



Global Journal of Scientific Researches

Available online at gjsr.blue-ap.org

©2020 GJSR Journal. Vol. 8(2), pp. 8-22, 05 Jul

Redefinition of typology of Iranian ecological semi-open housing spaces with respect to pattern of local houses at northern Iran in line with housing ecology

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Received: 05 June, 2020

Accepted: 16 June, 2020

Published: 05 July, 2020

ABSTRACT

Despite emerging of modern architecture and losing identity in new constructions, typology is assumed as one of the important subjects that try to identify applied techniques to achieve past local identity creating elements and patterns and to use them in today architecture as modern form. Traditional housing structures act as primary formative core in cities and also the existing architectural elements and monuments in them are surely assumed as precious heritage for review, analysis and presentation of suitable local architectural patterns. According to the conducted observations and studies, today housing constructions are usually built regardless of climatic and local patterns and they encounter several problems either in terms of identity or climatic dimension and energy consumption. Many residential complexes have been built during several years in most of which Persian traditional and local patterns have been forgotten and or utilized symbolically and as cases but they have neither climatic and functional efficiency nor effective in terms of identity. Inter alia, these patterns, central yards, open and semi-open spaces, extroversion and introversion have been highly addressed especially in cities placed in tropical climate.

Research criteria and objectives: The main problem of this study is lack of certain pattern or method to give identity to modern housing architecture that has been derived from original Persian local architecture.

Methodology: The above-said research is a qualitative studied methodology and the related diagrams are presented for data analysis with descriptive and analytical structure to examine patterns of semi-open spaces at northern Iran and also the used methodology is based collection of valid evidences from the sources in EBD. Accordingly, efficiency-based design is an approach in designing process that tries to employ evidences and case samples to meet the needs to design based on making decisions with high utility of responsiveness.

Research results: It is inferred from the primary investigations based on the given elements that using semi-open spaces of local patterns in design of modern houses may provide climatic comfort and even mental health for inhabitants and their identity structure as possible. Thus, it can be found that the role of local identity may depend on these criteria (e.g.) in the process of architectural design of modern houses.

Keywords: *Housing typology, Persian housing, Semi-open spaces, Architectural design*

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INTRODUCTION

The subject of using the housing typological theories that are based on founded standards in ground patterns may not be a new topic and it has been empirically utilized in traditional residential architecture. Designing plan based on these patterns was led to constant utilization from the plan during long years. The logical common features are visible in design of form of plans in coordination with climate and environment in housing typology of Iranian cities. The sustainable concept such as orientation, harmonies, way of establishment and proper placement of spaces and their relations with each other in building plan has been favorably expressed at micro scale of plan. Housing typology can be explored from various and numerous aspects and viewpoints. Dealing with general and various forms of placement of major spaces in a residential unit or types of traditional houses is deemed as one of the fields of typological studies. It aims to be aware of possible variations in general forms of residential unit and proper establishments of semi-open spaces in contemporary housing (e.g. balconies, patio, central yard and courtyard etc.) and also enhancement of quality and flexibility of these spaces for residential complexes toward developing privacy sense and or pausing space (interstitial spaces) were analyzed.

- Establishing efficient communication between house owners with semi-open spaces

- Removing idleness of semi-open spaces in modern housing
- Upgrading visually quality of balconies and patios
- Creating pausing space in lobbies of residential complexes
- Generating sense of place and sense of privacy at central yards
- Revival of values of interstitial spaces in modern housing

Lack of effective function of semi-open spaces and giving identity to them as an independent space on the one hand and shortage of interior spaces to meet needs of inhabitants in residential flats on the other hand has caused these spaces to find alternative practices e.g. storeroom and laundry house for cloth or placement of satellite dishes. Similarly, lack of necessary predications for location of HVAC utilities may sometimes convert semi-open spaces into location for placement of such utilities. Access to suitable space (penetration) and impact of climatic conditions are also assumed as very important factors in function of semi-open spaces that may be deemed as less important than other factors based on attitude of users. The necessity for paying attention to semi-open spaces in Persian housing may be thought in this way: Unfortunately, during recent centuries and over the time and especially with the presence of alien culture in housing architecture in this land, the subject of creation of dynamic and harmonic semi-open spaces for living of inhabitants has been forgotten and limitation of such places to storeroom, transport paths and or into residential units, it has omitted using semi-open spaces as some part of human living environment from residential complexes. The given pattern in research findings and related preferences may play essential role in identifying relevant problems and their correction within framework of design rules and or patterns.

As a result, approach regarding semi-open spaces and revival of this pattern in Iranian northern houses in contemporary residential spaces are intended to create sense of attachment and viability of house for the human at present time so that in this space his/her needs to be met along local and contemporary patterns. Finally, in order to design for living complex with respect to culture and type of lifestyle and social relations and useful life of housing and mental health of dwellers in this space we will build purposive and valuable form with viable future in it. In fact, housing design at present time requires for study and knowledge about housing types in the past time because identifying elements of traditional houses will essentially contribute to climatic design and quality of spaces in modern housing. The present study aims finally to acquire a hybrid pattern of traditional and modern architecture and to create quality in several spaces e.g. balcony, lobby, atrium and patio etc. and for new quality and valuable restoration of semi-open spaces in Persian housing.

Theoretical basis and methodology

The methodology and also main focus of current study is based on measurement of housing semi-open spaces by interpretation of criteria for more accurate analysis on human requirements and quality of environment with respect to pattern of local houses at northern Iran and additionally descriptive methodologies and quantitative evaluation were employed for this purpose. (Diagram-1)

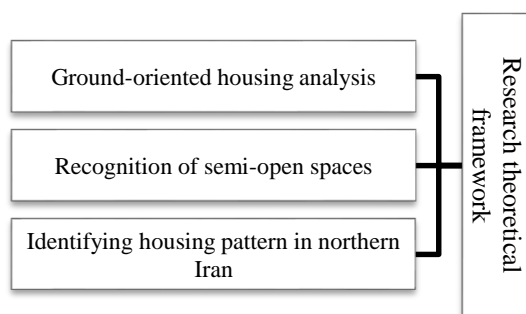


Diagram 1: Research theoretical framework (Source: Authors)

Methodology

The methodology of this study is based on evidences and data analysis. The data were collected by librarian technique and field study. Likewise, one could achieve research criteria by analysis and study in the process of the existing case samples.

Resources for collection of valid evidences in EBD: Rather than referring to published studies from scientific researches, the authors can receive help from other sources to acquire valid evidences and presentation of the best design for the current study. They can acquire knowledge from other existing sources by following techniques: This type of methodology, in fact, evaluates these elements by review of current samples and environment based on proved and observed criteria. (Mardomi et al. 2013)

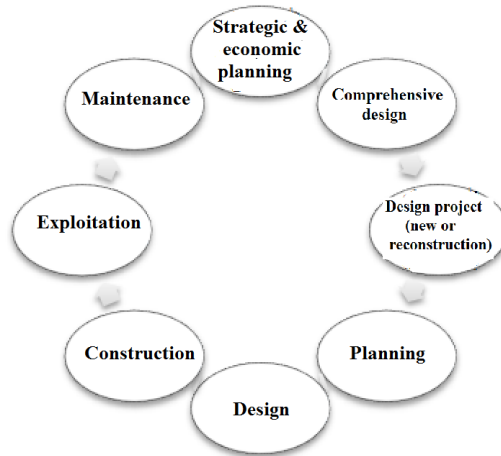


Diagram 2: Project life cycle in terms of evidence- based design EBD (Mardomi et al. 2013)

Research hypothesis

It seems typological analysis on architectural and local semi-open spaces in northern Iran can crucially help to employ these spaces in modern housing design.

1. Subject literature

Given the importance of house in relaxation, resting, self-suggestion and human growth and motion; on the one hand, and anxiety and extensive changes and lack of identity in today living spaces; on the other hand, we should ponder deeply in this regard. The residential spaces have devoted the highest percentage of use in urban buildings and also it has qualitatively essential and decisive impact on type and way of housing architectural design and lifestyle and quality in various social classes. Among them, northern land of Iran including Mazandaran and Guilan provinces which are considered as some of important cities in this country some houses with traditional texture and architectural value have remained. This study aims to conduct typological analysis on these monuments to improve this valuable texture and to rescue them from emerging abnormal buildings. For this purpose, rather than recognition of relevant concepts and selection of appropriate method and analysis and employing the given results and comparing them with the requirements in the present time, it acquired design strategy and pattern for modern housing units.

Definition of type and typology

The main task of typology is the classification and categorization of samples based common criteria. This common criterion may often include performance of architectural space and sometimes formative features. Although only existing commonalities in phenomena and particularly in architectural designs do not signify they follow a certain pattern, but classification of samples based on types may also contribute to identifying patterns. According to John Lang, architectural theorist, typology denotes classification of samples (designs of environment and landscape, building and urban plans) according to common purposes or structure and form. Climatic diversity of Iran has formed various types of architectures. Inter alia, architecture of residential spaces can be assumed as dependent on ground features (climatic, cultural, historical and social) and with respect to placement of any house in specific location one can refer to influence of features of natural environment.

History of climatic zoning based on constructional viewpoint:

This study has been conducted by several persons and they are called Algi, Mahani and Givani techniques. The initial climatic zoning of Iran included four climates, but the last zoning in which human comfort requirements are considered inside open space on the one hand and conditions for employing materials in building walls on the other hand and accordingly Iranian climatic zone is divided as follows: (Tahbaz, 2011:9)

Table 1: Climatic divisions and type of architecture in Iranian geography (Source: Author and quoted from Tahbaz, 2011:16)

Climatic divisions and type of architecture in Iranian geography				
Type of architecture	Type of climate	Climatic features	Geographic region	Sample cities
Semi- introvert	Plateau region	Hot and dry summer-winter cold	Regions locating in Iranian flats	Ardestan, Isfahan, Semnan, Sabzevar, Shiraz, Yazd, Tehran
Introvert	Desert	Very hot and dry summer-winter cold	Margin of Central Iran deserts	Khoor Biabanak, Tabas, Bam, Qom, Kashan, Gachsaran

	Khuzestan and Jazmurian plateau	Very hot and dry summer- temperate winter with relatively high humid air	Khuzestan plateau and Jazmurian water basin	Ababdn, Ahwaz, Dezful, Shooshtar, Khorramshahr, Masjed Suleima, Iranshahr
	Southern coasts and isles	Very hot and humid summer- temperate winter- very high humid air and soil	Amman Sea and coasts and Persian Gulf	Dayyer Port, Kengeh port, Chabahar port, Bandar Abbas, Bushehr, Jask, Kharg, Qeshm and Kish isles
Extrovert	Caspian region	Relatively cold winter- relatively hot summer- high humid air	Low points at the margin of Caspian Sea and Turkmen Flat at the east of Caspian Sea	Amol, Babol, Sari, Lahijan, Anzali, Astara, Rasht, Gorgan, Gonbad
Semi-extrovert	Mountainous region	Temperate summer- very cold winter with long icing conditions	High mountains	Abali, Lar Pulus, Lighvan, Sarab
	High piedmonts	Relatively hot summer and dry winter	Relatively high piedmont regions	Uremia, Khoy, Ardakan, Fars, Tabriz, Lhansar, Zanjan, Saghez, Shahrilurd, Ghoochan, Golpayegan, Mahabad, Meymeh, Hamedan
	Lower piedmonts	Relatively hot and dry summer- cold winter	Low height piedmont regions	Sanandaj, Qazvin, Tafresh, Kermanshah, Mashhad, Natanz, Arakm Torbat Heydariyeh, Kerman, Malayer etc.

With respect to the research objective one can answer to some part of research goals by introvert architectural analysis where architecture in northern Iran is also of type. In fact, introvert typology is exposed to a type of housing architecture with several features e.g. having direct visual and physical relationship with outdoor space, lack of yard, expansion in height and spatial organization versus another space e.g. corridor.

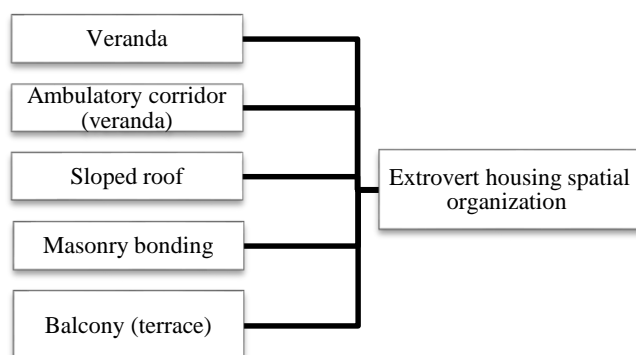


Diagram 3: Spatial organization of introvert houses in Iran (temperate and humid climate) (Source: Authors)

The free forms and even cross-like forms can be utilized in these areas; but nonetheless, building form must be drawn along eastern-western axis to enjoy the necessary wind stream. The main lighting front is directed toward south in most of rooms and verandas. The main yard of building is also placed toward south. Overall, wide and open plans and their form are mainly in geometric long and narrow figures. These plan have been determined to maximize use of wind stream in creating air circulation inside rooms and direction of placement of buildings was specified with respect to breezing direction of sea mild winds. In those points where sever winds may flow, the part of building is totally closed that placed against the wind. Similar to four-seasonal houses in arid zones where house dwellers displace from north to south according various seasons of a year, seasonal displacement is also done in houses at this region. As a result, the most important activities are done in rooms at first floor during cold season, but in hot season, these activities are done in verandas and especially veranda on the second floor (Talar) and room at second floor (Talar room). (Memarian, 2005: 10-78)

Urban texture is a platform including all formative elements and organic whole of streets and blocks one can assume them under various modes e.g. adjacency and full and empty spaces in various compositions as well as way of partitioning of lands. Urban textures are analyzed for three purposes: First, as tools for description of urban structure based on various features; the second, tools for analysis and creating relationship among ecological and socio-economic data with different types and their analysis; and third, tools for planning by providing deep perception of urban types that prepare the ground for more suitable planning and design. (Zaker Haghghi et al. 2010)

Table 2: Housing and city sustainable design principles in coastal areas at Mazandaran and Guilan Plateau (extrovert) at Iran. (Source: Authors)

Sustainable design principles of housing and city in hot and dry – arid zones (extrovert)	
Design principles	Texture treatment type
1. Orientation	a) elongation of block from east to the west
2. dispersed texture	a) Open plan form b) Texture dispersion for air circulation versus humid
3. Open paths	Application of open spaces with small walls
4. using materials with low thermal capacity	Local materials e.g. wood of trees to protect from high humidity
5. Extroversion and ambulatory corridor	a) Organization of spaces on ground floor is totally closed and on the first floor with Talar (veranda) and estival- seating spaces; under this condition, pleasant air is ventilated from sea and forest through higher floors day and night. b) Distribution of main spaces based on climate: Estival-seating space in houses on the first floor and hibernal-seating part occurs in totally closed room on the ground floor and also often on the first floor. c) Creation of veranda around building (ambulatory corridor) d) Lateral shades for wide windows
6. Using trees	a) Planting trees on slopes: To prevent from soil erosion
7. Natural ventilation and wooden grids	a) Using open air in two or four sides of building to create air circulation b) Using wooden grids for shading

Pattern-oriented architecture on the historical bed of Iranian contemporary architecture

Since the middle of Qajar era, fundamental transformation took place in Persian architecture so that the inspiring source, structure of design ideas and architectural form and thus materials and way of execution of building tended toward western world and kept Iranian multi-millennia architecture back (Ghobadian, 2013:123). This trend was led to disintegration from classic traditions at the end of constitutional period and Reza Khan’s era and tendency to foreign architecture emerged. At the end of constitutional period, the influence of western architecture and shifting artist’s image and fantasy took new dimensions from a subjective world to objective image and architecture during period of Pahlavi I and type of tendency from classic architecture became prevalent in Persian architecture (Saremi & Radmard, 1997:144). By inquiry in traditional architecture principles and inspiring from it at the end of 1960th decade it was possible for these architects to achieve Persian identity (Sobat Sani, 2013: 57-58). As a result, integration of classic architecture in Iranian contemporary architecture appeared newly in Persian modernism style (Ghobadian, 2013: 265-280).


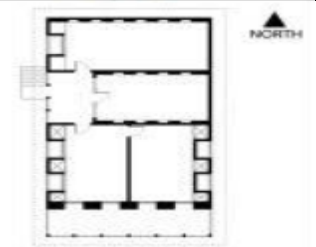

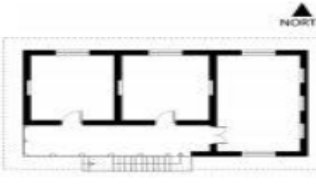




Unlike traditionalism that deals with repetition of classic symbols, noticeable approach in pattern-oriented architecture is concerned with updating the past and design and execution of historical symbols with new forms, colors, materials, harmonies and details. Therefore, the fact that traditional buildings have been constructed by modern technology or some traditional

decorations have been utilized on facades of modern buildings may exclude from classification of this study; the buildings and types of architecture in which Persian patterns are used in ideation and their formative design while in pattern-oriented architectural design and presentation of regional identity by architectural language is considered as the main objective.

The local architecture in Caspian coast which is integrated with form at the heart of nature and in coordination with it is today also appropriately responsive to create space in coordination with regional nature and climate so that it can be assumed as the best pattern to achieve sustainable architecture in this region. The coasts of Caspian Sea are composed of low plateaus with temperate climate and abundant rainfall where as it proceeds toward the east the moisture and moderated weather is reduced. Various types of materials are used in wall and ceiling of building in Mazandaran climate including wall built by circular mortise (*Zagmehi*), alternate planks (*Zigameh*), side-bond plank (*Darvarchin*), hen-claw structure (*Zogali*), wooden frame (*Nefar*) and roofs with plant gable (*Galipoosh*) or rice straws (*Kolash*), parallel planks (*Latesar*) and porcelain.

By formative comparison of local architecture with prominent thermal comfort strategies, it was concluded from the results of prominent thermal comfort parameters and local buildings in the region and through several case studies where some examples of them are given later that local architecture has paid very high attention to the climate and related design strategies have tended to tackle intrusive climatic conditions and using appropriate circumstances. Following tables includes some images of local architecture at this region compared with the reviewed climatic strategies. The following examples have been selected among 48 cases in comparison with climatic conditions and this issue may prove the fact of equality of thermal comfort strategies with experience of inhabitants (Delfanian et al. 2018).

Table 3: Pattern comparison of local buildings to climatic strategies (Delfanian et al. 2018)

Row	Image	Plan	Place	Pattern comparison with climatic strategy
1			Sama village (Kojoor)	Great number of openings at northern and southern sides, application of terrace for air circulation, roof with sharp gradient to oppose against rain, using materials with high thermal capacity
2			Pool village (Kojoor)	Using parquets with texture (radiation energy attraction), the walls related to fresh air, building length in east-west-direction, using moisture insulator materials, low density of building with maximum external surfaces
4			Pool village (Kojoor)	Using ecological and recoverable materials (sustainable architecture), e.g. wood as structure, lower number of openings at west direction, windows notch to create shade and prevent from entry of oblique raining in building
5			Left image: Pool Right image: Sama	Wide and open system to use wind, using radiation energy by means of materials e.g. straw clay, gradient elongated to ground to overcome oblique raining, using dark colors

Review of semi-open spaces in classic architecture

The semi-open spaces locating between residential buildings are the platform to link inhabitants to nature and place for spending leisure time in everyday life space. By traditional definition, Persian houses provided the potential for doing various activities prepared with different spaces around the house and family members could generally provide their spatial requirements inside these houses. In the past, yard was the first and most available space for close relationship with the nature and outdoor. Today, due to one-dimensionality approach and paying attention to economy, most of human, social, local and cultural values are ignored. As Tibalds implies about human-centered cities, the people were interested in traditional buildings and their more suitable juxtaposition because of existing necessary and specific qualities in these element such as recognizable patterns and complexity at the same time with order (Tibalds, 2006:19). The climate and culture of various regions are some of effective factors in formation of semi-open spaces at traditional houses. With respect to Iranian climate and also wideness and expansion of tropical climate in this country, placement of semi-open space beside residential space has been usually accompanied with formation of yard and veranda. Rather than creation of unity among space, yard produces a type of surveying relationship among them as well; this relationship is established either from entrance toward other side of sparse space or it relates various house parts with establishment of summer and winter landscapes in different fronts of house. Types of yard and open spaces inside traditional houses can be classified into ten types under influence of geographic phenomena: 1) Central yard, 2) Orchard ditch, 3) citrus garden, 4) Patio, 5) Gardened house, 6) Roofless space yard, 7) Outdoor stable, 8) courtyard, 9) landscape (half-fenced yard), and 10) Enclosed roof. (Soltanzadeh, 2011:84)

The yard with different typologies is located as one of the determinant and vital factors in tropical climate in Iran. Persian yard possess the following features:

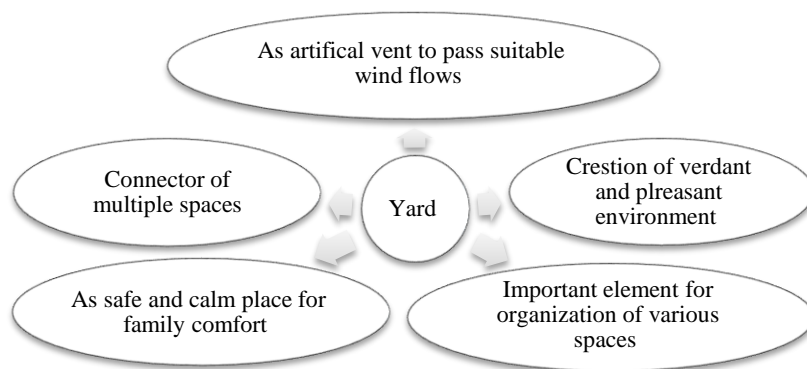


Diagram 4: Function and use of Persian yard (Source: Authors)

Analysis of semi-open spaces in contemporary architecture

Unlike the past time at present, the relationship is not addressed among human with natural environment and architecture and buildings form together regardless ambient factors and their role and impact in formation and organization of spaces so this is led to dissatisfaction of inhabitants and lack of spatial utility. One of features of semi-open residential spaces is geometric order and utilization from simple, familiar, harmonic and legible shapes to provide calm environment for living of inhabitants. This enclosed semi-open space is one of the important elements in Islamic cities that may respond to climatic factors and spatial pleasure at best by observance of privacy and spiritual requirements (Zare et al. 2013: 54).

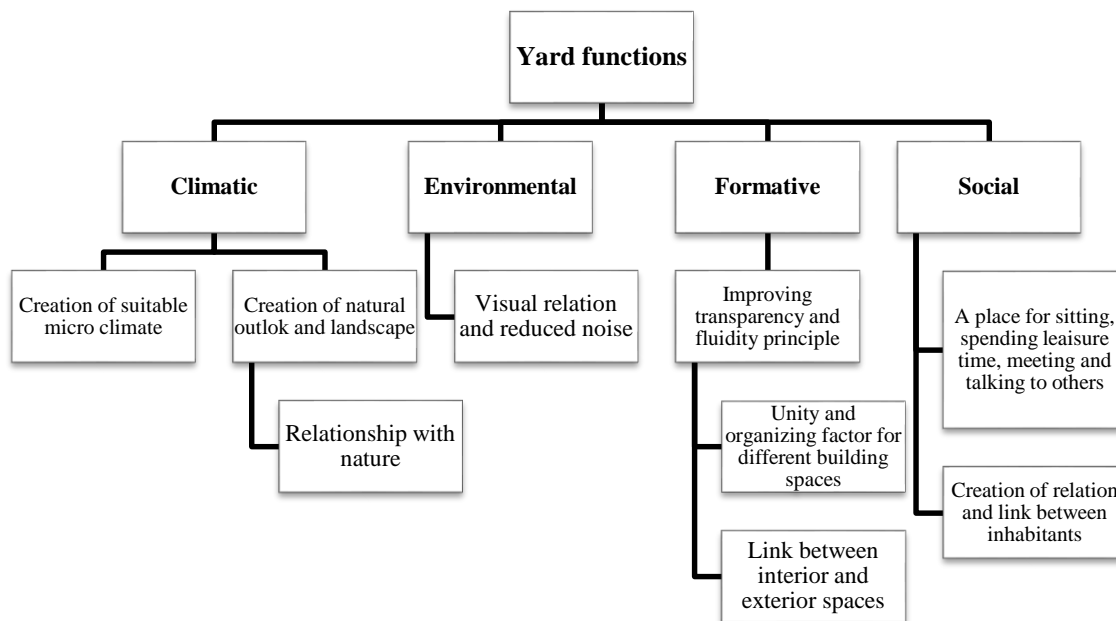


Diagram 5: Brief analysis on yard functions (Source: Author)

Comfort controlling factors in semi-open outdoor space

With respect to developing urbanism and spatial density in urban environments, today semi-open spaces play important role in human’s daily life and thermal comfort is deemed as one of the most influential factors in suitable preparation of open spaces. Paying attention to thermal comfort for improving quality of space is one of the foremost principles in architectural design. It necessitates paying due attention to creating thermal comfort conditions in open space at residential complexes and this important point is achieved by analysis on thermal comfort conditions that include individual and physical specifications of environment. The individual specifications include age, gender, and clothing type, type of activity and psychological statuses of individuals. These specifications follow individual preference of a person and perceived thermal comfort in human and it will not be possible to design space with respect to these cases and their variability while establishing comfort conditions and solving many climatic problems will be possible with respect to physical specifications and designing them accordingly and it is led to improving space of quality. Most of studies conducted in Iran are concerned with thermal comfort in interior space of building (Heydari, 2009; Saligheh, 2004; Nasrollahi Knight, 2008) and only few studies done by Ghiabakloo (2003), Tahbaz (2007), Mahmudi, Ghazizadeh and Monaam (2010) have dealt with subjects regarding thermal comfort in open space (outdoor). In addition to climatic conditions, thermal comfort is influenced by the surrounding built environment, ground surface coverage, evaporation and transpiration in plants and created shade by natural and hand-made factors. Designing parameters e.g. building form, type of plan site, façade orientation, topology of constructional blocks, used materials at different surfaces and ambient parameters e.g. rate of radiation, weather, skyline, shading level and vegetation are some items that affect thermal comfort in open spaces. The vegetation on surfaces is very influential in providing relative humidity and reducing air temperature, especially in arid regions and the surfaces covered with plant and cultivation of trees and suitable plants can be utilized for this purpose. As the potential is increased more for rising green and permeable surfaces in residential open space, the comfort conditions will be practical further.

One may refer to some cases that should be noticed in designing semi-open spaces at residential environments as follows:

- Avoiding from privatization of public site and joint use of private site in open space
- Divisibility of public and private sites in designing open spaces
- Using a suitable designing pattern e.g. systemic pattern that enables creating semi-open spaces at micro and medium scales.
- Observance of hierarchy of public to private semi-open spaces
- Sense of attachment of semi-open spaces with their divisibility potential and creation of suitable controlled spaces
- Paying attention to social concepts e.g. upgrading social interactions, collective spirit and social correlation

Semi-open space e.g. patios, ambulatory corridor or balcony, and semi-open yards can act as an ecological communicative factors among building and environment and strengthen flexibility of building as a micro climate versus temperature fluctuations, change in rate of humidity and external air flow and increase lighting in spaces at different parts. In addition, by creating various intermediary spaces among different building units, visual and social communications are increased among individuals and sense of attachment and belonging to their settlement environment will be improved among inhabitants. Semi-open spaces in

residential complexes may take step in line with ecological upgrading by energy conservation, coordination with climate, reduced use of resources, meeting of inhabitants' needs by the aid of human-centered design, coordination with surrounding location and environment, and finally construction healthy environment and also typically maintain sustainable architectural principles and link interior and exterior spaces in the complex and reducing energy consumption and fossil fuels in this regard by observance of open space formation and organizing factors in terms of dimensions, type of orientation, positioning and other effective criteria. The quality of human- environment relationship is one of the important conditions in evaluation of quality of environment. Improving a part of living conditions and meeting requirements for inhabitants are some of goals and requests of citizens. Thus, today directors, planners and designers intend to that residential spaces to have characteristics to provide comfort for the individuals.

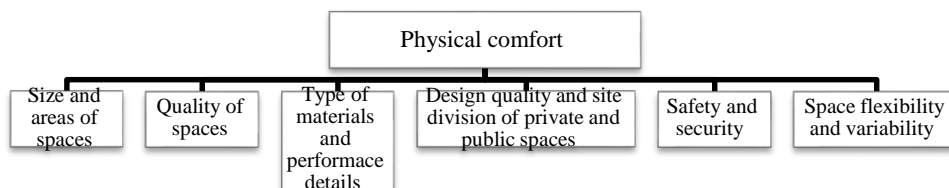


Diagram 6: Effective factors in physical comfort (Source: Authors)

The ambient comfort is assumed as one of important and basic elements in human environments. Therefore, it is necessary to recognize effective factors on environmental comfort and the related constituent elements and relations. This element is affected by surrounding environment and individual factors including physiological, psychological and formative. It is believed that environmental comfort is influenced by many variables; and many ambient and exclusive factors are involved in creation of this trend and one can assume environmental, individual, physical, social, cultural and economic elements etc. as these basic variables. Among them, attitude and attention is paid by designers to the elements that can be controlled in designing field to enhance quality of comfort. Air temperature, solar radiation and wind speed are environmental factors and parameters in definition of comfort limits.

Over the time, many researchers have devoted their own to modeling and evaluation of residential satisfaction as a parameter for quality of living environment of which one can refer to the models presented by Amerigo and Aragonés (1997) who have posited methodological and theoretical approach to study on residential satisfaction and a general attitude on interaction between people and living environment. Theoretical framework of model proposed by Amerigo is beyond a satisfaction model of housing and it examines way of interaction among individual and his/her environment. This attitude looks for study on dynamic relation among individual and analysis on perceptual, sensual and behavioral processes that may occur in this regard (Amerigo, 1997: 54).

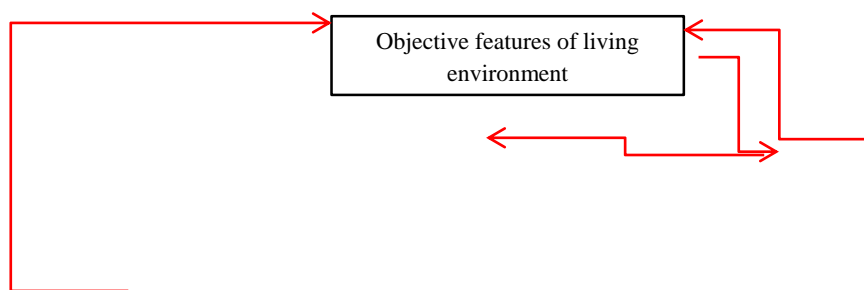


Diagram 7: Amerigo's model to determine residential satisfaction (Source: Amerigo & Lgnacio, 1997:48)

A model Amerigo proposes is an image of satisfaction. In this model, objective features of residential environment become subjective after personal characteristics by the evaluated individual and this increases rate of satisfaction with environment. The individual characteristics are also considered at three levels i.e. perceptual (knowledge and awareness), emotional and behavioral

in interaction with the given model. At perceptual level, the high quality housing parameters are examined so that inhabitants to evaluate environment by awareness of them.

At emotional level, interaction among individual and environment has been defined by formation of housing satisfaction that is a subjective issue and this subject is mentioned at behavioral level as well and if individual is satisfied with it will treat appropriate behavior with this attitude and usually acts toward improvement of current environmental conditions. (Amerigo, 1997:54)

Among major points that are noticed in plan of method of enhancing the living quality according to demographic regulations and standards and measurements, one can refer to the following factors:

- Improvement of localities which are under worse conditions. For example, those areas that are deprived from basic and essential facilities.
- Solving problems in regions that are closer to city center.
- Using the situation that facilitates execution of the plan.
- Considering spatial harmony for this purpose that development and upgrading quality of settlement that covers city system (Poormohammadi, 2014:124)
- Influential elements in formation and organization of open spaces
- Traditional pattern for organizing residential localities includes formatively organic structure and systemic approach in Iran. In these localities, the open spaces have various dimensions and arrangement according to climatic conditions and natural platform. However, contemporary residential complexes mainly follow linear, network and central patterns in Iran and using systemic pattern is less visible (Mozaffar and Asadpoor, 2012:11).

Table 3: Organization patterns for open-spaces (Source: Mozaffar & Asadpoor, 2012)

Title of pattern	Grid organization pattern		Linear organization pattern	Central organization pattern	Systemic organization pattern
	Regular	Irregular			
Title of pattern: Graphic model (Open space = black; close space = white)					
Features	- Arrangement of relatively similar open spaces within limit of 3D grid - it can be done in both regular and irregular forms.		- Open spaces are placed in linear, continuous and iterative arrangement together - It has direction and orientation.	- The existing dominant and wide open space so that other spaces are gathered around it or place in one or more sides of it.	- Including a group of open spaces that can be classified in a group due to existing common features in form and size. -They do not follow necessarily from the same group. - This pattern may be composed of previous patterns.

3- Case studies

One can examine accurately various analyses and review different theories by doing case study.

Mazandaran province possesses the nature that one could less find something similar to it. It is the nature where one the one side sea and on the other side Alborz Mountains are visible and it includes this local landscape. One can refer to some of them e.g. local life form and type of local house-building. Similarly, one may imply Saghanfar and Kandooj as examples.

Fig 1: Saghanfar (Source: Quarterly of Village; 2008, vol. 24)

From right to left: 1) Mazandaran local architecture; 2) Galipoosh; 3) Kandooj

Open spaces and climatic considerations

Housing and climate are two manmade and natural systems that affect each other more closely. Whereas climate is related to human comfort it results from factors e.g. sunlight, temperature, air moisture, breezing wind and rainfall rate. Climate has special suitable conditions in any geographic position and at the same time it is also followed with some design constraints. In addition to paying attention to functional, visual and aesthetic qualities in design of various housing spaces, it is necessary to notice type of city climate and observe climatic design rules and ignoring this issue may create certain problems. What makes sense and significant in a basic culture is selection of way achieving protection from climatic factors and enemies; namely, type of special response of that culture to some needs that can be adequately at high level and in wide range because these requirements depend on notion and interpretation of concepts of belief, philosophy, life, communication with compatriots and protection of their own from climate and enemies etc. (Rappaport, 2009:100).

Table 4: Analysis on first samples in northern Iran
The case studies will be examined by this fact if they have the given effective factors or not.

Stories	Shafahi house	Ghoreishi house	Manoochehri house
General approach	2 stories	2 stories	2 stories
Number and direction of opening			
Climatic approach	There is opening in 4 sides of building, but that number is more at north and south.		
Veranda			
Climatic approach	Rectangular at southern side	Rectangular at southern side	Rectangular at southern side
Formative approach	L- shape	Rectangular	Rectangular
Stair form and direction			
Climatic approach	South	South	South
Formative approach	One-way stair	One-way stair	One-way stair
Plan direction			
Climatic approach	East-west elongation or east-west rectangular is placed in the middle.	East-west elongation	East-west elongation
Type of architecture			
Climatic approach	Extrovert	Extrovert	Extrovert
Composition of plan and relation with yard			
Climatic approach	With open, semi-open and closed space that is directly related to yard	With open, semi-open and closed space that is directly related to yard	With open, semi-open and closed space that is directly related to yard
Climatic approach in bedrooms	At north and south sides	At north and south sides	At north and south sides
Climatic approach in kitchen	South side in yard	South side in yard	South side in yard
Climatic approach in services	West	West	West
Climatic approach in bath	Bathroom was not placed inside house in Qajar era and it was found publically in city.		

Given human’s daily activities are usually done in both open and closed open spaces, climatic conditions also affect differently human physiology in these two environments so that in open space various climatic elements such as air temperature, humidity, air flow, sunlight and rainfall directly influence in human and type of dress and rate of one’s activity are the only factor which separate human from ambient conditions. Moreover, climatic conditions of open spaces highly affect these environmental conditions inside building.

4- Extracted findings and suggestions

With respect to developing urbanism and spatial density in urban environments, today open spaces play important role in human daily life and thermal comfort is deemed as one of the most influential factors in suitable preparation of open spaces. Paying attention to thermal comfort for improving quality of space is one of the foremost principles in architectural design. Design

parameters e.g. building form, type of plan site, façade direction, topology of building blocks, used materials in all different levels and environmental parameters e.g. rate of solar radiation, weather, skyline, shading level and vegetation are some very influential items in dry and aid regions and for this purpose the surfaces covered with plant and cultivation of suitable trees and plants can be utilized. As potential is provided more to increase green and permeable surfaces in residential open space, the comfortable conditions will be more practical.

Table 5: Effective design parameters in thermal comfort of open space in residential complex (Source: Authors)

Building shape	Ambient pattern (middle open space)	Blocks have formed a central open space.		Jalili (2013)
	Linear pattern	<ul style="list-style-type: none"> - Arrangement of blocks is the simplest way in residential designs. - Design is affected by elongation of landform and or other influential factors e.g. placement beside a boulevard and or the given regional urbanism regulations. 		
	Individual pattern (micro designs)	<ul style="list-style-type: none"> - The residential high-rise blocks are separately distributed from each other on site of system. - Quality of external environment is totally different from middle open space designs. 		
	Hybrid pattern	It is composed of two or three types of environmental, individual and linear patterns.		
Topology of blocks	Temperate climate	Individual model creates the worst designing mode and ambient model (central yard) because of being protected against atmospheric agents that may create the best mode in terms of thermal comfort.		Taleghani (2014)
	Cold climate	Linear is the worst mode and ambient model is the best mode.		Seong Yeong Jeong (2012)
	Arid and dry climate	Central yard model is the best mode because of being protected from atmospheric agents including sever winds		Lenzholzer (2013)
Façade direction	Temperate climate	Individual topology	North-south and east-west directions are identical in terms of rate of sunlight and protection against wind.	Taleghani (2014)
		Linear topology	North-south direction makes cooler mode.	
	Cold climate	- East-west direction creates more comfortable conditions in terms of placement at exposure to direct sunlight.		Seong Yeong Jeong (2012)

		- Direction along southeast-northwest direction is the worst type of placement in this climate.	
	Arid and dry climate	- With north-south direction, central yard model provides the better thermal comfortable condition because of creating maximum shade at the hottest hours. - East-west model creates the least rate of thermal comfort due to the minimum shading. If thermal comfort is intended in winter season it needs to expansion at southern front but with respect to thermal comfort establishment in summer season this climate is suggested for north-south direction.	Berkovic (2012)

Diagram 8: Effective parameters in housing ecologic designs in parallel with semi-open spaces (Source: Authors)

Penetration status of domains (private, semi-private and public)

The clarity and resolution of spatial organization and boundaries of private, semi-private (semi-public) and public domains from each other may reduce penetration (access), rising social supervision and prevention from crimes. Oscar Newman founded his ideas on protection and use of environment and supporting from formative environment on a hierarchy that includes four zones (domains) for which their limits have been determined by fences (Salehi, 2008:185).

b) His given four regions are as follows:

1. Public space or environment: It is a region open to the all and it is used for several purposes.
2. Semi-public space or environment: It is a region open to the public, but it is used for limited application.
3. Semi-private space or environment: This is an area few numbers of individuals come and go and it is original for housing and used by building inhabitants. (E.g. apartment corridor)
4. Private space or environment: It is a region only devoted to inhabitants there (e.g. inside apartments).

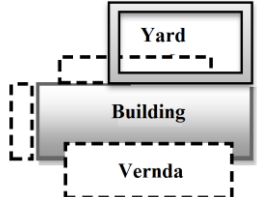
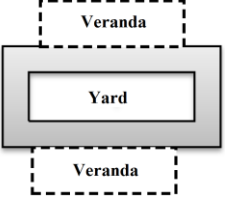

By definition and manifestation of public, semi-public, semi-private and private space boundaries and domains inside localities, the inhabitants and environmental users as well as observers and bystanders will be able to identify their own limits and type of applications and users can be characterized by determination of limit of ownerships. Definition of clear boundaries interprets ownership of a space and therefore creates sense of territory and sense of place. When it is performed at a human scale, definite nature of space is assumed as a step toward building of spaces. These activities can be assumed as start point in open spaces and a zoning framework of collective activities can be proposed in spaces between buildings (Salehi, 2008:185).

Regarding relationships between social fields and private and semi-private life scenes one can also imply balconies and roofs where by strengthening these walls one can deal with optional and social activities in these fields.

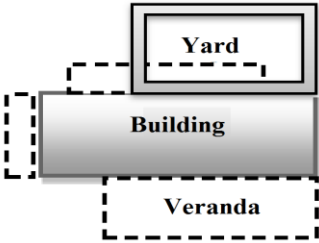
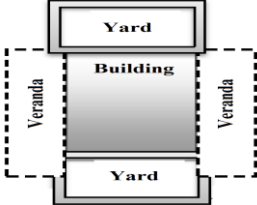
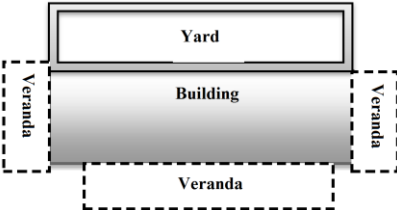
Fig 1: Zoning of collective activities in residential open-spaces (Semi-private, semi-public and public spaces): (Source: Authors)

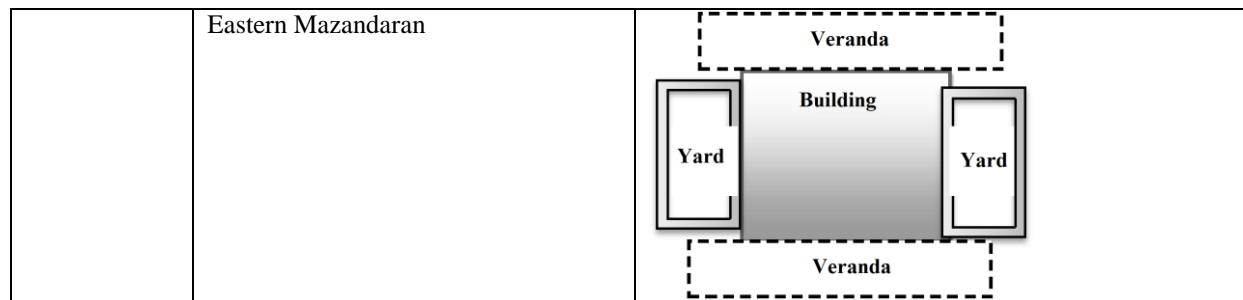
Zoning of social spaces in spaces between buildings can be divided into 3 groups:

1. Semi-private spaces: Urban balconies and or terraces and or roofs on buildings that can be within the limit of one and/or more units which are transparent boundary with other fields per se.
2. Semi-public spaces: They are intermediate space among block or buildings. These spaces may include architectural elements, tree, plants and any type of environmental elements that create liveliness. In fact, individuals can deal with verbal and hearing interactions and visit and amusement in semi-public environments.
3. Public spaces: These spaces are placed outside intermediate environment at buildings in fact and they are converted visually and mainly in terms of social position into locations for purchase and sport.

Typologies	Climate	Situation	Type of typology of houses	House pattern schema
Type I	Temperate-humid	Northern Iran- at the margin of Caspian Sea	Extrovert North-south direction of plans with yard, open and semi-open spaces as veranda	
Type II	Dry and arid	Central Iran	Introvert – central yard-semi-open spaces as veranda Using brick bond-portico	
Type III	Hot and humid	Southern Iran	Introvert-introvert verandas-portico	

The derived typology from semi-open spaces and given studied patterns:

Typologies	Climate	Situation	Type of typology of houses	House pattern schema
Type I	Temperate and humid	Northern Iran- at the margin of Caspian Sea	Extrovert, north-south direction of plans, with yard, open and semi-open spaces as veranda	
	Western Mazandaran			
	Central Mazandaran			



REFERENCES

- Mardomi, Karim et al. (2013). Evidence-based design for medical centers, Tehran: Asr Kankash pub.
- Tahbaz, Mansureh (2011). Climate-friendly architectural principles in Iran by approach to mosque architecture, Tehran: Shahid Beheshti University Press.
- Memarian, Gholamhossein (2005). Persian architecture. Tehran: Soroush Danesh.
- Zaker Haghighi, Kianoosh, Majedi, Hamid & Habib (2010). Codifying effective parameters on typology of urban texture. Journal of city identity. Vol. 7.
- Mir Sajadi, Seyed Amir (2012). Analysis of harmony of new structures in historical textures. National conference on Persian Islamic architecture and urbanism, Mashhad.
- Agrawal, Vedika (2013). Regionalism in architecture as an expression of appropriate technology and sustainably, Term Paper for History of Architecture
- Ghobadian, Vahid (2013). Western contemporary architecture. Cultural studies office publication. Tehran.
- Saremi, Ali Akbar, Taghi Radmard (1997). Sustainable values in Persian architecture. Tehran: Cultural Heritage Organization.
- Sobat Sani, Naser et al. (2015). Development trend of traditional houses in eastern lands at Uremia market to modern housings. National conference on architectural engineering, civil and formative development.
- Delfanian, Hamid Reza et al. (2018). A review on relationship between local and climate architecture with analysis on thermal comfort parameters. Case study: Noshahr city, Journal of architecture and urbanism of utopia, Vol. 25, p. 69.
- Tibalds, Francis (2006). Human-centered cities, Trans. Leghaei- Jadali, Tehran: Tehran University Press.
- Soltanzadeh, Hossein (2011). Role of geography in formation of types of yard in Persian traditional houses, Journal of physical geography studies, vol. 75.
- Zare, Leila et al. (2013). The relationship between nature and central yard (Looking at Persian Housing Architecture- Kashan), Journal of city identity, vol. 12.
- Heidari Nejad, Ghasem et al. (2009). Thermal comfort, Tehran: Construction and housing studies center.
- Maghsoodi, Mitra, Kurd Jamshidi Maria (2014). Improvement of thermal comfort in open spaces at residential complex. The 4th international conference on modern approach in energy conservation.
- Rafian et al. (2010). Living environment quality measurement. Tehran: SID, vol. 4.
- Amerigo, A, Theoretical and Methodological Approach to the study of residential satisfaction [Journal] journal of environmental psychology, 1977.
- Poormohammadi, Mohammad Reza (2014). Housing planning, Tehran: SAMT Pub.
- Mozaffar, Farhang, Asadpoor, Ali (2012). Role of formative and social patterns in organization of open spaces at residential complexes (analogy of urbanism experiences at twentieth century and Persian samples). Scientific- research Journal of urban studies, series 1, vol. 3, p. 11.
- Rappoport, Amos (2009). Meaning of built environment, Tehran: Tehran Municipality Pub.
- Salehi, Ismail (2008). Ambient features, secure urban spaces, tehran: Ministry of Housing and Urbanism .