Architecture

Family structure and housing
Investigating the effect of family structure changes on houses' spatial organization
(A case study of the houses of Yazd)

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Abstract

Iran's widespread developments influenced by the industrial revolution led to a lot of changes in family structure and by changing the function of family and the roles and relations of family members, paved the way for a change in the houses' spatial organization. Therefore, the main question addressed in this study is: 'What changes are brought about in the space organization of houses of Yazd as a consequence of changes in the family structure?' The strategy of research is qualitative and the method is grounded theory. The results of the present study revealed that every change in family structure has an equivalent effect on houses' spatial organization. In fact, with the horizontalization of the pyramid of power and the creation of democracy in the family, the house has also become democratic and age and gender hierarchies have been eliminated from the organization of spaces. Besides, with the increase of individuality in the family, the organization of housing spaces has also changed in order to create distinct personal realms and eliminate the continuity and fluidity of the space. Moreover, by eliminating many of the functions and duties of the family, the functions and duties of the house have also changed such that it has become just a place for resting.

Keywords: *Space organization, Family structure, House, Grounded theory, Yazd.*

1. INTRODUCTION

The nature of society along with what is realized in the behavior of its members is reflected in the space organization of the buildings [1]. In this regard, human beings, as the major actors of the space, have played a crucial role in bringing about this change. Human beings live in houses in the form of family, as the basic unit of society and any alternation in society brings about some changes in the structure of family and the needs of its members [2]; Thus, when residents' needs and their lifestyles change, their housing structure also undergoes serious changes.

Different studies have been conducted to investigate the relationship between the resident, as a family member, and their housing [3-10]. Many of these studies have focused on the natural transformations of families during their lifetime (changes in the age of the family, number of family members and members' capabilities) [3, 8, 11-13]. However, in the last century, Iran and its similar countries

have experienced the effects of modernization and industrial revolution on all of their structures and organizations, specifically families [14]. Given that the characteristics of the residents of a place are among the main factors determining the spatial organization of that place, housing spatial organization is affected by this transformation in family structure. In the field of social sciences, several studies have been conducted on the changes of Iranian families during the last century [15-18]. In the field of architecture, likewise, different studies have investigated the organization of housing space in terms of concepts such as territories [19-21], the hierarchy of private vs. public places [22-23], plan pattern, and the functional relationship between spaces [24-25].

Although identifying the effects of family transformations on housing plays a crucial role in making decisions and doing thoughtful planning for the future, very few studies have been conducted in this connection. In fact, most of the studies carried out on housing have only referred to the effects of family structure on housing in general [26-29], such that the relationship between the changes in family structure and housing in a focused case study has not received the attention it deserves [30]. Fazeli [30] asserts that such studies are related to the field of social sciences;

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rather than, architecture. However, if this issue is addressed by architects, it provides more practical results for planning in the field of housing. Given the above-mentioned research gap, the present study, adopting an interdisciplinary approach, aims at answering the following question: "What changes are brought about in the space organization of houses of Yazd as a consequence of changes in the family structure (from the late of Qajar dynasty to the present)?"

Different methods have been proposed for analyzing space and each of them uses specific instruments. These instruments are either quantitative (mathematic, computer, etc) or qualitative (description, and analyzing architectural patterns by users or researcher). The results obtained from each of these instruments can provide different social and cultural interpretations of a given space [31]. The present study attempts to investigate housing transformations based on residents' perspective, their life style, and their behavior. Thus, it uses the qualitative approach and grounded theory strategy. The city under investigation is Yazd during the first half of the 20th century (the late of Qajar dynasty, in which the industrial revolution began to affect the housing and the families of Yazd) to the present [32].

To conduct the study, at first, the concept of space and spatial organization were studied and, then, using the theoretical foundations in the field of social sciences, the changes in the family structure were studied. Based on these changes, the main categories were identified and used as the basis for the subsequent analyses. In the subsequent stages, using the grounded theory, the data obtained from the interviews and observations were coded and analyzed. The study findings address important conceptual issues of housing transformation and inform practitioners and other decision-makers in their efforts to design better alternative houses for today families.

2. LITERATURE REVIEW

2.1. Space organization

The topic of "space" has already been investigated by a number of scholars, providing sufficient literature on space as a multilayer category produced physically and socially [33-35]. In defining space, Grutter [36] distinguishes mathematical space from perceptual space and contends that mathematical space deals with the physical investigation of space, irrespective of individuals' perception of it. In fact, in mathematical space, all of the places of space are equally important; while, in perceptual space, space is described based on individuals' perception and their subjective implications. Hence, in perceptual space, space is construed as entailing a center, axis, direction, and relation between elements.

Spatial organization deals with the internal relations of space; thus, every spatial organization causes some specific perceptual qualities which play a crucial role in the understanding of architectural works [37] According to Rapaport [38], spatial organizations represent the values, objectives, and activities of the individuals who created them. Accordingly, as the characteristics and values of

their creators change, the spatial organizations undergo some changes, too. In fact, in each context, the spatial organization of housing is affected by technological, social, economic, and cultural features of that context and, as these factors change, the spatial organization of housing changes, too [38] Fig. 1. In this study, by space, we mean perceptual space and, as it was mentioned, in perceptual space, space is construed as a mental concept and is defined in the mind of the observer. Thus, when perceptual space is investigated, in fact, the relationship between the observer (the mind of the individual who perceives) and the mathematical space is examined. Hence, all of the analyses made on space should be based on the observer's perception. This perception is different in different individuals and differs substantially from one culture to another culture [39-41]. Thus, using the grounded theory strategy paved the way for investigating the changes in the space organization from residents' perspective and based on their behavior towards the space.
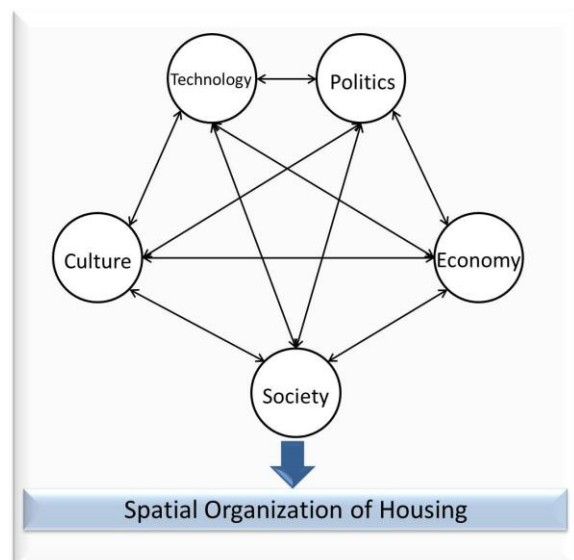
Fig. 1 The effect of different factors on the space organization of houses (drawn by authors adapted from [26])

2.2. Changes of family structure

The effect of political, economic, social, cultural, and technological changes on a society's social organizations is undisputable and family, as one of the most basic social organizations has always been affected by the above-mentioned factors [2]. In the last century, the industrial revolution brought about some changes in the structure of family such that the pattern of family has changed and extended families are replaced by nuclear families [42]. To the mid-19th century, in most of the countries, families were generally recognized as being extended and patriarchal. Despite the differences observed in the extended families of different parts of the world and during different historical eras, they were characterized by the following two common features: firstly, they included three or more generations who lived in one house and were a production-consumption unit. Secondly, the power was in the hands of the father and it was transmitted to the

oldest son (age-gender hierarchy) [43]. In these families, individual rights and freedoms were not recognized and the family determined individuals' social role and position [43]. Nowadays, families in most parts of the world such as Iran are nuclear. Nuclear families include the father, mother, and children. These families include two generations and the third generation does not have an extensive relationship with the first generation [44]. As extended families changed into nuclear families, the structure of the family underwent substantial changes. These changes can be investigated in the functions of family, the position of family members (power structure), and their relationship.

2.2.1. The function of family

In the past, family was the most basic social organization which had enormous responsibilities such as educating, socializing, employing, regulating sexual relations, and satisfying social and psychological needs of its members [45]. Thus, the house, besides being a place for resting, sleeping, cooking, eating, and gathering together, was a place for working, educating children, and spending leisure time. During the industrial revolution, some of the important functions of families (which are referred to as the secondary functions of family by Konig [46] was dedicated to other governmental, social, and economic organizations. In fact, places such as schools, kindergartens, restaurants, food stores, bakeries, cinemas, etc. performed some of the duties which were previously conducted by families [32]. Changes in economic aspects of the family were the most substantial and noticeable change in the functions of families. Before the industrial revolution, most of the economic activities were carried out in the family. However, after the industrial revolution, the role of the family as an economic unit changed such that it changed from a production-consumption unit into a consumption unit. This necessitated the separation of the working place from the living place. As the working and living places were separated and family members were employed outside of the house, their life style changed and they were heavily dependent on their production organization [43].

2.2.2. The position of family members

One of the most important consequences of industrial revolution for families is the changes it brought about in the position of family members. In this period, the traditional roles of men (making money and working outside of the house) and women (doing household chores) underwent substantial changes [42]. The reason is that modern thoughts, the change from agricultural economy to industrial economy, and the limitations of urban life were not compatible with a patriarchic family. In modern families, power is not in the hands of fathers. Instead, women, using immaterial resources such as their intelligence, attractiveness, or their education exercise power in the family and children, on the other hand, use their emotional resources to exercise power in the family. This diversity of power has challenged the traditional model asserting that

power resources are merely material and men, because of having a job and money, hold the power in the family [16]. By having access to some of power resources, women have nowadays managed to change the pyramid of power in favor of themselves. As the patriarchic system diminished, the family was no longer a place for the ruling of men over women; instead, it is a place for the interaction between husband and wife [47].

2.2.3. The relationship of family members

As Fazeli [30] contends, individualism is one of the important characteristics of modernity in the last century. Individualism refers to preferring individual and personal needs to the needs, values and general structures of the society. Extended families are characterized by being meta-individual in that, as it was mentioned, in different aspects of these families, such as livelihood, the family benefit is important. However, nuclear families are recognized by the centrality of individuals. In nuclear families, individuals build their lives based on individual work and effort and economic independence is the source of political and social independence for individuals [17]. Nowadays, families include individuals who are different from each other and are engaged in doing their own tasks and responsibilities. These individuals have different positions in the society and different norms and values direct their personal behavior.

As it was mentioned, family, as a social organization, is affected by economic, cultural, political, and technological changes. In this study, the effect of family structure changes (in terms, the role of members, their relations, and the functions of family) on the spatial organization of housing is investigated Fig. 2.
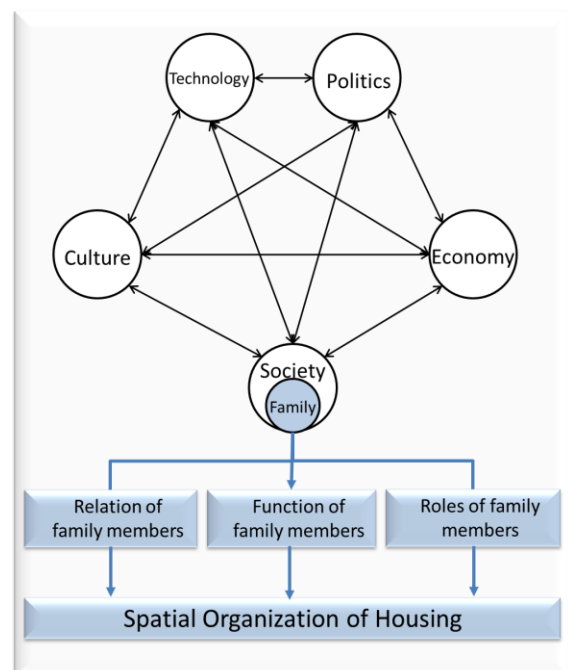

Fig. 2 The effect of the changes in the structure of the family, as a social organization, on the space organization of housing (source: Authors)

3. CASE STUDY

3.1. The city of Yazd and its housing patterns

Despite substantial changes of industrial revolution, Yazd is one of the prominent examples of cities whose social, cultural, and physical structure can represent and illuminate the spatial composition of Iranian traditional cities during the Islamic period [48]. Dehghan Manshadi [32] believes that experienced the industrial revolution after 1920. In point of fact, the establishment of Eqbal Company in 1934 can be construed as the advent of introducing industry into the city of Yazd. With the launching of this company, the first step toward modernizing this city was taken [32]. These developments rapidly affected and altered people's life [49]. As a result of the developments induced by the industrial revolution and the establishment of different companies, many people were employed in companies and producing-consuming families were replaced by consuming families.

From when the effects of industrial revolution started to loom, to the present, the city's residential architecture has undergone substantial changes. Although there are different housing patterns during different eras, today, all of the patterns are present and people still live in them. This paves the way for us to compare these houses for the purpose of the present study. The time span under investigation in the present study starts from the time of the looming of the industrial revolution effects to the present. To conduct the case study, we capitalized on purposeful sampling and selected some instances of the three dominant housing patterns. These patterns are as follows: The first type (traditional) includes houses with a central courtyard.

These houses were constructed until the beginning of the Second Pahlavi Era. Typically, extended families resided in these houses; while, nowadays, nuclear families reside in these houses. The second type (medial) includes houses which are characterized by having an exclusive courtyard in one side of the house. They are typically single floor houses. These houses were constructed from the Second Pahlavi era and have undergone minor changes to the present. The third type (modern) includes apartments or multi-story houses with a common open space for the residents and each unit accommodates one nuclear family Fig. 3.

First type (traditional)   **Second type (medial)**   **Third type (modern)**
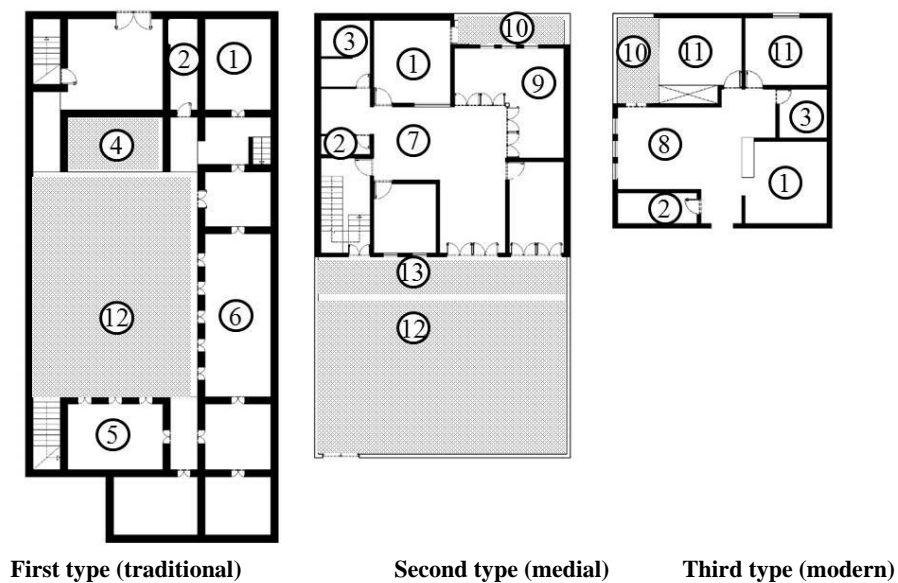
Fig. 3 Three dominant housing patterns in Yazd (1. Kitchen; 2. WC; 3. Bathroom; 4. Talar (summer living quarter of house); 5. Three-door room (winter living quarter of house); 6. Five-door room (winter living quarter of house); 7. Central hall; 8. Living room; 9. L room; 10. Balcony; 11. Bedroom, 12. Courtyard) (source: Authors)

3.2. Methodology

This is a qualitative research and its method is Grounded theory. At this stage, the samples were opted out using the purposeful sampling. The sample selection process continued until theoretical saturation was achieved. Data were obtained by means of open-ended and semi-structured interviews [50-52], along with Participant and non-participant observation. In sample selection, the following criteria were taken into consideration: the interviewees should be the owner of the house, the samples should be selected from different parts of the city, the owner of the house should be available for constant communication and interaction, and the internal space of the house should be available for observation. It is worth mentioning that very poor and wealthy families who have very different lifestyles and immigrants from other cities who lived in Yazd were excluded from the study sample.

According to the above-mentioned criteria, for each of the housing patterns, fifteen samples were opted for to be interviewed and every participant was interviewed in his/her own house. The interview questions were organized in three sections. The first section was concerned with the personal information of interviewees and their family members. The second section was dedicated to identifying the family structure by emphasizing the residents' behavioral patterns

and their life style. In this section, categories introduced in the theoretical foundation section (functions of the family, relations of family members, and position of family members) were adopted as controlling factors defining discussion limits. The third section, finally, included questions addressing the ways of using space, the modifications brought about in the house, the changes required to be made to the house and residents' reason for these changes.

As it was mentioned above, the strategy of research is grounded theory. Grounded theory uses the data obtained directly during the research-conduction process. In this method, the major stages are coding and categorizing the raw data, and determining the concepts, categories, and their relationship in a researcher-constructed framework. For doing these stages, Strauss and Corbin have introduced three kinds of coding, namely: Open coding, axial coding, and selective coding [53] Fig. 4.
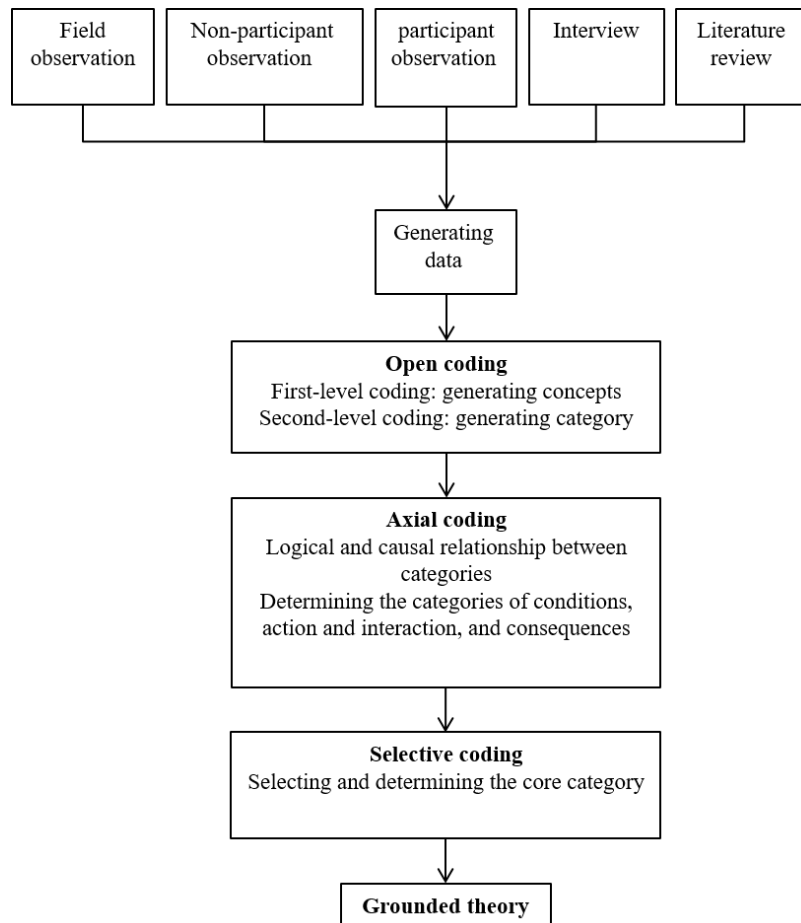

Fig. 4 Process of research (source: Authors)

3.3. Findings

The information gained from the theoretical foundation of the research in social sciences assisted the researcher in identifying family structure. The pattern of the behaviors of the residents of the first-type house is rather in line with the pattern of extended and traditional families in many respects. They are mostly farmers, repairmen, and workers. Most of these people had the experience of living in these houses from their father and their grandfather's time. Accordingly, their past experience of living in these houses assisted the conduction of the present study considerably. Regarding the traditional houses, given that modern life style has changed, compared to the past, the past experiences and memories of the interviewees were adopted as the criteria in the present study. Families residing in the second type of houses have different family structures and their pattern encompasses the patterns of

both semi-traditional and modern families. The third type of houses, finally, accommodate modern families and family members work in private or governmental institutions.

In this section, the obtained data (including pictures, observations, interviews, and field observations) were analyzed using the grounded theory. According to this method, theorization is conducted in the following three stages:

3.3.1. Open coding

At this stage, the obtained raw data were carefully reviewed, their characteristics and different aspects were investigated, concepts were determined, and then subcategories were made based on concepts. As it was mentioned, the categories constituting the bases of research, were selected from the literature review (changes in the

position of family members or power structure, relationship of family members, and family function).

Thus, categories which could not be subsumed under these three major categories were omitted. Hence, major categories defined based on theoretical foundations determined the scope of the study Tables 2, 3 and 4.

Table 2 Open coding (concepts and categories derived from interviews and observations)

Category: Changes in the position of family members (power structure)				
Traditional houses	**Medial houses**	**Modern houses**	**Concepts**	**Subcategories**
P1: The dedication of a private room to fathers	The dedication of a specific place to fathers only in some cases (Father's room or bed room)	Not dedicating a specific space to fathers, Fathers' resting on the sofa in front of the TV,	A reduction in houses' space personalization by fathers	A change in the role of men (Father)
P3: The conduction of most of the activities related to fathers' occupation at home	The transfer of fathers' work place to organizations outside of houses	The transfer of the fathers' work place and activities related to fathers' occupation to organizations outside of houses	A reduction in the area of space dedicated to father	
P4: The dedication of the exterior part of house to fathers' meetings and his job's related activities	Having fathers' working room only in some of cases	In some cases, Having fathers and mothers' working room		
P5: Locating the kitchen at the corner of the courtyard, Distant from the living room Fig. 5	The transfer of kitchen's location from courtyard to the inner part of the house near the central hall Fig. 5	Locating the kitchen near the entrance door Fig. 5	An increase in the relationship between women's spaces and other spaces	
P6: Dedicating a private space to women in the inner part of the house (Andaruni)	The kitchen and the bedroom are the private spaces of women	The bedroom is the only private space of homes	A reduction in the function of the house as a private place for women	
P7: Having an intervening space between the inner (Andaruni) and outer part of the house (Biruni)	The omission of the wall between the kitchen and the living room in some cases The kitchen or the bedroom are related to other spaces only by one door Fig. 6	The omission of the wall between the kitchen and the living room (open kitchen) Fig. 6		
P8: Space priority for family: 1. Living room, 2. Courtyard, 3. Hall, 4. Kitchen	Space priority for family: 1. Living room, 2. Kitchen, 3. Rooms and the courtyard	Space priority for family: 1. Living room, 2. Kitchen, 3. Rooms, 4. Courtyard	An increase in the importance of women's space	A change in the role of women (Mothers)
P9: Women's working in the kitchen all the day	Women' engagement in the kitchen only half of the day	Women's presence in the kitchen is very limited to some hours in the evening or at night	A decrease in women's cooking and doing house hold chores	
P10: Dedicating functions to spaces according to their characteristics[e]	Dedicating functions to spaces according to their characteristics and family needs	Dedicating functions to spaces according to children and women's taste and viewpoint	An increase in the participation of woman in managing spaces	
P11: Most of women's activities: Doing household chores, nurturing children, and doing actives related to family's occupation	Most of women's activities: Doing household chores, Nurturing children, And activities related to their own job or education	Most of women's activities: Activities concerned with their occupation, Education, Doing household chores, And nurturing children	An increase in women's attention to their own interests	
P12: Women's presence at home all day long	Women's engagement in activities such as doing shopping, Attending parties, And Rawda. Some of them are engaged in education or working	Most of the women' presence outside of the house for most of the time; Being engaged in education or working	A decrease in the time of woman's presence at home	
913: Not dedicating a separate place to children	Dedicating a place to children which is common with the place of doing some other activities	Dedicating separate space to children	An increase in the personalization of space by children	A change in the role of children

Fig. 5 The transfer of kitchen's location from courtyard to inside of the house near the central hall and living room

Fig. 6 The omission of the wall between the kitchen and living room (left and middle: medial house, right: modern house)

Table 3 Open coding (concepts and categories derived from interviews and observations)

Category: Changes in the functions of the family				
Traditional house	**Medial house**	**Modern house**	**Concepts**	**Subcategories**
P1: The father and mother usually work and rest at home all the day. Children either play at home or educated there.	Women are usually at home all the day, children are at school or university, and men work outside of the house.	In most of cases all the family is working or studying in different organization and they are at home in the afternoon.	Restriction of family members' presence at home to some specific times in the evening	
P2: On summer evenings and winter days, Families are engaged in working and resting in the courtyard and porch. The doors and windows are open to the courtyard Fig. 7	Some families use porches in summer nights for resting. At other times of the year their relationship with the courtyard is very limited and the windows opening to the courtyard are usually closed or covered by curtain. Fig. 7	During their presence at home, families use the kitchen the living room, and bedroom. They do not use open spaces	Being limited to living in closed spaces A decrease in the relationship between open and close space A decrease in the use of day light and airflow A decrease in the housing area required by the family	A change in the qualities expected from houses
P3: Home was a place for working, Resting, Gathering, And other different events	Home is a place for resting, Gathering, And parties	Home is a place for resting		
P4: Kitchen is completely separated from other parts of the house	Kitchen is located next to the living room and related to the living room by a door In some cases, the wall between the kitchen and the living room is omitted	Kitchen is located next to the living room and the wall between the living room and the kitchen is omitted	An increase in the relationship between kitchen and other spaces	
P5: The kitchen area is suitable for activities like cooking, Baking bread, Making halva, Making jam, And cooking for large number of people	The kitchen area is suitable for activities like cooking for the family and for parties	The kitchen area is suitable for activities like preparing and warming food for the family	A decrease in the area of the kitchen A decrease in the functions of the kitchen	
P6: The house has a lot of multi-functional spaces and dos not have a separate place for sleeping	Some houses have a separate space for sleeping and resting	Family members have their own separate space for sleeping and resting	An increase in the function of houses as a place for resting. Omitting some of the functions of houses	A change in the functions of the house
P7: Home is a place for working, Resting, For children's playing and educating, And other different activities	home is a place for resting, Gatherings, And holding parties	home is a place for resting		

Fig. 7 The relationship between residents and open spaces is reduced (right: Traditional house, Left: Medial house)

Table 3 Open coding (concepts and categories derived from interviews, observations, and field observations)

Category: A change in the relationship between family members				
Traditional houses	**Medial houses**	**Modern houses**	**Concepts**	**Subcategories**
P1: Family members used spaces multi-functionally and labeled them according to their characteristics (such as summer living quarter and winter living quarter).	Family members Label spaces according to their location and form of plan (such as the upper room, the corner room, The L room).	Family members use spaces single-functionality and label them accordingly (Bedroom, Working room, Dining room).	The privatization of space	An increase in the individuality of family members
P2: There were no personal spaces with definite physical borders.	Family members have their own territory (but it might not be private and it can be used by other members, too).	Each of family members' room is his/her personal territory.	An increase in the bordering of personal territory	
P3: Interconnected spaces with large area.	A decrease in the area of houses, compared to traditional houses.	A decrease in the area of houses. Having more rooms has higher priority than the area of spaces.	An increase in the number of separate spaces which have small areas	
P4: Most of family members' occupation was the same as father's occupation.	Every family member has his own occupation according to his interests and expertise.	Every family member has his own occupation according to his interests and expertise.	A decrease in job dependency to father	
P5: Three generations were living in a single house (extended family).	A nuclear family was living in a house. Extended kinship relations.	A nuclear family was living in a house. Very limited kinship relations.	A decrease in the relationship among generations	A decrease in the centrality of collectivism in the family
P6: All rooms are connected to each other like a chain.	Rooms are connected to a central Hall with one door.	Rooms are connected to other spaces with intervening space.	A decrease in the fluidity of space An increase in personal territories	
P7: Family members gather in different spaces such as the yard, Talar or rooms Fig. 8	Family members gather in the central hall, L room or porch Fig. 8	Family members gather in the living room Fig. 8	A decrease in the area and diversity of collective spaces of family	
P8: All faces of house have windows that are exposed to the yard (windows were usually open)	The south or north face of house have windows that are exposed to the yard and are usually closed and covered by curtain	The house has Few windows that are exposed to the alley or the yard (windows are usually closed and covered by curtain)	A decrease in the relationship between open and close space	

First type (Traditional)   **Second type (Medial)**   **Third type (Modern)**

Fig. 8 A decrease in the area of social spaces of family (social spaces are highlighted)

Contextual conditions
• People's living in traditional, medial, and modern houses of Yazd
• Society's undergoing change and development as a result of industrial revolution
• Diversity of ways of providing livelihood
• Diversity of family structure

Causative conditions
• A change in the role of men, women and children
• A decrease in the time of woman's presence at home
• Restriction of family members' presence at home to some specific times in the evening
• A decrease in dependency on father's job
• A decrease in the relationship among generations
• An increase in the individuality of family members
• A decrease in the centrality of collectivism in the family
• An increase in women's involvement in decision makings
• A change in the functions of the house
• The centrality of the resting function of home
• A decrease in the functions and the kitchen

Action and Interaction
• An increase in the relationship between women's spaces and other spaces
• A reduction in the area of space dedicated to father
• An increase in women's involvement in arranging spaces
• An increase in the number of separate spaces which have small areas
• An increase in space personalization by mother and children
• An increase in Bordering and separating personal spaces
• The separation of sleeping place from other places
• A decrease in the area of openings
• A decrease in the relationship between open and close space
• The formation of nominal possessions for spaces
• A decrease in the area of the kitchen
• A decrease in the area of the living room

Consequences
• A decrease in the function of houses as providing a private place for women
• Being limited to living in closed spaces
• A decrease in the use of day light and airflow
• A decrease in the housing area required by the family
• A change in the qualities expected from houses
• A decrease in the fluidity of space
• An increase in personal territories
• A decrease in the area and diversity of collective spaces of family
• An increase in the centrality of spaces possessed by children and mother
• A decrease in the centrality of spaces possessed by father
• An increase in the quality of women's working spaces
• An increase in the number of personal and single functional spaces
• An increase in the area of spaces used for resting

Intervening conditions
• The advent of new technologies Promoting different life styles in media and virtual spaces
• An increase in women's education
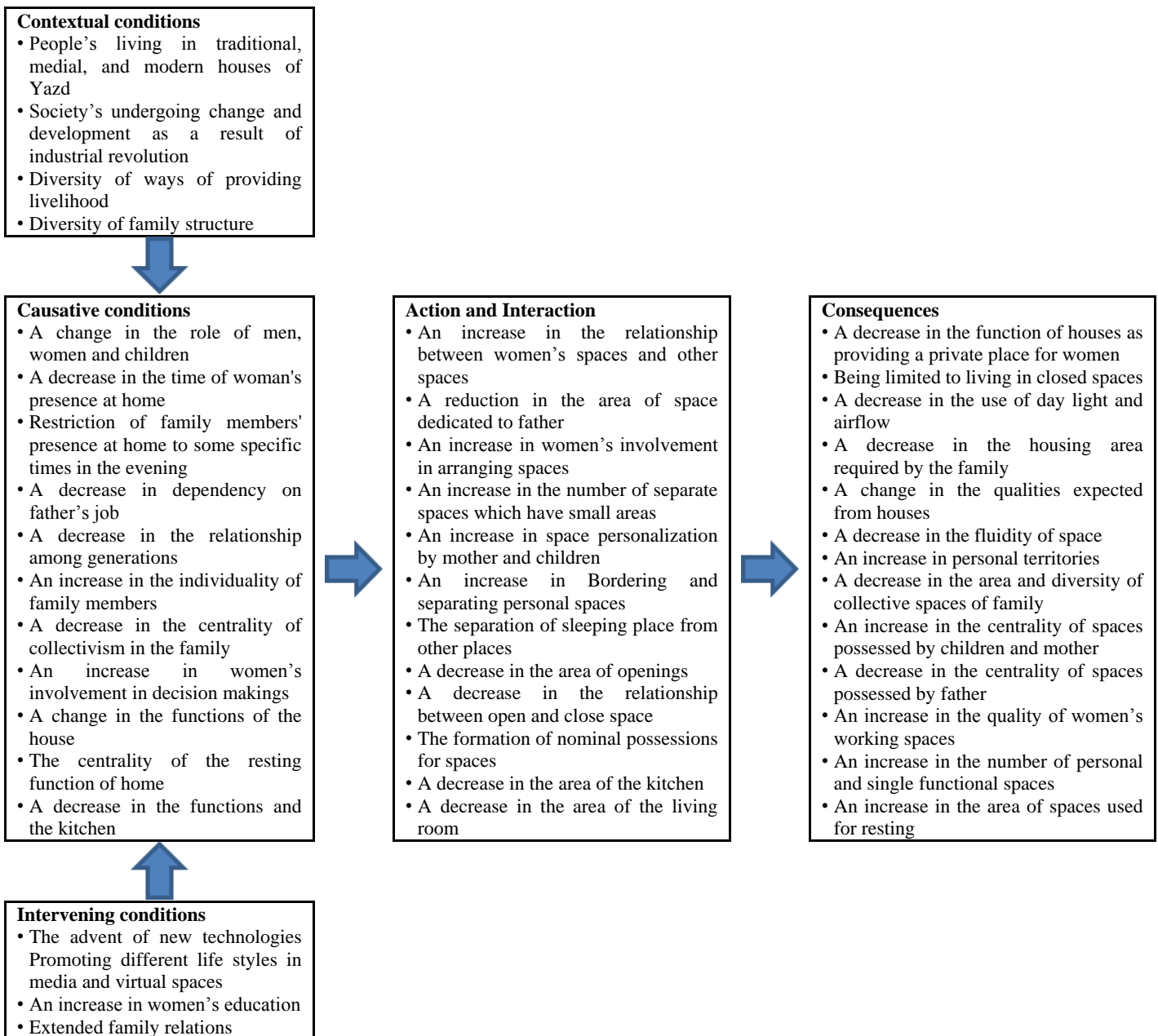• Extended family relations

Fig. 9 Axial coding

3.3.2. Axial coding

At this stage, the phenomenon under investigation is placed in its structure and the relationship between categories is determined by answering the following questions: who, when, where, why, how, and what consequences [53]. In this part of the study, factors leading to changes in the houses' space structure were subsumed under the labels of causal conditions, intervening conditions, and contextual conditions. Causal conditions, as their name suggests, lead to changes in the space organization of houses. These factors are concerned with changes in the family structure. Intervening conditions, on the other hand, increase or decrease the speed of changes. For example, the advent of new technologies, the promotion of different lifestyles in different media, and the increase in women's education accelerate changes in the behavior and family life style but the tendency Yazd's people towards traditional life style and extended kinship relations decreases the speed of change. Some factors have been identified as contextual factors. Nowadays, these conditions exist in the area under investigation. In point of fact, this is one of the reasons for selecting this city as the case study in the present research. In encountering these conditions, some actions and interactions are formed which are manifested in the form of changes brought about in houses. These actions and interactions also lead to some wanted and unwanted consequences which affect houses' space organization. These factors are provided in Fig. 5.

3.3.3. Selective coding

This stage, construed as the main stage of theorization, endeavors to systematically relate all the categories and concepts identified in previous stages (irrespective of being a category or subcategory) to the core category. In this stage, redundant and incongruent categories were either omitted or altered. For the purpose of this stage, the core category is: The effect of changes in family structure on houses' spatial organization Fig. 6. As it was stated, changes in family structure have been manifested along the following three axes: the position of family members (family power structure), the relationship of family members, and the function of family. These changes led to changes in the space organization of houses Fig. 6.

- **Omission of age and gender hierarchies in organizing spaces**: This condition is brought about as a result of changes in the position of family members, for example, a change in the roles of men, women and children a decrease in the time of woman's presence at home and an increase in women's involvement in decision makings. This factor is manifested in space organization in the following ways: An increase in space personalization by mother and children, a decrease in the area of spaces belonging to father, an increase in the involvement of women in managing spaces, and a decrease in the function of houses as providing a private place for women. In this regard, Fazeli [30] maintains that, nowadays, houses have become democratic; while, in the past, it was not democratic and men and women

were not equal such that houses were mainly intended to provide the husband with comfort and prosperity. The concept of "father's house", which is common among Iranians, is indicative of the patriarchal nature of families. According to the author, today's houses perform the traditional gender function to a lesser degree. The observed change in the gender hierarchy not only affects the decoration and architectural factors of houses but also influences the internal relations of houses. For example, the omission of the kitchen's wall, the omission of the *Andaruni* and *Biruni* (inside and outside), dedicating a separate rooms and equal spaces to boys and girls, increasing the number of openings to the outdoor space are among these changes [30].

- **The centrality of individuals in structuring spaces**: This condition is caused by a decrease in the relationship between generations, a decrease in being dependent on father's job, a reduction of collectivism and an increase of individualism in the family. This factor is manifested in spatial organization as the decrease in the area and diversity of collective spaces, the increase in the number of personal and single-functional spaces, the formation of nominal possession for spaces, and the increase in the bordering and separating personal spaces. In this connection, Alalhesabi and Karani argue that, in traditional Iranian houses, there was no border between the *mahrams* of the house and they worked in a common and shared space [26]. However, today's houses have become a personal space such that everyone has a personal room and family members see each other in the hall or in the kitchen at certain times of a day [45].

- **The decrease in space fluidity**: This condition is also caused by changes in family members relation. These changes are manifested in spatial organization in the following ways: an increase in the number of personal and single-functional spaces, an increase in the bordering of spaces, a decrease in the relationship between open and close spaces.

One of the characteristics of the traditional houses was having multifunctional spaces such that, in these houses, the eating and sleeping places were not distinguished from each other [26, 54]. Furthermore, because of the spatial organization of the house, family members had extensive relations with the open spaces which is the collective and common spaces of the house [26].

- **A change in the qualities expected from houses**: This condition is caused by a change in the functions of the family. A decrease in the times of being at home and the presence of all family members at home in the evening have led to not experiencing different times of being at home. However, in the past, family members were present at home throughout the day and night and experienced different qualities of the daylight at home. Nowadays, the resting function of home is prioritized over other functions and most of the functions of the house and kitchen, are omitted or altered. The effects of these conditions on houses are manifested in a decrease in the area required for houses (specifically the kitchen), an increase in the relationship between the

kitchen and other spaces of the house, the specification of a separate space for sleeping .The results of Ahrentzen, Levine & Michelson's study reveal that even employed women, compared to housewives,

spend more time in the bedroom and less time in the kitchen [7]. Thus, residents of modern houses prefer houses with more bedrooms to houses with a great hall or a large kitchen.
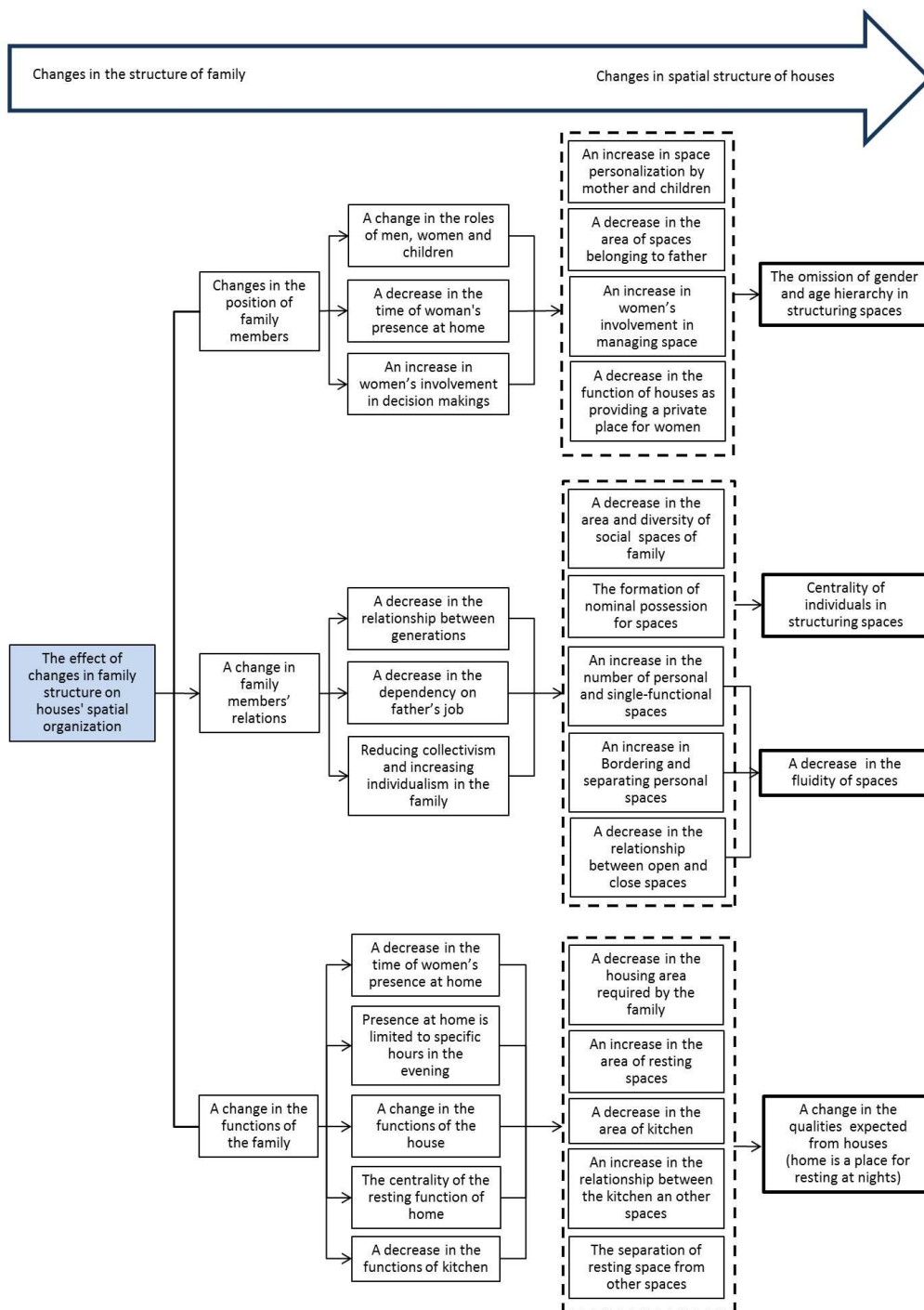

Fig. 10 Analytic model of selective coding

4. CONCLUSION

The results of the study revealed that changes in family structure are accompanied by an equal and equivalent change in the spatial organization of the house. Thus, when the power pyramid became horizontal and families became more democratic, the houses become more democratic and age and gender hierarches were omitted in space

organization. With the increase in individualism in families, the organization of the house spaces also changed to create personal spaces and to omit the continuity and fluidity of spaces. Moreover, with the omission of some of the functions and duties of the family such as educating, providing jobs, providing physical and psychological needs, the functions of the house have also changed and houses are no longer a place for living in; instead, they are a place for

resting. This has changed not only most of the quantities of the house but also most of the qualities of houses.

Accordingly, the family and house are two interrelated systems which affect and are affected by each other. As the position, the relation of the parts and the functions of one of the systems changes, the position, the relation of the parts and the functions of the other system changes, too. Architectures' awareness of the changes and transformations of each of these systems (the house or the residents) and the interaction between them not only paves the way for solving the issues in the field of housing but also sets the scene for managing the future transformations and changes. Studying this interaction requires an interdisciplinary methodological approach that can utilize information sources from multiple disciplines and a broader range of research methods and strategies for studying different concepts and various perspectives with a specific structure.

One of the most important achievements of the present study for future research is using the grounded theory for an interdisciplinary research. In this study, the effect of a factor in the field of sociology is investigated on the structure of houses and, for data analysis, major categories are derived from the theoretical foundations of sociology and the concepts are derived from the field of architecture.

APPENDIX

A: Family structure includes the people who are considered part of the family-present members, as well as important figures from the past-and the quality of the relationships among them. The family structure represents the operational rules that govern the way family members interact with each other [55].

B In this connection, some studies were conducted by Belad and Wolf (1960) which lead to the proposal of the power resource theory. According this theory, when one of the spouses has more resources such as education, job credit, social position, etc., the balance of power changes in favor of him/her [56].

C: It is worth mentioning that this article is based on the thesis of the first author of this article entitled "Resident-Housing congruence: investigating the congruency of Yazd's residents and contemporary houses". In this thesis, the researchers have thoroughly investigated the dominant housing patterns of Yazd. In this article, the results of these studies are mentioned in terms of the three introduced patterns.

D: L room is a room that its plan is like L. It is used as a guest room.

E: (for example, winter living quarter and summer living quarter. The northern wing of traditional houses which receives direct sunlight was used as family living quarter during the cold months of the year, while the southern wing which is always in shade was used during the summer months [57].

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

REFERENCES

1. Karimian H, Ahmadi A. Spatial archaeology; A scientific approach to the study and analysis of architectural works, Urban Spaces, and Ancient Contexts. Archeology Studies, 2016, Vol. 7, No. 2, pp. 103-116.
2. Mahdavi MS, Khosroshahi S. Study of the distribution of power in the family, Journal of Women's Studies Sociological and Psychological, 2003, Vol. 1, No. 2, pp. 27-68.
3. Crull SR, Bode ME, Morris EW. Two tests of the housing adjustment model of residential mobility, Housing and Society, 1991, Vol. 18, No. 3, pp. 53-64.
4. Ann Lodi K, Raedene Combs E. Housing adjustments of rural households: Decisions and consequencesn, Housing and Society, 1989, Vol. 16, No. 3, pp. 13–22.
5. Earhart CC, Weber MJ, McCray JW. Life cycle differences in housing perspectives of rural households, Home Economics Research Journal, 1994, Vol. 22, No. 3, pp. 309-323.
6. Moghimi V, Jusan MBM, Izadpanahi P, Mahdinejad J. Incorporating user values into housing design through indirect user participation using MEC-QFD model, Journal of Building Engineering, 2017, Vol. 9, pp. 76–83.
7. Ahrentzen S, Levine DW, Michelson W. Space, time, and activity in the home: A gender analysis, Journal of Environmental Psychology, 1989. https://doi.org/10.1016/S0272-4944(89)80001-5.
8. Riemer S. Sociological theory of home adjustment, American Sociological Review, 1943, Vol. 8, No. 3, pp. 272–278.
9. Yancey: Architecture interaction and social control: The case of large scale housing project, Environment and Behavior, 1985, Vol. 3, pp. 3-21.
10. Hanan H. Modernization and cultural transformation: The expansion of traditional batak toba House in Huta Siallagan, ASEAN Conference on Environment-Behaviour Studies, Procedia-Social and Behavioral Sciences, 2012, Vol. 50, pp. 800-811.
11. Rossi PH. Why Families Move, Glencoe, IL: The Free Press, 1955.
12. Mcauley WJ, Nutty CL. Residential preferences and moving behavior: A family life-cycle analysis, Journal of Marriage and Family, 1982, Vol. 44, No. 2, pp. 301–309.
13. Abdul Z, Hariza A. Adapting to terrace housing living in Malaysia, 2012, Vol. 36, pp. 147–157.
14. Jamshidiha GR, Fasaei SS, Lolaavar M. A sociological study on the impact of modern culture on the development of the family from a gender perspective in Tehran, Journal of Women in Culture and Arts, 2013, Vol. 5, No. 2, pp. 183-198.
15. Soroush M, Hosseini M. Globalization, independent identity and urban women lifestyle: A comparison of women in Shiraz and Estahban, [In Persian], Journal of Woman and Society, 2013, Vol. 4, No. 13, pp. 53-76.
16. Sadeghi Fasaei S, Erfanmanesh I. Social analysis of modernization impacts on Iranian families and the necessity of planning an Iranian-Islamic example, [In Persian], Journal of woman in Culture and Arts, 2013, Vol. 5, No. 1, pp. 63-84.
17. Azadarmaki T, Bahar M. Families in Iran: change, challenges

and future, Journal of Comparative Family Studies, 2006, Vol. 37, No. 4, pp. 589-608.

18. Saroukhani B, Doodman L. The structure of power in family and its effect on social participation in Shiraz, Sociological Studies of Youth, 2010, Vol. 1, No. 1, pp. 106-129.

19. Hosseini A, Jafrzadeh T, Rohban F. Residential space syntax for better family members' interaction, Housing and Rural Environment, 2016, Vol. 35, Issue 154, pp. 41-58

20. Einifar A, Fallah E. Territory in the housing of Iranian desert city: A case study of territories in three housing periods of Aqda, 2018, Vol. 37, No. 161, pp. 45-60.

21. Einifae A, Aghalatifi A. Concept of territory in residential complexes: A comparative study of two high-rise and low-rise complexes in Tehran, Journal of Fine Arts, 2011, Vol. 3, Issue 47, pp. 17-28.

22. Ghafourian M, Peysokhan M, Hesari E. Typology of spatial configuration and hierarchy of entry in Iranian houses: Concentrating the issue of privacy, Journal of Management System, 2017, Vol. 4, Issue 7, pp. 129-144.

23. Labibzadeh R, Noghrekar H, Hamzenejad M, Khanmohammadi M. Reading the house of spaceship based on islamic texts by EBS method and its adaptation to the priorities of spatial relations from the perspective of Alexander and Lang, Journal of studies on Iranian Islamic City, 2015, Vol. 22, pp. 5-22.

24. Yazdanfar A, Hosseini B, Zaroudi M. Culture and house form (case study: traditional houses in Tonekabon and Ramsar), Journal of Housing and Rural Environment, 2014, Vol. 2, No. 144, pp. 17-32.

25. Biddulph M. Introduction to Residential Layout, Routledge, 2006.

26. Alalhesabi M, Karani N. Factors affecting the transformation of housing from the past to the future, Housing and Rural Environment, 2013, Vol. 32, No. 141, pp. 19-36.

27. Khalaj T, Foroutan M. Investigating the spatial structure of home and family-anthropology of housing, International Conference on Research in Science and Technology, Germany, 2016.

28. Hayeri Mazandarani MR. House, culture, nature: An overview of the architecture of historical and contemporary homes, Urbanism and Architecture Research Center of Iran, 1st edition, 2010.

29. Pourdehimi Sh. Culture and Housing, 2011, Vol. 30, Issue 134, pp. 3-18.

30. Fazeli N. Modernity and housing, Journal of Iranian Cultural Research, 2008, Vol. 1, Issue 1, pp. 25-63.

31. Heidari AA, Ghasemian Asl E, Kiaei M. Analysis of spatial structure of traditional iranian houses using space syntax method case study: comparison of Yazd, Kashan and Isfahan houses, Journal of Iranian-Islamic City, 2017, Vol. 28, pp. 21-34.

32. Dehghan Manshadi M, Hashemi Bajgani L. A Century of Transformation, [In Persian], Yazd, Nikooravesh, 2009.

33. Krier R. Urban space, London, England: Academy Edition, 1979.

34. Lefebvre H. The production of space (translated into English by: Donald Nicholson-Smith), Oxford, UK, Blackwell, 1991.

35. McDowell L. Spatializing feminism, geographic perspectives. In N. Duncan (Ed.), Body Space, Destabilizing Geographies of Gender and Sexuality, London, England: Routledge, 1996, pp. 28-44.

36. Kurt Grutter J. Aestetics in architecture, Translated by J Pakzad, Beheshti University, Tehran, 2nd edition, 1987.

37. Dorri A, Talischi GR. Explaining the transparency of the spatial structure of Iran's architecture during the Safavieh period (case Study: Hexa Paradise summerhouse and Imam Mosque of Isfahan), Journal of studies on Iranian-Islamic city, 2017, Vol. 27, pp. 41-50.

38. Rapoport A. The meaning of the built environment: a nonverbal communication approach, Sage Publications, 1982.

39. Amraee B. Intersemiotic analyses of relation between form and space, Journal of Honar-Ha-Ye-Ziba, 2015, Vol. 19, No. 4.

40. Javadi M, Boodagh M, Makani V. Introduction to the identity of the built environment by elements of location, space and body, International Journal of Urban and Rural Management, 2016, Vol. 4, No. 41, pp. 139-160.

41. Damiar S, Narighomi M. Comparative study of the space concept in the vernacular architecture and modern architecture, Honar-Ha-Ye-Ziba, 2012, Vol. 13, No. 1, pp. 65-72.

42. Enayat H, Movahed M. Women and structural changes in the age of globalization [In Persian], Women in Development and Politics, 2004, Vol. 2, No. 2, pp. 153-166.

43. Ezazi Sh. Sociology of family: With emphasize on the role, Structure and the function of family in contemporary world, [In Persian], Tehran, Roshangaran and Women Studies Publication, 7th edition, 2010.

44. Saroukhani B. An Introduction to family sociology, [In Persian], Tehran, Soroush, 2nd edition, 2014.

45. Cheal D. Families in Today's World: A Comparative Approach, Routledge, 1st edition, 2008.

46. Konig R. Desintegration und desorganization der familie in franz filsner (Hrsg.), Einfuhrung in die Familien soziologie, Zurich, UTB.S, 1978, pp. 244-257.

47. Hocker J, Wilmot Burton W. Power in interpersonal conflict, Chapter three in Interpersonal Conflict, Brown Publishers, 2nd edition, 1985, pp. 67-90.

48. Tavassoli M. Urban structure and architecture in the hot arid zone of Iran [In Persian], Tehran, Iran: Department of Urban and Regional Planning, Faculty of Fine Art, University of Tehran, 1982.

49. Tashakori Bafghi A. Constitutional in Yazd, [In Persian], Pejman, 1st edition, 1998.

50. Creswell JW. Research design: Qualitative, quantitative, and mixed methods approaches, Thousand Oaks, CA: Sage, 2nd ed, 2003.

51. Kvale S. Interviews: An introduction to qualitative research interviewing, Thousand Oaks, CA, Sage, 1996.

52. Minichiello V, Aroni R, Timewell E, Alexander L. In-depth interviewing, Researching people, Hong Kong, Longman Cheshire Pty Limited, 1990.

53. Strauss Anselm L, Corbin Joliet M. Basics of qualitative research: Technics and procedure for developing grounded theory, Sage Publications Inc, 1998.

54. Peivasegar Y, Heidari AA, Eslami M. Recognition of the five principles of professor Pirnia in the architecture of traditional Iranian homes and its analysis based on islamic beliefs (case study: Houses of Yazd city), Journal of Studies on Iranian-Islamic City, 2017, Vol. 7, No. 27.

55. Goldenberg I, Goldenberg H. Family therapy: An overview, Belmont, CA: Brooks/Cole, 2000.

56. Blood R, Wolfe D. Husbands and Wives: The Dynamics of Married Living, New York, Free press, 1960.

57. Ghobadian V. Shape of sustainable houses in Iran: a climatic analysis, Europian Online Journal of Natural and Social Science, 2015, Vol. 3, No. 3, pp. 110-120.

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