilation of the interior spaces, So that providing windows along one front of a room would suffice. But ventilation of interior spaces of residential units and some other spaces in humid, Mild-and-humid, or hot-and-humid regions was very sensitive and important, because living in an enclosed humid space, without ventilation is almost impossible.

As it is the case with regions with very hot and humid climate, like regions along the Persian Gulf, it is not possible to live in enclosed and without ventilation rooms especially during summer season. Thus to better ventilate these spaces, windows are provided along two fronts of a room, preferably at two fronts opposite each other, for better air movement [7].

- Providing possibility of taking advantage of natural or built landscapes outside of enclosed spaces, is another application of windows. Living within a built space that its lighting and ventilation problems are solved in any way but lacks proper landscape and visibility is not desirable, and in long term living in it would become unbearable and problematic.

For this reason, in introspective buildings, in which the court provided the landscape of the building, it was designed and constructed in the most appropriate way to function also as a good landscape. Also in introspective buildings often the most important part of the open space, in various types of architectural units that constituted the landscape, was decorated in the most pleasant way [7].

- Window was not considered only as a simple element for maintaining some primitive needs, but like many of architectural elements, played an important role in decoration and aesthetics of buildings. So that in many of architectural spaces it was utilized as the most important factor in design and decoration of interior and exterior facades. Accordingly, the form, size, position and order of it in a façade were under scrutiny [8].

5- Role of social behaviors in the windows

By studying a few books or even looking at some old pictures of a few past decades, one could see a major difference between past and present. During a few decades human life changed dramatically. Technology and innovation have introduced extraordinary changes in our life making it much different from that of our fathers and forefathers.

Today's mankind is not satisfied with horses, carriages, or even black and white TVs, instead new hobbies and necessities which are dependent upon technology have taken their places. Facilities and communications

available to us were not even in the imagination of people living just a few decades ago, while their absence is unbelieveable and a catastrophe for us.

The cause of all these changes, is new technologies being emerged during recent decades and changing our life, It is not possible to mention all of them but to name the most important and influential one, it is the invention of electricity. Electrical energy has provided mankind with the most complex advances in technology. It is one of the most respected achievements of mankind which has on undeniable role in his life. The role of electricity on social behavior of people was so that the traditional role of windows as elements supplying light, maintaining visual contact between interior and exterior and providing natural ventilation is forgotten now.

In continuation we will investigate the role of social behaviors on the performance and the place of windows in residential houses. This research aims to investigate the role of difference in existing behaviors on the windows of traditional and modern houses, through study of the past and present social behaviors. Thus four historic houses of the City of Sari, located at "Abe-anbare-no" alley (in the historic texture part of the city) and four modern houses at "Peyvand-8 alley (in the modern texture part of the city) have been selected, and the role of social behaviors on the windows of these houses is studied from the following points of views and factors: (Figs 1&2).

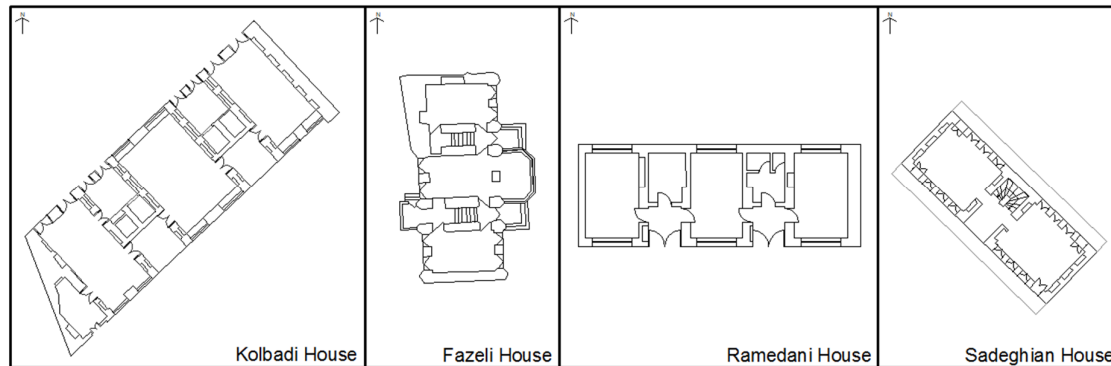


Fig.1. Plan of historic houses in Sari

Source: Encyclopedia Architectural History Iranshahr (Iranshahrpedia.ir)

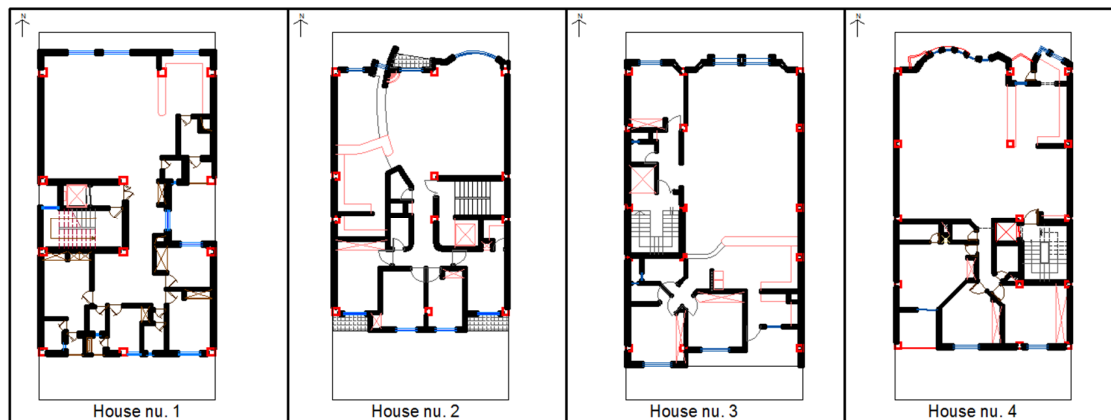


Fig.2. plan of modern houses in sari. source: Author

5-1- Supply of light

Light is an active factor in introducing the space, therefore utilizing light in space making and creating a desirable atmosphere is an influencing factor. Light is the primary condition for any visual perception. In absolute darkness we cannot see the space nor forms and colors. Light is not solely a physical necessity but its psychological value is among the most important factors in all aspects of life. Light in addition to its application has symbolic value and has been a indispensable part of life itself [9].

In Iranian architectural spaces, use has been made of light and darkness hierarchy in the direction of movement and conduct from a space to another space. Along the movement track, entrance of light through Rozans into the interior space is highly sophisticated. Also the openings and Rozans of the room are so that the entrance of light, allocates a limited area of the interior space skin. Entrance of light into the interior space is established through the beams of light, and being in contrast to the dominant dark space of the interior, the effect of light becomes more important and significant [5].

Natural light in traditional buildings always determines the direction and enters from a specific direction in to the spaces. But in contemporary age, with obvious changes in human understanding of sky, from a metaphysical

space to a physical and materialistic principle, light has turned to a physical element. Therefore utilizing light in modern space has turned to an applicable element void of its mystical meaning. In other words it could be said that: “light in traditional architecture causes concentration and in modern architecture, dispersion” [11].

In investigations made from new constructed houses mentioned before, we find that these houses are used more during night (except for holidays). The residents who had jobs were mainly out of their houses during hours of day. This in turn reduces the importance of windows as means for absorbing natural light, also provision of thick and multi-layered curtains in front of all windows of these houses is another reason for the diminishing role of windows in providing light in newly constructed houses.

Now we will perform a comparative investigation of role of windows of modern and traditional houses in terms of amount of light received from two aspects of the area and number of the windows (Table 1). For this purpose we have calculated the area and number of windows of above mentioned houses and divided them by the total area of the building and so have reached a criterion for performing comparison.

Table 1. Role of windows in the amount of received light. source: Author

	House name	Window area (m ²)	Building area (m ²)	Percentage of window area to the total area of the building	Number of windows	The number of windows per 100 sq.m
Traditional Houses	Kolbadi House	83.1	204	40.7 %	12	6
	Fazeli House	49.0	100	49.0 %	15	15
	Ramedani House	18.9	146	12.9 %	6	4
	Sadeghian House	32.0	75	42.6 %	16	21
Traditional Houses		183.0	525	34.8 %		9
Modern Houses	House nu.1	20.4	234.5	8.7 %	House nu.1	4
	House nu.2	22.4	222.1	10.0 %	House nu.2	4
	House nu.3	18.6	249.2	7.4 %	House nu.3	3
	House nu.4	17.6	239.5	7.3 %	House nu.4	4
Modern Houses		79	945.3	8.3 %	35	4

Figures 3&4 compare the percentage of windows area to the building area, and their number per every 100 square meters of modern and traditional houses.

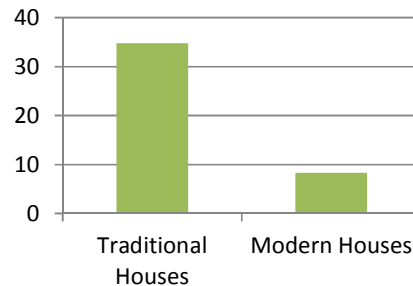


Fig.3. Number of windows per every 100 m² of houses source: Author

Fig.4. percentage of windows area to the building area source: Author

By investigating the table and the above diagrams, we find that windows in the past had a more obvious role in absorbing natural light. Hence the social behavior of the residents of the newly constructed houses, in terms of using the space of homes during night hours rather than day hours, shows its impact on the area and number of windows implemented in these houses.

5-2- Natural ventilation

Air drafting within interior spaces of a building, or in other words ,free and relatively rapid flow of air from a window to another window of a room, removes the hot and humid layers of air from around body of the inhabitants of these spaces, and is a kind of physiological cooling of a building, which creates a state of comfort for man in the interior spaces of humid regions [18].

In humid regions where natural ventilation and air drafting in interior spaces is among main objectives of climatic design, the windows characteristics, especially those windows located in front of the wind, are of vital importance. The direction of the window compared to the direction of wind, the height of the window, and the position of installation in the wall, the type of the window and the way it opens, especially shape and size of those located in front of the wind are among the factors that determine the potential ability of the building in air drafting within interior spaces [19].

The role of windows in ventilation of houses could be investigated in the following points of view:

- **Area and number of windows:** It is natural that by increase in the area and number of windows, better ventilation of houses becomes possible.

• **Position of the windows:** In humid regions, among the best climatic methods for adjusting environmental conditions is utilizing wind flow and ventilation, the best installation conditions of windows to establish a desirable ventilation are as follows:

- In northern and southern walls, in a height equal to the height of a man and at the direction of the wind.
- Similar to the above case, also in interior walls [19].

There should be no obstructions against the wind flow entering from a window and existing from another window, because in this way the natural ventilation of the home is decreased. A complete open plan without walls is the best way of using air flow (Watson & lab,1993,pg.16). It is clear that by reducing the distance between windows, better air drafting conditions would be provided, for this reason buildings in these regions have wide, lengthy and narrow plans.

After questions made from the inhabitants of modern houses, it is found that neither of them is willing to use window instead of cooler during warm season of the year. It is clear that this change in social behaviors of the inhabitants, which itself is influenced by rapid technological advances, would affect the shape, role, and position of windows of present day houses.

Inhabitants of such houses are not able to bear high temperatures, and with least temperature intensity are after using electrical appliances to cool the interior spaces, It is clear that the impact of thick curtains in front of windows could not be overlooked. Table 2 investigates the role of area and position of windows in interior ventilation of houses mentioned above.

Table 2. Role of area and position of the windows in interior ventilation of houses. source: Author

	Houses	Percentage of window area to the total area of the building	Position of windows	distance between windows
Traditional Houses	Kolbadi House	40.7 %	North - South	7.1 m
	Fazeli House	49.0 %	All directions	4.5 m
	Ramedani House	12.9 %	North - South	6.1 m
	Sadeghian House	42.6 %	West - East	4.0 m
Traditional Houses		34.8 %		21.7 m
Modern Houses	House nu.1	8.7 %	North - South	20.75 m
	House nu.2	10.0 %	North - South	16.8 m
	House nu.3	7.4 %	North - South	19.35 m
	House nu.4	7.3 %	North - South	18.15 m
Modern Houses		8.3 %		75.05 m

Figures 5&6, compare the percentage of window area to total area of the building and also total distances between windows located on two opposite fronts in traditional and modern houses.

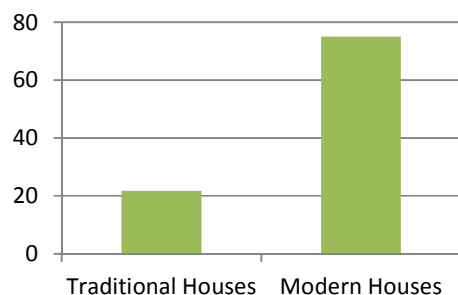


Fig.5. Total distances between windows source: Author

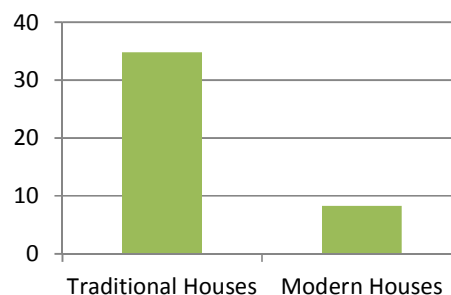


Fig.6. Percentage of windows area to total area of the building source: Author

A simple look at the table and above diagrams, reveals that the importance of opposite situated windows in natural air drafting of the interior spaces of houses is more in traditional houses than modern houses. Hence the role of social behaviors of modern houses inhabitants in not tolerating hot weather conditions because of taking advantage of modern civilization products, could be sought too in the construction of the windows. This is while the existence of thick curtains in front of windows adds to our reasoning.

In modern houses, the windows having large distances from each other and also due to presence of many obstacles between windows located at two fronts, they have not the same efficiency as windows of traditional houses in terms of ventilation.

5-3- Visual connection between interior and exterior

Weakest connection between interior and exterior occurs when we make opening in an element which completely limits the space. The aim of architecture is to create an interior space, as it separates a portion of the environment as a special space, from a larger environment. The strength or weakness of this separation depends

upon type of the openings. Basically a space to be recognized as a space needs that somehow this separation takes place. On the other hand complete separation is not a right act. Atobnolph says: "In order that a home does not turn into a prison, there is need for some holes toward outside world, so that it connects the interior space to the exterior space in a reasonable way". When separating the interior space from the exterior space in a physical manner, openings will be limited solely to doors and windows. Door allows possibility of entrance and exit for those allowable, and on the other hand it helps prevent entrance of miscellaneous people [20].

Window is the flying point of vision from exterior to interior. Man by looking toward interior, feels being inside home and experiences the place he belongs to. The space in front of the window of a room is a potentially distinguished place. Transparency of window, direct light and sun that shines through it, invite us to do specific jobs: Sitting next to the window, following outside traffic without being seen, looking at the nature and weather condition, studying or time-consuming works are among the live behavior patterns which emerge in a way in every culture and create the identity of the window [3].

Providing the possibility of taking advantage of landscapes both built and natural outside of enclosed spaces could be among other functions of the window. Living in a built space that is provided with light and ventilation in any way, but lacks a good sight and landscape is unpleasant and living under those conditions for a long time is very hard and problematic. Windows provide a good sight from interior space toward outside and facilitate visual connection between interior of the building and surrounding spaces [7].

The effect of social behaviors could be easily detected in the role of visual connection provided by the windows.

A window in modern day houses is covered with thick and multi-layered curtains so that it can't provide a landscape of the exterior space for the inhabitants of the house. This issue is completely obvious in the arrangement of furniture where the direction of all tables and furniture is toward TV. Today, people are not so willing to look at outside environment from their houses, and because of that, the area and number of windows in traditional houses has significant difference with those of modern day houses.

Variation and developments in vertical position of windows is also affected by variation in social behaviors of the inhabitants of these houses. As the sitting place of traditional houses was the ground and as windows played a great role in provision of proper sight toward outdoor space, the vertical position of windows in these houses was extended from the ground up to the roof. In fact with an OKB near zero it was very easy to have visual access to the exterior space, while in modern day houses the sitting places are furniture and chairs. Hence today the windows have higher OKBs. Fig.3 illustrates the role of social behaviors of inhabitants on the manner of sitting in the home and on the vertical position of windows especially the OKB value of the windows. Also Fig.4 illustrates the role of other social behaviors of today and yesterday inhabitants, while sitting together, on the position and importance of windows.

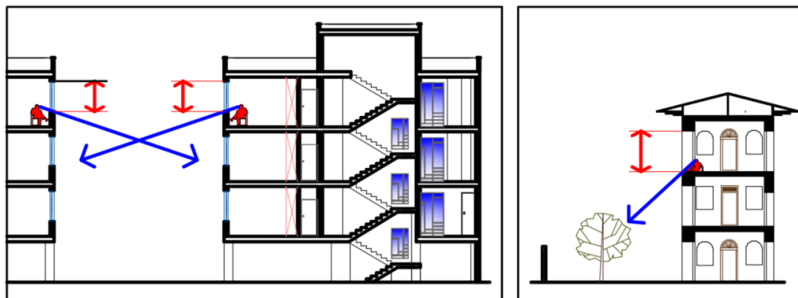


Fig.7. Role of OKB of the window on visual access to the exterior space. source: Author

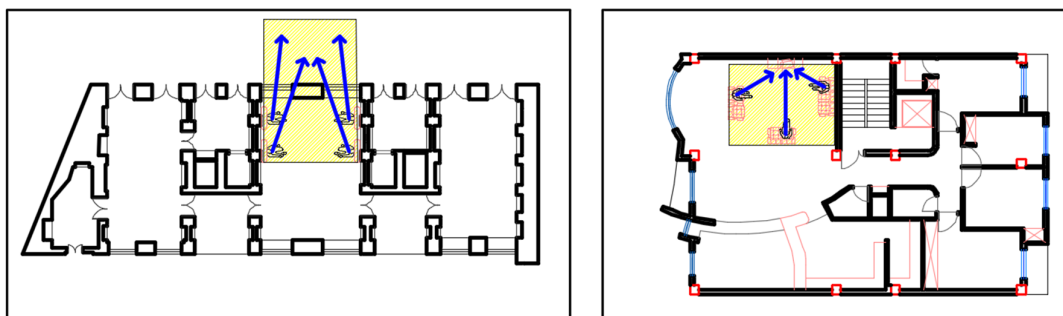


Fig.8. Role of social interactions of inhabitants on the formation of windows. source: Author

6- Conclusion

The role of social behaviors on the windows of traditional and modern houses could be investigated from the following aspects:

- As inhabitants of modern houses spend their at-home times during night rather than day and considering possibility of maintaining lighting of interior spaces by artificial light rather than natural light, the characteristics

of windows in traditional houses for absorbing natural light is important , among them the following aspects could be mentioned:

- The area of windows in traditional houses was more than that of modern houses.
- The number of windows per every 100 square-meters is more than that of modern houses.
- Inhabitants of modern houses prefer using cooler and other cooling facilities rather than natural ventilation and air-drafting. Because of this, the area of windows in traditional houses was more than that of modern houses, also they had smaller distances of each other.
- Inhabitants of modern houses tend to cover the area of windows with thick multi-layered curtains which limit visual access from the interior to exterior space, while windows in traditional houses provide easy visual access to the exterior space.
- Inhabitants of modern houses tend to sit on chairs and furniture rather than on the ground, this has made the windows to be extended horizontally with an OKB equal to 80 cm, while windows in traditional houses are extended vertically with an OKB near zero.
- Inhabitants of traditional houses tend to speak with each other in their meetings. The arrangement of the interior furniture which included mats and pillows, increased the importance of this matter. The role and importance of having visual access to the exterior is manifested in the direction of furniture towards the windows. Here visual access from the interior to the exterior space is easily possible, while arrangement of furniture in modern houses is focused on television, here visual access towards exterior is not possible.
- Table 3, illustrates the comparative comparison of the role of social behaviors in windows of traditional and modern houses.

Table 3. Role of social behaviors in the windows of traditional and modern houses. source: Author

Modern houses	Social behaviors	Use of houses is more at night rather than day		Lower tolerance of inhabitants toward heat(using technology products)		Window covered with thick curtains	Focus on TV when sitting together
	windows	Small area of windows to total area of the building	Lower number of windows per every 100 square meters	Small area of windows to total area of the building	Large distance between windows	Not watching exterior space through the window	
Traditional houses	Social behaviors	Use of houses is more at day rather than night		Higher tolerance of inhabitants toward heat		Window not covered with thick curtains	Speak to each other when sitting together
	windows	Large area of windows to total area of the building	Higher number of windows per every 100 square meters	Large area of windows to total area of the building	Small distance between windows	watching exterior space through the window	

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