

Porch and balcony as sustainable architecture factors in vernacular houses of west of Guilan: Case studies in Khotbehara, Iran

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Abstract: Porch and balcony are the most important parts of the vernacular architecture in the west of Guilan, and have responded properly to all functions. In this study, formation and location of them are investigated, and their different functions are surveyed. The architecture of this region is outward oriented because of porch and yard with open view, which are influenced by climate, social factors, culture and economy. According to this issue they are able to provide the best solution for weather balance conditions in summer and winter and climate comfort. There are some proportions in the porch that in addition to aesthetic and pleasant form, are in harmony with environment, and vernacular material have been used for their construction. These porches encompass cultural, social issues and other issues that are clearly discussed. In this article through sustain concept and defining the vernacular architecture of the west of Guilan, which is located beside the Caspian sea in the north of Iran, the effective factors of balcony and porch formation are compared and analyzed in order to improve the current conditions according to the lack of fossil energy and attention to economic efficiency inspired by vernacular architecture regarding to sustainable development.

[Elham Mehrinejad Khotbehara, Pegah Eghbal, Sara Nourmusavi Nasab. **Porch and balcony as sustainable architecture factors in vernacular houses of west of Guilan: Case studies in Khotbehara, Iran.** *World Rural Observ* 2016;8(3):48-56]. ISSN: 1944-6543 (Print); ISSN: 1944-6551 (Online). <http://www.sciencepub.net/rural>. 7. doi:[10.7537/marswro080316.07](https://doi.org/10.7537/marswro080316.07).

Key word: Passageway; Porch; Balcony; Vernacular architecture; Sustainable architecture.

1. Introduction

The aim of recognition houses pattern particularly balcony and porch in the west of Guilan is a significant step to recognition construction principles, people encountering ecological and cultural features to provide comfort condition. Residential complex of Caspian Sea cost has architectural attributes which probably can be found in the west of Guilan. This kinds of architecture like all vernacular architectures is based on wise and economic response, human social relations, difficult condition, operation ability and available materials. What distinguish this region architecture from other types of vernacular architectures, is combination of formic factors, mountainous mild and wet region that strongly, and beautifully has been generated, and is still exploiting. The collection of traditional architecture is a valuable heritage that is necessary to be maintained. The sign of this collection is symptom of national and cultural identity of costal and mountain dwellers that need to more recognition and introduction. With a little more contemplation and study about traditional buildings it is understood that in most of Guilan's buildings cultural, climate and originality of material is completely considered. Porch is a significant and fundamental parts of Guilan's houses, and native people experimentally achieve some results during years that are in the harmony with human spirit by

contemplating points, which are always in their comfort area. In this research due to the role of porch as the most important element of the building, balcony and porch are investigated, and their connection with sustainability indexes are studied. Cognition them, using patterns inspired by new technology and coordinate with current condition can be a solution with regards to cultural, social and environmental attributes and lead to sustainable development.

1. 1. Problem statement:

Global warming, energy crisis, environment pollution are current problems of the world. All of them cause a lot of energy consuming for heating and cooling. The best solution is the reasonable use of natural and vernacular sources, and proper management of urban and rural construction, protect natural sources and reduce energy consumption as much as possible. (Talar Poshti, 1389, 4)

In recent years, the growth of construction in rural areas has caused a lot of traditional building destructions, and it is still continuing in villages. Unfortunately, we are witnessing the destruction of construction's principles and valuable monuments of vernacular architecture in the villages; instead of them urban architecture modeled employ heavy structure attached to the land, non-recycle materials, costly, and spending time to build. There is no attention to ecology, such as (balcony location according to the

geography) and compatibility to surrounding environment, context, comfort, satisfaction of people who live in the past.

Global warming, energy crisis, environment pollution are current problems of the world. All of them cause a lot of path are consumed to heating and cooling spaces, it should be possible to reasonable use of natural and vernacular sources and proper management of urban and rural construction protect natural sources and reduce energy consumption as much as possible (Talar Poshti, 1389, 4).

Moreover, paying attention to historical monuments preservation and surveying them are not only a culture's need but also respond to the need of development (Sartipipour 1377) Identification and preservation of valuable architecture heritage and historical country's national capital help to discover mysteries and secrets; symbols and signs, which lies in them, follow last remaining sustainable principles in new frame and preserve identity and originality of rural dwellings (Sartipipour 1378). In the novel sustainable architecture discussion it is tried to decrease drawbacks of new architecture on environment. Instead of it employ materials which are compatible to environment and climate design, and avoid the indiscriminate use of energy consumption (Talar Poshti, 1389). Factors affecting the formation of architecture are: (culture, beliefs, rituals, religion) nature (climate and geography, supply nature economy and its variants) society (tribal structure, homogeneous and heterogeneous community) (Fallah, 1392).

1. 2. Proposes, questions and hypothesis:

In this study in conjunction with evaluation current architecture in local tissues of the west of Guilan that is unknown for many experts in the field of architecture: it is processed to record and collect data from the villages of west of Guilan. Furthermore, cognition and categorize the patterns of vernacular and traditional architecture, the attributes of architecture and structure of buildings in the area are sorted. Due to the fact that sustainability is one of the important issues in today's architecture, rural buildings can be inspired in order to achieve the sustainable patterns modern buildings.

1. 2. 1. Purposes:

- Porch and balcony as sustainable architecture factors in vernacular houses of Guilan
- Role of social and climate, social, cultural, economical, and environmental features in layout of spaces of porch and balcony in vernacular houses of west Guilan

1. 2. 2. Questions:

- What are the main reasons that balcony and porch are remarkable elements in west of Guilan?

- What are noted attributes of balcony and porch in the vernacular and traditional architecture of Guilan?

- How sustainable factors impact on form and location of balcony and porch?

1. 2. 3. Hypothesis:

- Balcony and porch had sustainable indexes in the west of Guilan.

- Surveying and inspiring balcony, porch and the pattern of vernacular and traditional architecture will lead to sustainable design.

- Achievement sustainable design to some extent solve the local houses of Guilan's shortage of modern life.

2. The vernacular architecture in west of Guilan:

West of Guilan is located south of Caspian Sea and north Iran. It is one of the rainy and greenest areas of Iran's climate where is rainy in all seasons. There is specific weather because this region is located between Caspian Sea and Alborz mountains. Nights are mild and sleeping outdoor is satisfactory. This area has hot and humid summer during June to September months that is controlled by natural ventilation. Most people are agriculture and orchardist, they plant specially kiwi and sericulture. So many cities and villages in west of Guilan province are along the route between Rasht to Astara, where merchant came from the west to north of country in the past. Trade and commerce have been existed from the past, fishing and sericulture (kiwi product) are seasonal jobs. Rivers full of water, abundant rainfall, fertile soil for agriculture farming and animal husbandry.

Knowing Guilan is in fact knowing people that spend their life in terms of human and cultural standards of honesty and simplicity of nature around them and continue their history until today. It is possible to survey different types in the categories of this architecture. From one side vernacular and rural architecture according to owners need and minimum facilities in the nature, from other side urban architecture has been used advanced material such as brick, ceramic in a volume composition (Rezaeirad, 1377). Anyway vernacular architecture of Guilan have been influenced by climate and exploiting of vernacular material that is full of trees and floral, has been shaped according to their culture as outward oriented spaces (Ghobadian, 1381, Memarian, 1371). Guilan's important fractures impacts on their architecture have abundant rainfall in all season specially autumn and winter, humidity in all seasons and low temperature different between day and night. Constructing balcony is one of the fundamental reasons that prevent to penetration of rain to interior spaces and greatly reduce the intensity of rain that harsh treatment of humidity in this area, also north-

east wind cause coolness in summer is the reason why balcony and hall of most houses in this area are located in the east side and in winter north west wind cause rainfall.

So providing ventilation to reduce humidity is important factor of Guilan's vernacular architecture. It causes creating buildings in height that is open from each sides with east-west extension and exploiting favorable northeast wind and protection against rainy northwest winds (Diba and Yaghini, 1377). Balcony is one of the main reasons cause air ventilation in these houses and connect indoor to outdoor air vent from outside to inside and vice versa. It prevents air stagnation in humid climate. The house of this region with stretched rectangular form to internal layers more exposed to air, consequently air exchange occur more than other forms.

Green spaces impact on people's behavior. People are calm, good-natured, philanthropic and hospitable (Diba and Yaghini, 1377) material can be compatible with environment. Appearance variation of houses in Guilan are influenced by the close relation of architecture form, lifestyle and climate, but it is observed that in skin of buildings used vernacular materials. Generally employing vernacular material lead to being in a harmony with environment. Guilan's home is in continuity between nature and culture. Houses are outward oriented, unlike the central plateau of Iran, façade of houses are visible from outside. This factor illustrates the priority of open space element to close space in the culture of Guilan. Therefore veranda is an integral parts of the old houses which has variety functions such as living room, guest room, bed room, children's play room, dining room and any activities during day and night. In the back of balcony mostly in the south, rooms are located (Bromberje 1370). Usually base course houses have 2 rooms. Rooms are located around living room and balcony is located in the main façade after stairs.

2. 1. Porch:

Porch as a semi-open space is the most significant and commonly place which is multi-functional, so nine months (late March to early November) due to low fluctuations temperature and climate sustainability almost placed all activities such as (cooking, house work, eating, living and even sleeping) (Diba, Yaghini, 1377). Porch with at least 2 to 2.5 meter wide, is located in the length of building and connect rooms from outside (Miryusefi, 1384, 10). Moreover sometimes balcony has economical function and sometimes use as living space, storage and service area. East hall (east balcony in the second floor that air vent easily) more than napping place in summer has economic function, converting some horticultural crops such as walnut and hazelnut to product supplied to the market done in this space and also use as storage

in winter (Khakpour, 1384, 68) because of rainfall main rooms are in the second layers and protected from rain by porch (that is along building or at least in south and east). This space cause avoiding hot summer weather enters inside. It is the most important space as a semi-open space that has multi and seasonal function and open from two or three sides (priority to south and east). So main porch which plays living room's role is wider than all spaces and higher to have better view and ventilation, it is decorated by wooden fence and hanging vase. Porch in upstairs is named balcony, which has proper quality compare than porch, because it is located higher. This space in summer use for resting and sleeping (Diba and Yaghini 1377; Miryusefi, 1384; Memarian, 1371, 123).

2. 2. Balcony and passageway:

Balcony in second or third stairs called hall. Balcony is a few steps higher than balcony and usually placed barn or stable under it. In some cases under it is empty. The room that is in the back of balcony usually known as attic (Memarian, 1387, 123). Main balcony mostly is located in south side due to local wind and crooked rain and increase penetration sun ratio in winter (Khakpour, 1385). Halls are often two floors and three floors are not common because of abundant wind in autumn. Downstairs called stayed winter and upstairs which have balconies and passageway called stayed summer.

Passageway is calmed space in the backward of balconies that prevent to direct and intense sunlight to building's wall. Passageway's functions are including protect from rainfall and direct sun light in summer, shading in summer, air conditioning and summer breeze surround the building (Mahbalani, Daneshvar, 1389). Between wooden columns of passageway there are usually wooden beams that connect them horizontally. This space is suitable for hanging products such as garlic, pumpkin vase and... use drying product and beautifulness.

2. 3. Evaluating climate space and functional pattern of houses with balconies and passageways:

- 1) The ratio of length to wide is 1 to 2.
- 2) Upstairs allocated to bedroom and private room, public spaces are located in first floor and ground floor. Empty spaces, which are under floors are used as storage and animal shelter of chickens, cows, sheep and etc.
- 3) Balconies and passageway created to protect buildings from rainfall and decrease intense sun ratio in summer and winter.
- 4) Houses with balconies have better ventilation and proper lighting because of height.
- 5) They are suitable strength to rainfall and flooding caused by seasonal rainfall. They differences are in their height that prevented the development of skin diseases and athirst: rheumatoid for residents.

6) Houses with passageway have wide shading space in south side.

7) Formation and presence of wide space, multiple openings and passageway cause maximum comfort condition for residents that live in the past; pattern ecology design and removing moisture of inside and outside ventilation lead to increasing the useful life compared to other types.

2. 4. Sustainable architecture:

Sustainable development is a kinds of development that meets the needs of present generation without drawbacks for the next generation to supply their needs. This definition states by World Commission on Environment and Development in 1987 there is another definition, it also means providing solution in face physical, social, economic and moral patterns of development that is able to prevent destruction of natural resources, destruction of global pollution of biological systems, climate change, excessive increasing population injustice and decrease quality of life. More appropriate definition can be found in a report from "global survival strategy" that answer to five major worldwide today problems; are including survival link global development, supplement of fundamental human's needs, improvement quality of life, social justice, providing a context for social autonomy, environmental and biological integrity, safer and more secure future (Ghiyasvand, 1386; Hui, 2002).

Generally sustainable development have three main principles: protect environment, cultural and social justice and economic sustainability (Hui, 2002). All human's activities occur in architecture space, it plays an urgent role in suitable life supplement. Applying sustainable concepts in architecture create new topics as sustainable architecture, ecologic architecture, green architecture or environment architecture that all have the same meaning, eco architecture. Sustainable architecture is responsive to properties of environment and improve context ability to proper environment condition also brings the least damages to the environment. Moreover it flexible to changes, conditions and needs meanwhile attention to aesthetic is compatible with natural ecologic capacity of its context (Golshanimanesh). The main principles of this architecture are including: identify the place, attention to its capacity, accessibility and ecology, relation to surrounding nature, compatibility with natural life cycle.

Sustainable architecture is based on this fact that we receive what we need in the world. Sustainable buildings do not prescribe a formula to salvation just create this consciousness. The object of sustainable architecture is finding architectural solution that cause welfare and coexistence for groups covered by it. The major purposes of sustainable architecture are

including: protecting resources and saving them. Design according to cycle and suitable life (human). After investigating these three stages, architecture with correct perception of architecture effects will be design environment (Celebi, 2003).

3. Research method:

This study tries to survey and analysis balcony and porch' sustainability in the west of Guilan specially Talesh village. Research method is descriptive- analysis, observation, interview and data collected from written sources such as books and articles. Methodology is examine case study in west of Guilan that are influenced by sustainability factors of balcony and porch in these buildings.

4. Result and discussion

4. 1. Social and cultural effective factors of balconies and porches in west of Guilan:

There is basic differences between Guilan's culture and inward oriented architecture, it shows their willing to communication and group life what is opposite to the architecture of central region of Iran (desert areas) where have inward oriented architecture; Guilan's houses open to the public and balcony is the symbol of connection between indoor and outdoor spaces that can be observed in all sides. Ability to communicate to nature: human need to connect to nature, spiritually or materially, and traditional houses of Guilan provide it. Another point is that social relations of people in this area and the friendship of them. Short fences of this region moreover than ventilation and great view is evidence of solidity and daily interaction of people.

Economic factors affect on balconies and west halls of Guilan, supply life factors which are around rural houses and the ground floor's stores of vernacular houses, here architecture gets out from center part and deals the edges. There is more attention to the location of spaces in site, buildings are located in planet region and solid segmentation does not separate them. All houses use vernacular materials (exploiting recycle materials such as wood and stone) which in addition to the cost, effects on the constructions time and present an architecture in a harmony with nature and human's spirit.

4. 2. Environmental factors impact on balcony and porches in the west of Guilan:

Every buildings that is calm and light located on the ground (respect to site), buildings in this area do not consume energy greedy and interact to ground, and in fact it is possible to revive building without damaging to the site and without giving its identity. Yard is useful for ventilation of inside and outside. Balcony is semi open space that is intermediate yard (open space) to close space (inside) for ventilation and

humidity weather of region especially in summer, provide high ventilation for residents of these houses and prevent penetration rainfall to inside. It is considerable that in this region the continuity between nature and culture is completely outward oriented opposite to central plateau of Iran's facades; it is obvious this attributes states the priority of open factors to close factors in the culture of this area. The importance of close space: they have been used more in cold weather where there is at least air exchange.

4.3. Survey some cases in Khotbehsara village

Figure 1 indicates the view of a vernacular house, while **Figure 2** shows its plan and elevation. The **Figure 1** shows that the building has west-east extension. Meanwhile, the balcony and porch are located in the east. Materials of the balcony and porch were: river stone, lime stone, wood. As can be seen in the figures, on arrival step, the stairs extend to the balcony on one side and the stairs of the porches on the other side. The porch that is located in the middle of this building has been used in winter. Main purposes are: thick walls in both sides that minimum air exchange and are located in low height that has less airflow in comparison with upstairs.

The view, plan and elevation of another house in Khotbehsara village are given in **Figure 3** and **Figure**

4, respectively: it has extended form like other houses of Guilan. Materials were extracted nature such as, fir wood, stone and lime, river stone, and sand of the Caspian Sea, that consequently, has led to build a house compatible with environment, scenic, light, recycle material and economic. Arrival of the building has porch, and residents used to live in the rooms facing this porch during cold seasons (winter and fall) due to the warmer weather in downstairs, and also exploit proper light in winter. Porch is connected to balcony by stairs which cover east and west. As balcony is located higher than porch, so there is airflow and favorable wind of east, which cause residents to live in the balcony (upstairs) facing rooms in summer, and provide comfort condition for resident's sleeping due to the height and favorable weather. Moreover, during the days local women are engaged drying fruits, sniping cloth to patch kiwi trees which is prevalent product of this area in these balconies and porches. Therefore, the economic activities performing in the balconies and porches indicate the lack of gender discrimination in the area. In other words, this exhibits the communications of women in an environment with their neighbors and other people in order to contribute to the family livelihood.



Figure 1: Mehrinejad's Vernacular house in Eshik Aghasi of Khotbehara

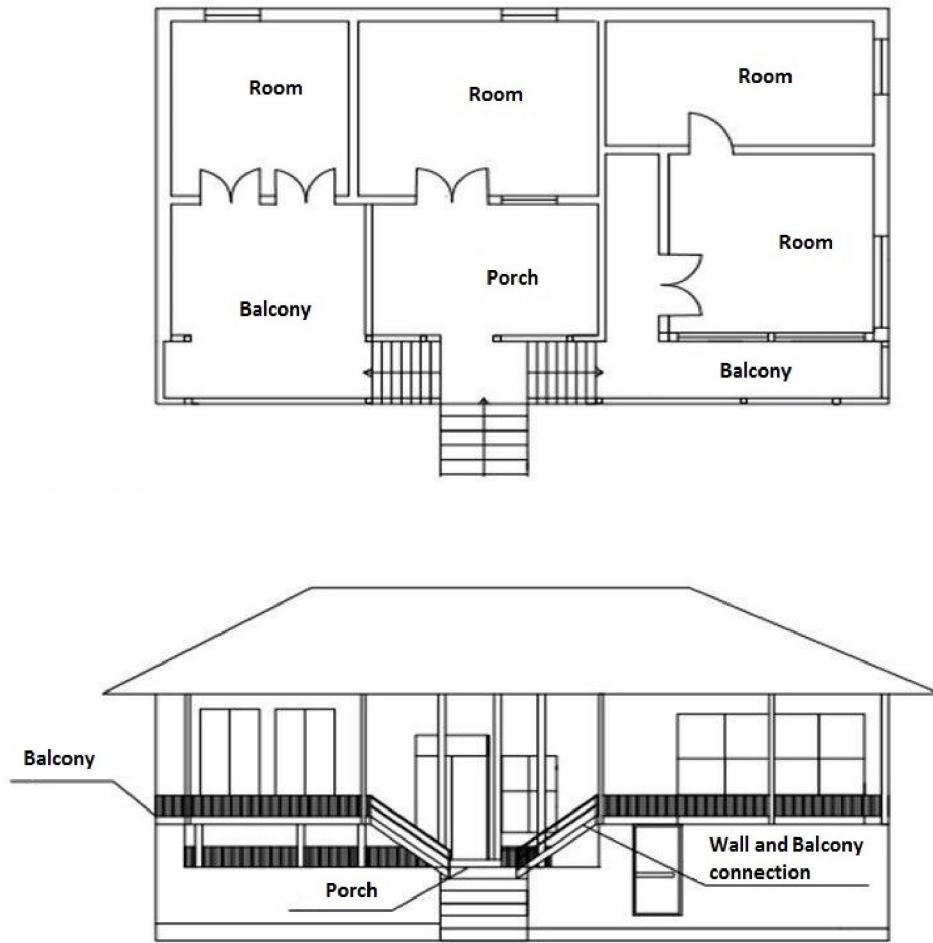


Figure 2: Plan and elevation



Figure 3: A vernacular house in Khotbehsara

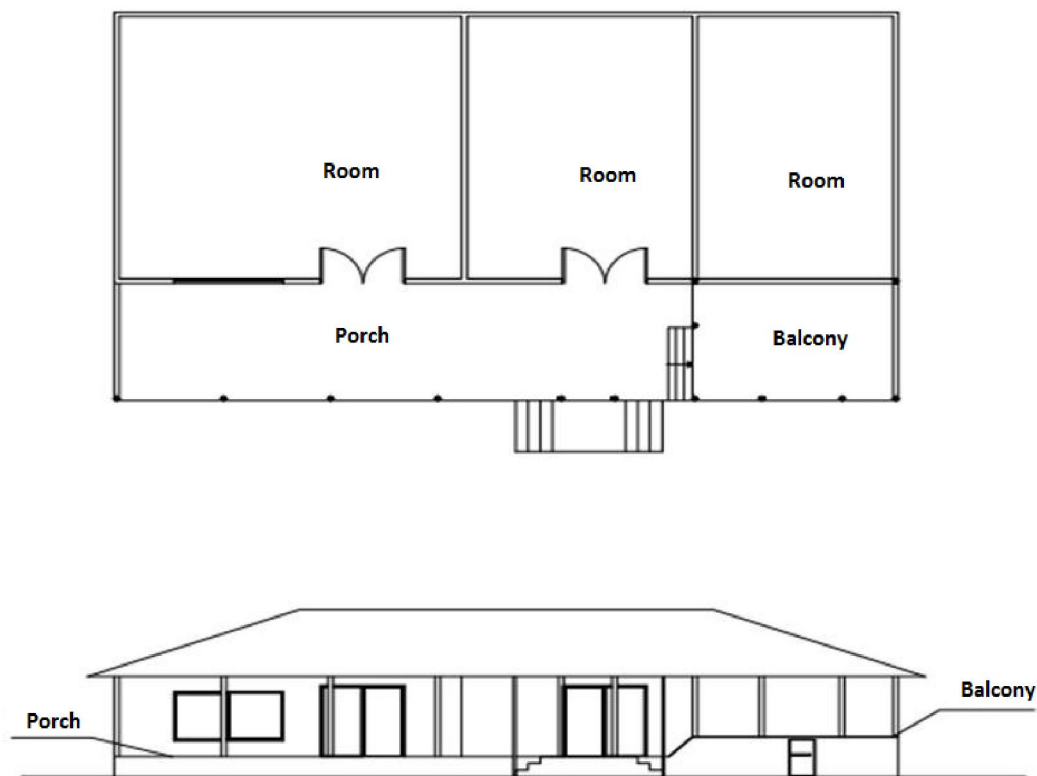


Figure 4: Plan and elevation

It is noteworthy that indiscriminate use of fossil energy in buildings have been caused by construction buildings in recent decades. The vernacular houses with sustainable factors have been replaced by non-recycle, heavy and expensive buildings. Lack of attention to the features of the site, climate and culture of region has made buildings as a strange factor of environment, while maintenance of them is still consuming. All these have led to analysis whatever exists in the past architecture in the west of Guilan and be inspired by important points of vernacular architecture regards to sustainable development. Considering that sustainable design seeks to a solution for environment, respect to knowledge and vernacular culture to access construction pattern should know traditional architecture precisely. The importance of balcony and porch in Guilan is as the main part of a building. Porch is the distance between outdoor and indoor space. The cultural and social reasons, which have affected their form and shape are described in **Table 1**. One of the most important influential factors of orientation and layout of balcony and porch is ecology that influences the framework (**Table 2**). Another factor is economy and its role in the livelihood of the local people (**Table 3**).

5. Conclusion:

The vernacular architecture of west Guilan consists of all sustainability factors without consciousness of people. Repetition these principles have been conveyed generation to generation as far as rational thoughts have been prominent in this process. This vision that every new things are the best without attention to the past has occupied the position of local architecture, and houses have been converted to buildings with unknown features. Without considering ecology and in order to achieve comfort excessive usage of fossil energy in construction purposes has led to one of the major problems in human life during recent years in Iran. Moreover, it is costly and there are lack attention to social and cultural relations through the buildings. The spirit of place and environment which used to exist in the past does not exist. Inspiration the vernacular architecture, these solutions can be addressed: 1) Using new materials, such as nanomaterial, recycled material like a variety of plastic and glass which are lighter than stone, cement, brick or block; these new materials with sustainable approach are in line with architecture's purposes. 2) Attention to orientation and layout of balcony and porch according to ecology factors to achieve comfortable condition, and also saving fossil

fuel in order to alleviate the critical situation of fuel shortage in upcoming years. 3) In the culture of this region balcony and porch are considered as one of the

main parts of houses. In lack of the condition to build them should attempt to construct traces to meet the cultural need of local people.

Table 1: Different aspects of social and cultural impacts on creation of balcony and hall.

How to influence these aspects and factors in shaping the space of the hall and balcony	Cultural and social aspects that impacts on layout of spaces
Multi-functional spaces, with the aim of responding to various activities, communicating to the outside	Response to basic human needs
_ Balcony as connecting the interior and exterior with light and transparent connection and create a place for socializing and meeting friends and relatives	Social relations
_ Celebrations, especially celebrations related to marriage halls and courtyards in the balcony or in interaction with each other and create a visual connection between the balcony and hall, lack of rigor at the entrance of distant relations in these celebrations even without inviting _ Login celebrations are done with entrance filter house	Customs and traditions
_ The absence of gender-segregated spaces, lack of hierarchy in order to enter areas of women _ On the contrary to the central plateau of Iran, which houses women should pass the hierarchical spaces to enter	Confidentiality
_ Women's employment outside the home alongside men, lack of sensitivity to hide in enclosed spaces open and semi-open house from view _ On the contrary houses of Yazd in central Iran that has a closeness like open spaces and semi-open spaces from view	Status of Women

Table 2: balcony and hall structural features in west of Guilan with the impact of climate

Climate features	Physical features
- shading in summer -Creating profit space for daily activities - Taking advantage of the cool wind North East	- Creating a semi-open space in the eastern and southern sides More
- Avoiding rain and rain crooked particularly troublesome the North West of rain in the winter to residential space	- The formation of spatial hierarchy, from outdoor to semi-open and closed
Creating profit double airflow and raise the temperature of the comfort to some degree	- proper view of the balcony to green space

Table 3: economic issues impact on balcony and hall of the west Guilan

How habitat influence on economic issues in construction	Impact on the form Ivan
- The use of vernacular materials	Main material in the construction of balcony: Wood (from the forest), stone (river stone), straw and mud
- Ease of preparation of materials from the environment -Simplicity in the construction -Reduction in construction time No cost for heavy cars and transportation vehicles far from - Economical	Simple form extracted from nature
-Providing Material without changing the texture -Lack of spending money to industrialization Recycled simple Lack of produce non-recyclable waste	-Show natural materials -Using light material in structure -light connection

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9/22/2016