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Housing Development Strategies in Small Cities Case Study: Khomam City in Guilan

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Abstract

Problem statement: In housing development planning, a comprehensive approach is required. In this approach all elements and components affecting the housing are considered, the relationships between them are identified and finally a set of different solutions by prioritizing them should be provided. Locating and examination of the place where new housing and living environments are built is one of the components of this comprehensive approach. Therefore, it is essential to provide housing development strategies tailored for a specific location which are small cities in this study.

Research objective: The purpose of this article is to provide strategies for proper housing development, considering the role of these cities in balancing the habitat system in the codification process of a comprehensive housing development plan.

Research method: In this research, the logical reasoning has been used in the explanatory section and in the section of presenting strategies analytical-descriptive method has been used. Documentation methods and field studies have been used to collect research data.

Conclusion: This study showed that in the specific process using vernacular architecture principles, strategies for proper housing development can be codified. These strategies can be divided into four categories: form, function, space, materials and construction. Proper development in the housing sector contributes to the sustainable development of small cities and strengthens their role in the regional development process.

Keywords: *Housing, Development Strategies, Small City, Khomam, Guilan Vernacular Architecture.*

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Introduction

Housing is considered as an essential need. Its role in urban and regional system and its function in economic and social systems is very important. Also, housing interaction with residents as its main user and its characteristics in regard with them, need to be studied. Nowadays, housing problems (whether quantitatively or qualitatively) are intensified due to the concentration and accumulation of population and activities in large cities, and lack or inability to respond to rapid emerging needs. Various policies have been compiled to address this problem and provided quantitatively housing that needed in development plannings. Different strategies and approaches such as social housing, low-income housing, rental housing, etc., indicate planners' efforts to solve this issue. With urbanization growth and migration to large cities, regional planning approaches have been studied considering the role of small cities. Small cities and their sustainable development can lead to a balanced regional settlement system. In an unbalanced regional settlement system, small cities struggle with management problems and unemployment (Irandoost & Amini, 2012) and housing as an essential infrastructure plays a significant role in the sustainable development of such cities (Yaran & Mohammadi Khoshbin, 2012). Therefore, it seems presenting strategies and policies for housing development in these cities due to their small size and their being between urban and rural architecture is very important.

This research aims to find effective factors in the codification of a proper method for housing development and providing strategies for its layout and planning in small cities. In other words, this research seeks to answer these questions: how is the process of achieving housing development strategies in small cities? How this process will be done in a case study (small city of Khomam in Guilan province)?

Guilan vernacular architecture, both in rural and urban areas, has unique features that have the

potential to be used in layout and planning in the housing sector nowadays. Attention and extraction of these concepts and principles not only increases harmony between residential buildings and environmental and climatic conditions but also increases life quality as a result of creation and development in residents' cultural context.

Literature review

Housing planning and its development have been the subject of many research and various aspects that are affecting it have been studied. Housing location in the region, and in particular small cities, have been subject of some researches too (Sharifinia & Noura, 2011; Zarrabi & Mousavi, 2009; Fanni, 2009). In some studies, structural-functional indicators of urbanization quality in such cities have been analyzed (Firozi, Sajadiyan, Amiri Falyani, Moradi & Boostani, 2016) which can be effective in housing planning. Previous studies have shown that housing is a significant issue in the spatial and physical development of small cities (Yaran & Mohammadi Khoshbin, 2012).

Various studies have also been conducted to investigate different characteristics of housing. These studies have tried to identify qualitative and quantitative factors and define features that affect planning, construction, and design of proper housing (Sartipipour, 2004, 2006; Azizi, 2004, 2005; Lotfi, Ahmadi & Hassanzadeh Farjud, 2009). In housing planning, quantitative indicators of household, person and room density in the residential unit and per capita rate of each, as well as quality indicators such as the proportion of proper housing based on materials, durability, and housing facilities have been introduced (Pourahmad, Ziary, Yousefi & Hajilou, 2016). In sustainable housing development strategies, improvement in urban texture, using modern methods, restoration of valuable buildings, increasing density, spatial balance in the functional system and controlling the extent of development

in architecture is recommended (Hekmatnia & Ansari, 2011; Lotfi & Kheirkhah, 2012). The impact of vernacular architecture and its role in increasing the quality of the environment has been emphasized in numerous studies (Iranmanesh, Nosratpour, Mirashk Daghan & Hadi, 2015; Khakpour, Ansari, Sheikhmehdi & Tavoosi, 2015; Sartipipour, 2008). Vernacular architecture also has different strategies and methods to provide proper living conditions in buildings (Molanaei & Soleimani, 2016) and identifying these principles and strategies by investigating vernacular architecture has been studied as a subject in various researches (Raheb, 2015; Yazdanfar, Hosseini & Zaroudi, 2014).

In the region of Guilan, various studies have been done on the shape, climate, and other aspects of vernacular architecture features. In these studies, process of physical development, effect of geographical and climatic factors, livelihoods and cultural activities, (Khakpour, 2005) socio-cultural factors on texture, (Khakpour & Sheikhmehdi, 2011; Khakpour & Eshghi Sanati, 2015) features associated with climate and impact of these factors on formation of architectural elements, (Gorgi Mahlbany & Daneshvar, 2010) as well as comparing characteristics of this type of architecture with other regions, countries (Gorgi Mahlbany & Yaran, 2010) and architectural styles (Yaran & Mehranfar, 2016) have been studied and with using vernacular architectural characteristics, some suggestions for the residential architecture of the area have been presented.

Housing and planning for its development have been considered from various physical and spatial aspects, the importance of addressing it in different cultural and geographical regions has been expressed and various strategies presented based on the context of these studies. Also, in the literature review, the importance of vernacular architecture and its role as a guide to find principles that can be used nowadays in architectural planning and layout are emphasized. Small cities

have also been introduced as a platform that can play an important role in balancing the settlements in the region. The study of these cases has been neglected in this area. Therefore, the two issues of housing and the role of vernacular architecture in planning and also presenting strategies for its development, considering the role of small cities in the region, need to be further explored which will be addressed in this paper.

Research method

In this paper, in the first section using the logical reasoning method, the effect of various factors affecting housing and its planning were discussed. Then, using the analytical-descriptive approach, the process of achieving housing development strategies was discussed and its effective factors were studied. In this section, a specific process to achieve strategies was introduced. These factors and characteristics were analyzed in the case study (Khomam small city) and its features were extracted and finally, architectural strategies for housing development were presented (Fig. 1).

Theoretical framework

• Housing and development

The word “housing” means habitation and residence, ie, inhabitancy and dwelling has a broader concept than physical activity of settlement, and includes a set of individual and collective activities. Housing can be characterized by positioning and authentication. Some of the special features of housing are:

1. Diversity of its users’ needs and behavior and its spatial diversity while being small compared to other functions;
2. Type, quantity, and quality of space use,
3. Physical and climatic protection;
4. Close connection with vernacular culture and identity and aesthetic satisfaction (Alalhesaby, Arababian & Yousef Zamani, 2009).

In the framework of providing the space for human comfort, housing is not only a physical existence

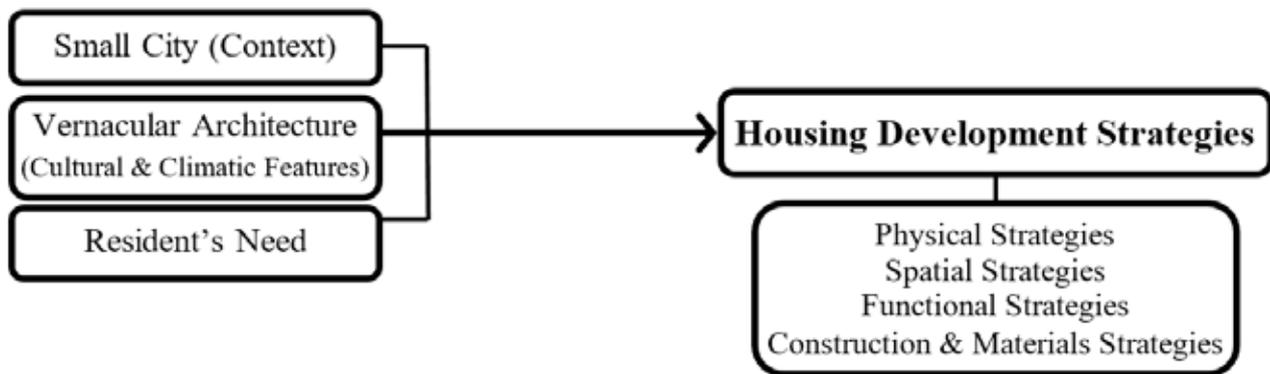


Fig. 1. Research's conceptual model (The relation between research's concepts). Source: authors.

that its realization requires engineering knowledge but the quality of space which provides spiritual and psychological needs. In this framework, in addition to residential units, neighborhoods, villages, and cities are also considered as housing (Sartipipour, 2004).

Planning for housing development in small cities is influenced by economic, social and demographic predictions. Housing planning for people with different economic, social and cultural aspects will only be successful when these different aspects are considered in a holistic view far from idealism and being aware of existing infrastructures and facilities (Gharakhlou, Shabani-Fard, Hosseini & Ahadzade, 2009). Theories of physical planning rely on physical criteria and engineering, architectural, construction, housing, landscaping and urban infrastructures installations dominate them (Papoli Yazdi & Rajabi Sanajrdy, 2010). Based on literature and previous studies on housing development, influencing factors can be classified in terms of economic, physical, cultural-social and biological aspects, as shown in Table 1.

Having a comprehensive approach to all components effective in proper housing can lead to the desired housing development. In this research, various aspects of housing development at architectural scale have been considered in presenting strategies.

The process to achieve strategies for housing development

The housing development is not only for numerical increase of housing construction, but strategies for proper development in both quantitative and qualitative aspects of housing. This approach is based on identifying features of housing in both macro and micro scale, its role in city and beyond that in the region as well as its impact on residents' lives. This identification helps to detect effective criteria in developing architectural strategies and expressing ways to develop it. Based on this, in a multi-stage process, the first role of housing in small cities and its situation is studied, then vernacular architecture and its formation foundations are analyzed. In the next step, residents' needs and role of housing in individuals' life are investigated and finally, by summarizing mentioned steps and conclusions from findings, criteria and strategies for housing development are expressed and presented.

1. Expressing the role and place of housing in small cities

Housing is the largest function in cities and its construction and production is a determinant factor in the physical development of cities, especially small cities; thus, it can be expressed that housing and its development play a significant role in shaping the form and identity of the city. Housing development, is considered to have a big capacity in the allocation

Table 1. Classification of influencing factors on housing development. Source: authors.

| Classification of factors | Influencing factors | Related literature |
|---------------------------------|--|--|
| Economical | Investment, job creation and production prosperity Economic efficiency Tourism | |
| Physical | Development pattern (horizontal and vertical) and housing typology (single room, apartment, residential complex, high rise) Density and occupancy area Quality and visual richness Materials and structures Physical comfort (thermal comfort, climate orientation) Mental relaxation (psychological needs, vision and perspective) | Alalhesaby, Hosseini & Nasabi, 2012; Bezi, Kayani & Razi, 2010; Daneshpaye, Habib & Toghyani, 2017; Hekmatnia & Ansari, 2011; Mahmoodi & Nikghadam, 2008; Pourmohamadi, Roustaei & Asadi, 2014; Sartipipour, 2006; Zandieh & hesari, 2012 |
| Spatial & Functional | Spatial qualities Facilities, infrastructure and related installations Proper access and optimal distribution of utilities and urban services | |
| Social | Balanced society Interaction and social vitality Safety and security | |
| Environment | Conservation and utilization of natural resources (renewable energies) Proper land use and maximum natural surrounding environments use Environmental health and safety | |

of manpower and finance, can contribute to economic growth. Small cities can also serve as destinations for tourism as a recreational area with rural characteristics and urban comfort facilities. Proper housing growth provides residents' biological needs in cities and improve social conditions in households which have a very important role in improvement and promotion of social and environmental indicators. These, contribute to political stability of small cities that lead to sustainable urban development. Therefore, housing has a fundamental position and one of the main factors in achieving comprehensive and sustainable development of small cities which has a significant role in sustainable and balanced regional development (Yaran & Mohammadi Khoshbin, 2012).

2. Vernacular architecture and analyzing the foundations of its formation

Vernacular buildings in all regions is the result of thinking and practice of centuries of experience that can be used as a continuous source of knowledge

(Oikonomou & Bougiatioti, 2011). These buildings are designed bioclimatically to achieve thermal, acoustic and lighting comfort conditions while taking into account climatic conditions. Vernacular architecture of each region tries to integrate with its surrounding environment (Anna-Maria, 2009). From this perspective, the study of vernacular architecture can provide effective strategies for built environment that are evaluated in relation to sustainable environments and uses local resources to meet local needs (Philokyrou & Michael, 2012). Also, formation of residential environment based on vernacular architecture and technology gives them a special feature and can be used as fundamental capital and wealth to maintain their identity (Sartipipour, 2008). Attention to culture, practices, and traditions of residents' lives can also lead to their relative satisfaction from the residential environment (Mahmoodi & Nikghadam, 2008).

By examining different aspects and taking

into account natural and human systems that influencing formation of architecture (natural systems include: climate, water, land, and plants and human systems including social, economic and cultural), foundations of vernacular architecture formation are extracted and can be used in layouts and plannings.

Therefore, in the design of housing with a distinct identity, vernacular architecture can be used as a source that is constructed and formed in adaptation with cultural, social and economic needs of inhabitants and in accordance with time conditions.

3. Study the needs of residents and the role of housing in people's lives

Housing is the smallest form of physical visualization of interaction between human and environment (Roustaei, Ahadnejad, Asghari Zamani & Zangeneh, 2012). Residential spaces should be designed to meet diverse needs of different social groups in all range of ages. A proper housing should provide a compatible and consistent environment with human lifestyle. In other words, it should meet both quantitative and qualitative needs of residents. Quantitative needs include per capita, size of spaces, and physical requirements of the building. Most housing development planning focus on this issue. Considering qualitative needs of residents as well as the role of housing in meeting these needs include a wide range of studies too. Socio-cultural features are one of the most influential factors in qualitative needs that in residents' behaviors.

The study of human needs and effect of housing in providing them, as well as analysis of the role of housing in terms of various aspects of people's lives and other people in society, is important in achieving a proper development method.

4. Providing criteria and strategies for housing development

The compilation of mentioned steps in previous sections and conclusion from findings lead to

presenting architectural strategies for proper housing development.

Findings

• Housing situation in small towns of Guilan province

The growth of urban population in Guilan province has been increasing in recent years, and most of them are in medium and large cities. The development of facilities and infrastructure in small cities has taken place slowly and can not meet the citizens' needs, population growth and rural areas that are under influence. This will accelerate the process of migrating to big cities from rural areas and even small cities. Small cities' development and increase of their capacity in the region can control this issue significantly, this growth and development requires attention to various parts of these cities, in particular, proper housing development planning.

Assessing indicators for housing situation are divided into two categories: quantitative and qualitative. Quantitative indicators included net and gross area, household density, persons and average number of rooms per unit and household growth in relation to housing growth rate and qualitative indicators for housing include location and physical condition of housing unit. One of the best indicators in predicting required number of residential units is based on households' increase rate. Based on statistics of the comprehensive housing plan in Guilan province, considering population growth and need of households to build new housing, from the year 1395 to 1405, growth in the needed residential units for construction increased to 188740 units (Motale'at-e tarh-e jame'e maskan-e Guilan [Guilan comprehensive housing plan studies], 2009). Small cities are more vulnerable to this issue. Traditional texture of these cities is changing rapidly with new construction to respond to this need, and new buildings are generally built without any regard to vernacular

architecture's principles and patterns.

Current housing situation in Khomam city

Khomam is one of the six districts of Rasht city and is located in plain area. This city leads from south to Rasht, from north to Caspian sea and Bandar (port) Anzali, from west to Anzali lagoon, and from east to the Khoskbijar section. Around the city, there are agricultural land and belt road in the eastern part. Due to its location, Khomam can play an important role in balancing the region's development (Fig. 2).

Khomam is facing with shortage of housing due to the need for development of this sector because of population growth. The residential architecture of Khomam has changed over the past three decades due to extensive construction. Today, many constructed buildings do not differ in terms of form and use of materials with other urban areas, and problems such as lack of attention to vernacular architectural principles are evident in layout and construction of new residential buildings. Development of residential texture in Khomam like many other cities has weaknesses, some of which are:

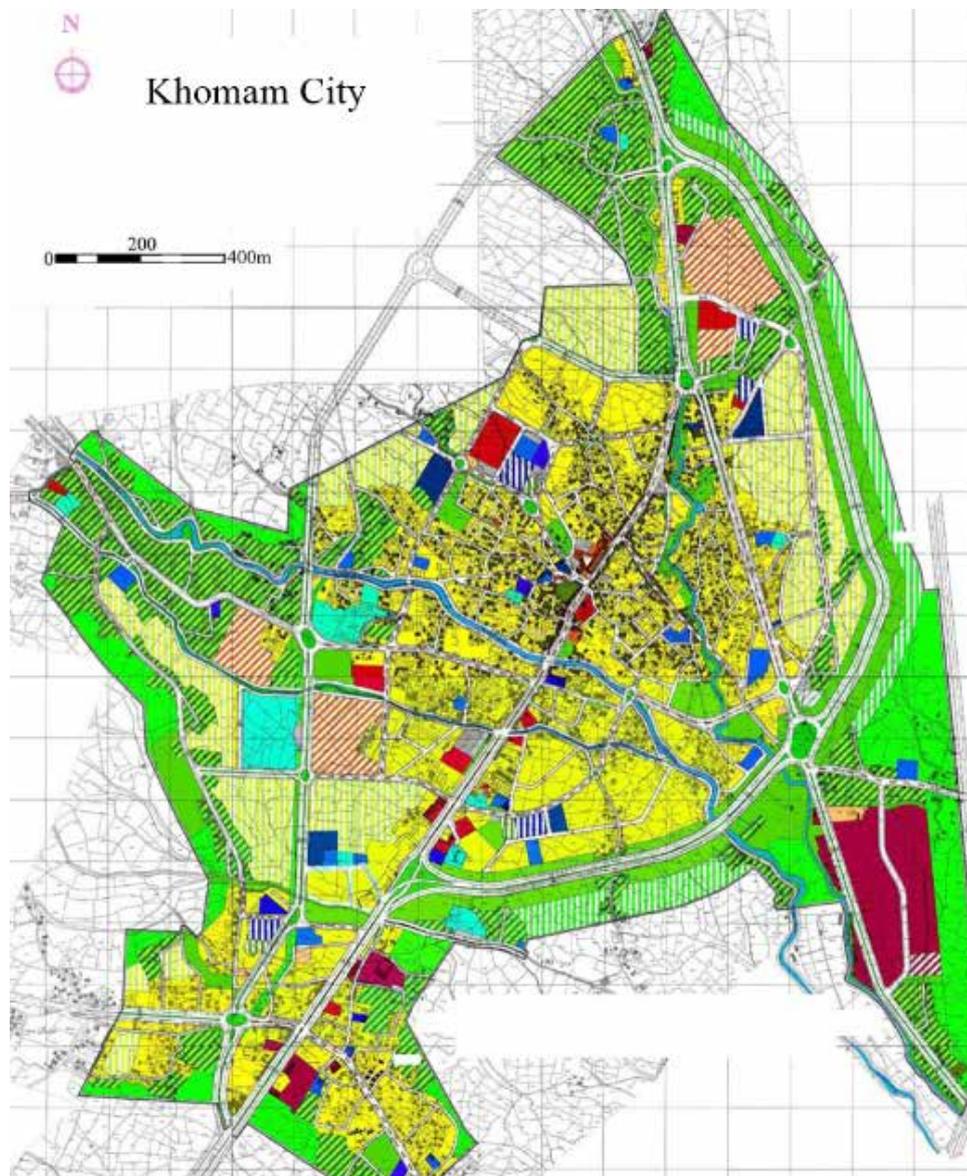


Fig. 2. Map of Khomam city. Source: Motale'at-e tarh-e hadi-e shahr-e Khomam [Khomam guide plan studies].

- Lack of standards and principles in layout and construction (Fig. 3);
- Decline in architectural qualities (lack of attention to vernacular architecture) (Fig. 4);
- Considering economic aspect of housing to generate more profit;
- Confrontation with environment rather than alignment with it (see Fig. 3);
- The alienation of residential units with residents' socio-cultural patterns;
- Growth of residential areas regardless of infrastructure in creating service spaces and facilities in the area;
- Disturbance of equilibrium in open, semi-closed and closed spaces with increasing construction density in the city.

Therefore, considering the need of small cities such as Khomam to develop housing quantitatively due to urban population growth to stabilize their position and role of balancing the region settlement system, as well as quality problems in housing sector, attention



Fig. 3. Building on agricultural land, regardless of surrounding texture (right) and extensive construction in narrow alleys (left). Source: authors' archive.



Fig. 4. Residential growth regardless of resident's needs and vernacular architecture. Source: authors' archive.

to effective and achievable strategies in housing development sector is necessary.

Vernacular Housing Architecture in Khomam

In recent years, due to extensive construction, traditional texture has been destroyed or diminished in many cities, including Khomam. There are only a few traditional houses left in Khomam. Therefore, in this section, the characteristics and principles of vernacular architecture of Khomam are identified and extracted through study of these houses as well as rural vernacular architecture of Guilan.

Architecture of Guilan residential buildings, with its environmental influences, such as geographic, climatic, social and cultural factors, is unique and born from interaction between humans and its surrounding nature. These buildings reflect residents' needs and desires and their layouts respond to behavioral and climatic needs. Factors influencing formation of vernacular housing of Guilan can be considered in two macro clusters of "climatic" and "cultural-livelihood" (Yaran & Mehranfar, 2016).

Guilan's vernacular architecture has form and function features that make up its identity. These features are related to climate, culture and social conditions. In the preceding studies, various features and principles of Guilan vernacular architecture has been described. In general, these features could be categorized as follows in Table 2.

Residential architecture of small cities in many cases climatically shares the same features with rural architecture of its surroundings and is different from rural vernacular architecture only because of its residents' livelihoods, due to type of functional spaces and shape of elements. About ten percent (10%) of Khomam's population are active in agriculture, and others are engaged in other areas such as service, administration or in relation to agriculture. As a result, diversity of functional spaces varies depending on residents' livelihoods. However, linear structure, close interconnection between inside and outside as well as functional hierarchy are commonly found in houses.

In this architecture, houses are usually free or

Table 2. Guilan’s vernacular architecture’s features based on previous studies. Source: authors.

| Classification of features | Influencing factors | Related literature |
|----------------------------|---|---|
| Formal features | Building positioning in the middle of the site | Khakpour, 2005 & 2006; Khakpour and Eshghi Sanati, 2015; Khakpour, Ansari and Tahernian, 2010; Georgian Mhlbany and Daneshvar, 2010; Georgian Mhlbany and Yaran, 2010; Tahbaz and Jalilian, 2011; Yaran and Mehranfar, 2016 |
| | Building positioning above ground level | |
| | Sloping roof | |
| | Orientation towards seasonal winds | |
| | Porch in one or several fronts of the house | |
| | Linear form (rectangular) and east-west stretches | |
| | High porosity in main Façades | |
| | Avoid abundant luxuries | |
| Functional features | Decorating in fences and corrugations using elements such as pot in the façade) | |
| | Access through the porch and placement of various activities in it | |
| | Different functions of rooms in different seasons base on residents’ needs | |
| | Boundaries and respect invisible privacies base on residents’ needs | |
| Structural features | Multilayer spatial and functional areas in the center of the building | |
| | Relatively simple structure (wooden beams and pillars) | |
| | Use of vernaculars materials (wood and plants fibers) | |
| | Transmission of lateral loads through diaphragm and foundations with jointed bearings | |

connected only on one side to walls of the site. The positioning of building allows residents to connect more to open spaces (yard) and more importantly, provides more semi-open spaces for residents. “Ivan” (porch) has also emerged in Khomam as a fundamental principle of Guilan’s vernacular houses and as an interface between inside and outside, serves different functional roles depending on residents’ needs. Multiple openings and semi-open spaces and building relative freedom from ground provide airflow and ventilation.

In Khomam, buildings are higher than ground to be away from damp. Architectural materials, although still built with low thermal capacity, wood is used less in walls as dominant materials. Roofs of houses are more similar to Guilan’s rural vernacular architecture. Contrary to Guilan’s rural architecture, surrounding walls are not transparent and inside of the house is distinctively defined from public spaces (streets and alleys).

Although urban and rural architecture of various

regions of Guilan is different in some ways, traditional architecture of Khomam city is not different from the principles and features of Guilan’s vernacular architecture, and some of its physical differences are due to various livelihood and cultural diversities of residents.

Residents’ cultural and biological needs

Housing provides human biological needs. These include not only physical needs such as shelter, noise and pollution protection but also spiritual needs. Therefore, housing or living space should function in two aspects, one is to create a proper environment in terms of physical conditions, such as physical requirements, creating the optimal temperature, humidity, airflow and light, and also meet spiritual needs, i.e. to create proper spaces for mental comfort and spiritual relaxation. People and their behaviors are part of residential environment system, human behavior is always shaped in the environment context so they can not be separated from each other.

Housing is not only a building or a shelter, but in the context of social development, it can lead to a sense of social and neighborhood belonging. Housing should provide the place for interaction between residents through architectural elements. Architectural elements such as porches and terraces (semi-open spaces), gardens, semi-public spaces, and multi-functional buildings have an important role in strengthening this factor. Indeed, since any social relationship requires a place, achieving a successful housing model in terms of social interactions requires a review of appropriate spatial-physical patterns for residents' social activities.

The role of housing is to meet qualitative needs of residents and provide favorable conditions for them as well as realization of household activities for the purpose of family stability and solidarity. Another role of housing is the family's participation in a larger society because social contact is one of basic human needs. Family's social contribution to housing, on one hand, creates hierarchy and discipline of residential units and makes it different from shelter and on the other hand, it will affect the way in which units are interconnected and interact with each other in a macro system with residential texture (Pourdeyhimi, 2012).

With changes in human needs and lifestyle, behavior patterns of residents have also evolved in houses and created a different spatial organization. Residential environment as a symbol of residents in the interactive process interprets and expresses their characteristics in which six attributes such as shelter, identity, solidarity, comfort, convenient and physical suitability for it can be expressed (Pourdeyhimi & Nourtaghani, 2013).

In order to provide cultural and social goals in housing, by exploring life, history, thoughts, beliefs, patterns, customs and traditions, principles and rules are extracted which can be used in layout and planning. This means that proper housing development planning should encourage

promotion of culture and social characteristics, local interactions and social institutions.

Discussion

• summarization and presentation of strategies

Housing has physical, functional and spatial qualities and characteristics. Formation and creation of these features are realized using various materials and methods. In this research, housing development strategies are presented in four categories: physical, spatial, functional, and construction and material related strategies.

• Physical and formation strategies

- **Long-Forms:** form is lengthened in the east-west direction. In addition to providing more light on facades, it allows natural ventilation through seasonal winds.

- **The orientation and position of building in the site:** the building is better to be free from three directions in order to provide needed space for residents and also with proper orientation to create internal ventilation. Building freedom in the site makes it possible to connect more with open spaces and placement of semi-open spaces on different facades of the building.

- **Porosity in facade:** in this climate, natural ventilation plays an important role in creating comfort in buildings, so placing openings in locations where air and wind flow more easily into the building are important.

- **Semi-Open space:** semi-open spaces, in addition to functional features, have an important role in creating an external image of buildings of this cultural-climatic region.

- **Low and medium height:** buildings in small cities, unlike large cities, grow less vertically. Residential buildings in small cities are usually allocated to just one or two units. This can be effective in creating social ties and a sense of belonging and ownership in neighborhoods of small cities. This is one of differentiation features of development strategies in small cities in

comparison to large cities and metropolitan areas.

- **Rural architecture pattern:** by developing residential complexes in which vernacular rural architectural patterns have been used in their construction, small cities can be tourist destinations because of their location and comfort facilities. In addition to preserving vernacular patterns and architecture, this strategy addresses the economic development of small cities.

• **Spatial strategies**

- **Widespread and linear spatial layout:** in order to create ventilation in the building, there is a need for a spacious layout and because of their long-form, arrangement structure of spaces is linear and along each other.

- **Interconnection between inside and outside:** many activities in this region can be carried out in semi-open and open spaces. Communication between house (inside) and yard (outside) in addition to generalization of residential area to the entire site, can be effective in shaping these activities.

• **Functional strategies**

- **Arrangement:** hierarchy in functional spaces by specifically locating them in the building, as well as creating visible or invisible boundaries in housing to differentiate between public and private spaces. Flexibility: design of spaces with different functions based on residents' needs, as well as use of semi-open space on different fronts, with the ability to realize a variety of functions that can be added to inside during cold seasons.

• **Construction and material related strategies**

- **Use of light materials:** use of low heat capacity materials due to air moderation and ventilation capacity in buildings.

- **Considering rain and humidity:** placing the building above ground to prevent the damp rise from the ground and create natural ventilation under the building. Rainfall as one of the most important climatic features of this region plays an important role in construction of housing. Storage

and use of rain as one of design strategies in this region can lead to more self-sufficiency and sustainability of housing.

Conclusion

Proper housing is the place that provides ideal environment for meeting biological, physical, cultural and social needs. Design, will get to a better result based on the knowledge of how humans interact with the environment. Vernacular architecture is formed in context of environment with regard to human and natural systems, and as a result, its strategies to respond to these systems can be used nowadays in many cases with accurate examination and identification. Therefore, by studying housing situation and considering its role in small cities as an appropriate place for development and based on comprehensive human needs indicators and criteria for proper housing will be expressed. These with identifying vernacular architecture's patterns and restoring them as environment-compatible examples, can present layout and developing strategies for housing in small cities.

Findings from the case study (Khomam small city) showed that based on the process and stages mentioned above, housing development strategies are divided into four categories of physical, spatial and functional, construction and materials (Table 3).

These strategies are presented on architectural scale and include various aspects affecting housing development including economic, physical, functional, spatial, social and environmental. Although many of these strategies can be used in medium and large cities due to cultural and climatic commonalities, some of them include vertical development (low and medium height), as well as the use of rural architectural patterns in some sectors as a destination for tourism and temporary residence are specific to small cities. Since the two factors of culture and environment have a significant impact on these strategies, these strategies can not be generalized to different geographic and cultural regions. Therefore, further researches are

needed in various cultural and climatic regions in this field. Also, other factors affecting housing development planning, such as quantitative features

and executive issues, can be considered as the subject of further researches, in order to formulate and present a comprehensive model.

Table 3. Housing development strategies. Source: authors.

| Categories of housing development strategies | Housing development strategies | Constructional details |
|--|--|--|
| Physical Strategies | Long Forms | Use of pulled forms in east-west direction |
| | Orientation and porosity | Natural air ventilation with building orientation and positioning openings according to seasonal winds |
| | Positioning | Placing Buildings freely in site for ventilation and connection with open spaces |
| | Semi-open space | The use of semi-open spaces with the ability to convert into closed areas with flexible walls Building retreat on north and west sides using porch |
| | Low and medium height | Average height Buildings (two or three levels) |
| Spatial Strategies | Rural architecture pattern | The construction of buildings with vernacular rural architecture pattern for tourism and temporary accommodation |
| | Widespread spatial layout | Widespread spatial layout for ventilation |
| | Linear organization | Organize spaces in a linear way along each other |
| Functional Strategies | Interconnection between inside and outside | Intense interaction between inside and outside (transparency) |
| | Arrangement | Creating functional spaces hierarchy and distinguishing between public and private areas |
| | Flexibility | Flexibility in living spaces for use in all seasons Use of semi-open spaces with ability to realize a variety of functions |
| Construction and Materials Strategies | Use of light materials | Use of materials with low thermal capacity due to moderate temperature and ventilation |
| | Rain and humidity | Ground floor above natural ground to prevent damp rise and to create an interstitial space Collecting and storing rainfall to use in green space Slope roofing |

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