Original Research Article

Patterns Transition: A Comparative Analysis of Changing the Open Spaces in Houses of Tabriz*

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Abstract

Problem statement: Accelerated physical developments in the last century have led to the inefficiency of contemporary residential open spaces in Tabriz. However, in the realm of Iranian culture, especially in Tabriz, residential open spaces, have formed their patterns over time. The qualitative study of such embodiments can reveal the remaining capacities to address and resolve the challenges.

Research objective: This study investigates the patterns of open spaces in Tabriz houses over the times, intending to deepen the architects' understanding of recent accelerated changes and to identify a meaningful relationship between them. Besides, the study tries to present an appropriate method for this kind of researches.

Research method: This research is qualitative with an interpretive approach and data-driven method. First, by reviewing the relationship between the concept of pattern and other influential components, a theoretical configuration for integrated analysis is explained by the QCA method. Then the data collected from the samples are organized and put into this configuration and finally, the findings are discussed.

Conclusion: In the qualitative analysis of consecutive categories of Tabriz houses (historical, middle and contemporary), there are three modes for the transition of identified conceptual patterns: Continuous (emergence as before), change of position (continuity of emergence but in different forms) and total change (elimination or replacement in the relationship between man and the environment). According to the analysis, the change in the combination of constraints in the outcome with environmental concepts has led to a change in how the patterns emerge and thus, transition. An overall assessment of this transition also reveals that environmental concepts derived from conceptual patterns have undergone fewer changes than they appear to be (sub-patterns) and making the place in the open spaces of houses in Tabriz, despite the precipitous external changes, has a relatively stable essence and is slowly evolving.

Keywords: *Conceptual Pattern, Pattern Transition, Open Space, QCA method, Tabriz Houses.*

Introduction

The hasty alteration in physical environments in the current century, which have been accompanied by the transition from the past architectural patterns, is a significant phenomenon in identifying the relationships and procedures ahead for all stakeholders in this field. Therefore, deepening the knowledge of this field is indispensable in solving the forward environmental challenges. This phenomenon is even more critical in developing cities such as Tabriz, which have remarkable traditions in the architecture of human settlements because this process practically leads to the confrontation of global and local patterns. The most evident and fundamental example of this transition must be sought in houses. While the house has a direct connection to the most private areas of human life, it is also continuously influenced by social, economic and political processes in the age of globalization. A general overview can clearly show that the most influential part of the house in such a situation was the open spaces. What, as a "problem" can be the starting point of this research, is the uncertainty and inefficiency of contemporary open spaces and their transformation into "leftover" spaces between buildings and passages, putting masses only based on urban criteria and staying away from the meaningful place formation process. This is while, in the realm of Iranian culture, residential open spaces have evolved as part of the architecture and urban planning traditions and have developed their patterns. Tabriz, a historic city in a developing country that has experienced major physical growth of the housing sector in recent years in parallel with economic development, is an appropriate context for studying such this phenomenon. Locating the adequate range of historical and contemporary houses in this city can provide a complete image of the transition of open space patterns. Accordingly, the main question in this study can be considered as follows:

What patterns have open spaces in houses of Tabriz had from the Qajar era to the present, how can these patterns be identified and with what modality has the transition of patterns occurred in the time?

Answering this question begins with demystifying the concept of pattern, In such a way that will be able to correlate with the idea of time meaningfully. Then, by examining and organizing the data collected from the samples in the form of sub-pattern and conceptual patterns, an attempt is made to provide a comparative analytical analysis of the evolution of patterns in the open space of houses in Tabriz according to presenting a configuration based on theoretical argumentation.

The method of this research is qualitative with an interpretive approach[1] and a data-driven method. In analyzing the qualitative data in this research, a kind of coding has been used that facilitates the description and, by using concepts and categories, moves in the direction of analyzing and creating the theory (Strauss & Corbin, 1990, 101). In this study, this was done through the integrated analysis of the reduced data from samples by the QCA[2] method. Eventually, they are categorized under the headings of "environmental concepts" and compared and discussed.

Pattern and the concept of Transition

"Transition" is defined as the movement, development, or evolution from one form, phase, or style[3] to another one and from this perspective, it is a substantial concept in pattern studies. Because although awareness of the pattern as a tool for conceptualizing and predominating it in designing the environment, can take on a rigid nature, it is also essential to apprehend the hidden dynamics in the arrangement of the built environment to discover what is happening in the environment premiere. The concept of transition was first proposed by the architect and urban planner Doxiadis[4] (1968, 23-40) in describing contemporary architecture. He considers today's architecture as the result of a transition period that follows the progression of its era. The architecture of this era is evolving much faster than before and although in the previous century the problem of architecture was to confront the past and freedom in creation,

now the main challenge is to get caught up in a period of transition. The dominance of the concept of transition over architectural evolution has led to generating styles at any time and place. Therefore the border between "style" and "fashion" is severely diminished (ibid.). In such an atmosphere, architects design "showcase" buildings to pretense in the media, while these works represent a small part of what is being built today (Salingaros, 1999). On the other hand, the people mostly incline to traditions that are not created by architects but by time. Thus, the amount of change requires architecture to be new but also to have been affected by its background a lot (Doxiadis, 1968, 28). In such an interpretation, the role of the "agency" becomes momentous and it distinguishes today's architecture from the pre-existing architecture based on traditions that have emerged from [social] structures. The agency that is not entirely free and is affected by the "inertia" of the environment. Because man's perception of the environment builds around himself depends on his culture (Grütter, 1987, 53). Therefore, human decision-making in shaping the environment is not a completely free choice, but in "interaction" with the structures and its appearance should be sought in the patterns. The patterns in the tradition have strong cultural roots (Doxiadis, 1968, 28). In contrast, the stylistic rules of contemporary architecture, with their extreme reliance on innovation, are the anti-pattern. Besides, just because of the novelty, against the traditional patterns (with the mask of new trends), they use the natural renovation process of pattern language, to destroy it. On the other hand, Patterns have evolved through synergy in a dynamic balance of coexistence and competition (Salingaros, 2000). Thus, the acceleration of evolution, in the age of transition, has severely distorted the structure-agency interaction, in the selection and renovation of patterns. Therefore, to explain the correct operation of the pattern, it should be briefly stated: The pattern must be in line with the past and also must be different from it. The concept of pattern in architecture should be explained by

considering both aspects; otherwise, it cannot be relied upon in the analysis. The weakness of pattern-based approaches should also be found in the lack of simultaneous attention to these propositions in the continuous rethinking of the concept of pattern.

Pattern and relationship

The word Pattern (Shayanmehr, 1998, 79) is equivalent to idea, shape, model, template, design, manner and example in Persian. (Bridjanian, 1994, 419) and accordingly, the pattern has been used to refer to behavioral qualities, ideal role models, or to explain cultural principles (Gould & Kolb, 1965, 91). On the one hand, the pattern originates from an environment with comparable value, including educational and methodological values. on the other hand, the pattern can be applied in designing complex environments or adapting to new changes (Voigt & Swatman, 2006). That is why the function of the pattern can be considered as an attempt to simplify and understand the reality by arranging the elements and entering an order in them (Tavassoli, 1990, 142) and understanding complex relationships, which either have a subjective dimension or have appeared objective. Such perception has changed in various sciences and patterns based on popular conception have evolved into theoretical and abstract patterns (ibid., 144) and there has been a gradual shift from material patterns to formal patterns. The material model shows a complicated system in a more straightforward way that must have its complex characteristics and includes two main types. The first is the mechanical (non-organic) pattern that became popular after the Age of Enlightenment. The second is the Organic Pattern, which is similar to a living organism like a human body5. However, Formal patterns are the relatively simple institutional and logical structure, mentally provided and have structural features in the original real system (Shayanmehr, 1998, 86). In this pattern, the problem restructures reality in mind through abstraction and representation by signs and concepts (Tavassoli, 1990, 146). Accordingly, all

parts of the world (physical, biological and social) evolve according to similar principles (Turner & Beeghley, 1991, 29) and in the meantime, by emphasizing the element of similarity, the pattern provides a clearer understanding of the correlation between reality and the mind (Tavassoli, 1990, 30). The most famous example of the development of formal patterns in architecture can be considered in the theories of Christopher Alexander. In his view, each pattern describes a problem that is repeated and expresses the depth of the problem in such a way that the result can be applied many times without repeating the same path (Alexander, 1979, xv). According to Alexander, Ishikawa, Silverstein, Jacobson, Fikidahl-King and Angel (1977, 22), what is created by design must act in the creation of a continuous structure of the generality of its around. From this point of view, the pattern is both an interpretation and a prescription that contributes to creating a sense of place in the built environment (Alexander, 1987, 278). The value of such a pattern in architecture is the non-direct connection to specific types of buildings and addressing structural components with infinite composite capability (Salingaros, 1999). In this view, the use of pattern languages is organized, resulting from two different needs, first to understand and control a complex system, second as a design tool for functional and structural coherence (Salingaros, 2000). However, the use of the pattern in the views of Alexander and his associates has also been widely criticized (Dovey, 1990). Moreover, with the development of the concept of pattern in architecture, various methods for computer-aided design have been proposed, such as Shape grammar (Duarte, 2014)، Genetic algorithms (Chu, 2006), Swarm intelligence (Hoar, Penner, & Jacob, 2002), L-system (Lindenmayer, 1968), Cellular automata (Wolfram, 2002) and other similar cases (Ozdemir & Ozdemir, 2018) That are shape-based understanding of patterns and their relationships. From this perspective, they cannot be completely related to the purposes and content of the architectural place,

because they are the result of a kind of extreme "Rule-based formalism", the outcome of the "Syntactic knowledge encoding" of architectural designs. (Cagdas, 1996). The prevalence of such an approach will practically lead to the severance of the relationship between form and content in understanding and recreating architecture. There is also the weakness based on formalism in Iranian studies in this field and most of the analysis about the evolution of Iranian houses is based on the introverted-extroverted duality and with the focus on the dominant pattern of changing the central courtyard to the side courtyard (See Haeri Mazandarani, 2009; Saraei, 2012, Aghalatifi & Hojjat, 2019). However, the important point in all these approaches is paying attention to the relationship of patterns in the form of language or algorithm. Because each complex system has a hierarchical structure in which different processes occur at different scales or levels (Mesarouie, Macko & Takahara, 1970, 34). Accordingly, any perceived weakness of the patterns can be considered the result of the lack of understanding in their compound language (Salingaros, 2000). Therefore, in this study, "conceptual patterns" have been proposed to understand the content of architecture that is placed in a deeper layer than the "Sub-level" pattern (which are directly touched in the environment). In this way, the content of the connection between the patterns is established in a conceptual way that precedes the formal nature of the patterns. The human-environment relationship should also be considered as the content in the study of the historical evolution and not a formal one. From this perspective, the built environmental concepts are the studied content. On the other hand, while many are trying to study the evolution of architecture by using external factors such as globalization, economics, politics, etc. on an urban scale (Rao, 2007; Schneider-Sliwa, 2006; Shakur, 2005; Shepotylo, 2012), seems to encounter with this evolution, the internal analysis of architecture based on the behavior and agency of the user (instead of formal analysis) is necessary to create a more humane vision.

Patterns in the conceptual level

Conceptual patterns are related to the relationships between phenomena (Chen, 1993). In recognizing the pattern, the objectives can be divided into two types: Recognition of rigid and objective cases (such as recognizing visual and auditory patterns) and recognition of abstract relationships (i.e. conceptual recognition). A set of patterns studied in recognizing a conventional pattern is identified by some common features. Similarly, a collection of conceptual patterns is determined by some common conceptual features (ibid.). In other words, conceptual patterns are a more abstract state than the perceived Sub-patterns. They have been obtained from the similarities and relationships of Sub-patterns in each category. In this way, the organization and the integration of guiding knowledge and principles in the conceptual pattern are formed in relatively specific terms (Cornell, 2014). But before searching for a more profound conceptual layer, the nature of Sub-patterns, how they emerge and their examples in the body of architecture must be determined. Sub-level patterns are patterns that can be seen in early observations and evaluations and describe a single feature of space or its events. In this regard, the views of Edward Hall (1965, 103-111) can be used. He considers the model of "Proxemics", as an advent of cultural wisdom from an anthropological perspective, to have three main aspects: fixed-feature, semi fixed-feature and informal space. fixed-feature space includes material appearance as well as interior and hidden layout that guide man as he moves around and buildings are the faces of a fixed pattern. Semi-fixed space consists of the function and the arrangement of equipment and it is the explainer of Sub-patterns that represent large cultural groups and their differences in cultures. Informal space is also a specific dimension that forms an essential part of the culture (ibid.) and it refers to the human who is always moving in space. Rapaport (1982, 88-96) also compliments his theories similar to Hall's opinion on the division of space types. Similarly, in a residential open space, three categories of Sub-level patterns will be recognizable: fixed, semi-fixed and moving, which appear respectively in physical, physical-behavioral and behavioral order (Fig. 1).

Integrated pattern analysis

Analyzing the evolution of patterns requires a method that can integrate the collected data into a comparative framework based on a theoretical structure. Integrated analysis occurs when data elements and analysis strategies are combined during the study to achieve synergy between them in achieving a common theoretical goal (Bazeley, 2009, 432). This integration is done using different but complementary resources and in the process of forming results (Bazeley & Kemp, 2012). QCA techniques, as a kind of integrated analysis, are performed in a two-dimensional matrix; in one dimension, the variables and the other aspect the case studies concerning complementary approaches. These matrices, such as "macro-comparative" and "Small-N"[6], can provide a systematic comparison of cases with the help of tools and take advantage of cases and use "configuration" (Rihoux & Ragin, 2009, 31). These configuration-based comparative analysis techniques are "case-oriented" and deal with a limited number of complex cases. Each case is considered as a combination of properties, an integrated whole that should not be lost or obscured during the analysis and therefore reinforces a comprehensive view (ibid., 33). In the process of comparative analysis with configuration, the researcher is engaged in a dialogue between the relevant cases and theories. The choice of variables
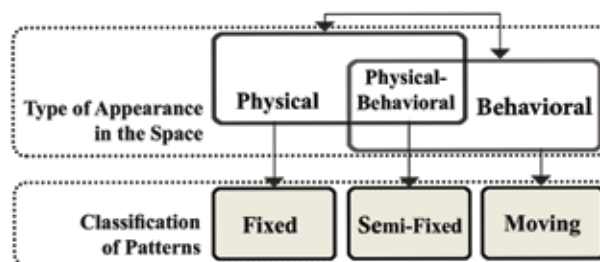

Fig. 1. Appearance of patterns in open spaces. Source: authors.

(conditions and results) for the analysis must be theoretically conscious. Thus, according to various theories, QCA is in the general realm of medium-range theorizing (Smelser & Baltes, 2001, 15641-15647). Therefore, it has been very suitable for examining architectural examples. It is possible to combine aspects of structure and agency with that and reach a general historical perspective or medium-range theorizing. In the integrated analysis, different parts of the analysis are Put together with a theory-based configuration.

Theoretical configuration of analysis

Theoretical configuration for the pattern transition analyst should be based on the human decision-making and environmental intervention system as the primary driver of such a process. In its intervention in the environment, man seeks conceptual ideals and in this way, it also faces limitations due to the facilities provided by the environment. Based on this, it can be said that conceptual patterns are the resultant of understood ideas and limitations. Accordingly, the manifestation of human agency in shaping the environment can be analyzed concerning the following three factors that form the integrated analytical configuration (Fig. 2).
- Conceptual patterns: are the data obtained from sampling and based on what has been said, in the integrated analysis, they are represented as short statements.
- Constraints: by creating a framework for human access to objective and subjective possibilities and situations in decision making and consequently his interventions in the environment, affects human agency in the application of social structures in shaping space and from this perspective, it is an essential factor in interpreting the action taken concerning the environment. Lawson (2005, 92) in describing a model for design issues, discusses The similar thing and assumes four fundamental, practical, formal and symbolic roles for it, that affect the producers of the design issue (customer-user-designer-legislator) in both internal and external

domains. In the present study, by summarizing the producers of the design issue in the agent, i.e. man, the Constraints have been more considered in the external domain and the internal domain has been less considered in this analysis due to the functional similarity in the samples.
- Environmental concept: Concepts are the fundamental units of thought (Sartori, 1984) that one of their main functions is to connect the mind to the world. So, having a concept is about providing a way to think about something. Concepts are also used to formulate complex beliefs, desires, plans and other complex thoughts and judgments. Therefore, they play a fundamental role in explaining cognitive processes such as classification, induction inference, causal reasoning and decision-making. (Weiskopf, 2013). Thus, on the one hand, they are related to patterns and on the other hand, they are the product of decision criteria. Concepts are the free creations of human reason and their basic nature involves going beyond the level of perceptions (Blumer, 1931; Stremke & Koh, 2011). From this point of view, they are different from the conceptual patterns, which, depending on the nature of the pattern, are "limited" to perceptible objects. Thus, it can be said that concepts play the role of ideals that determine the orientation of conceptual patterns despite Constraints. Although the concepts of the unit are thought out, such units as atoms are not separable. In any concept, elements or parts of them are known as concepts in turn. The set of these elements varies from person to person and at different times in one
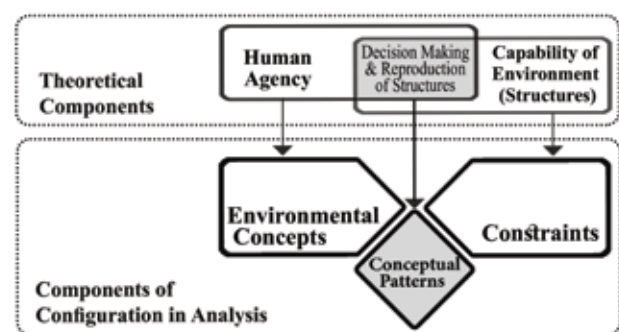

Fig. 2. Theoretical configuration of the analysis. Source: authors.

person. This set (variable and indefinite) is called the purpose or Intension of a concept (Marradi, 2012). In the present study, this intention of concepts is related to the decision-making process and intervention in the built environment. Therefore, the concepts of the built environment will be found as the result of the integrated analysis at this stage and will be interpreted with a complete abstraction of the perceived objects.

Case study, sampling and initial data

The open spaces in the houses of Tabriz have changed a lot over time, but in general, it has two types of internal and external (Keynejad & Shirazi, 2010, 17). Following the evolution of these spaces, it can be seen that many historical houses had both. In the Pahlavi era, the external courtyards were gradually dominated. By the transition to the contemporary era, with the diminishing of the spatial features of the courtyards in the pervasive apartment houses, they have become very different spaces from the past. The selection of samples in this study should make this evolution of patterns in Tabriz researchable and, at the same time, have sufficient information richness. Besides, the number of samples should be proportional to the capacity of qualitative analysis. Therefore, the samples were selected in two stages. The method in the first step is "purposive sampling", which type is "sensitive case". With an overview of the houses in Tabriz, three significant categories have been identified in terms of the objectives of this study. Assuming the Constitutional Revolution and the developments that led to the fall of the Qajar dynasty as a turning point

in major social, political and physical changes in Tabriz, a group of examples will be the result of the traditional architecture of this city and belongs to the Qajar period and early Pahlavi. The second category has been built since the middle of the Pahlavi period and open spaces still have a strong presence in houses, but the organization of open and closed spaces is not necessarily based on the traditional pattern. The third category of contemporary Tabriz houses, being dominated by the official urban regulations and following very strong economic relations, are built in the type of apartments. In this study, these three categories of samples are named as historical[7], middle[8] and contemporary[9] houses, respectively. Initially, 4, 3, 2 and 1 samples were collected from each category, respectively, to the theoretical saturation of the samples in terms of observable patterns (Fig. 3).

In the next step, after ten samples, four samples from each category were selected with the criterion of introducing the category and used for integrated analysis. The main method of data collection is the direct and inactive observation, to complete the information in the middle samples, the structured interview method with the user. Besides, in contemporary samples, the semi-structured interview with the builder is used as the backup method.

The patterns are extracted from the collected data in two steps. First, Sub-patterns are derived from existing data and then conceptual patterns that are more abstract, are explained through the identification of relationships and kinship of Sub-patterns. The way these patterns are represented at the Sub-level is important in the quality of data
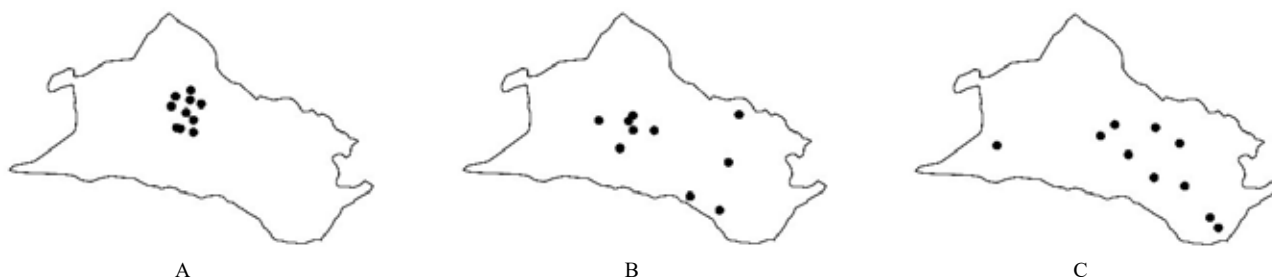

Fig. 3. Distribution of samples in Tabriz. Source: authors.
A) Distribution of contemporary samples. B) Distribution of middle samples. Distribution of historic samples.

analysis and reduction. Because any attempt to quantify a pattern in a structure causes the content of the information to be considered, including two separate variables: first, the actual information and its presentation and second, how to organize this data (Salingaros, 1999). By examining the Available terms, two types of "morphological" and "textual" representations can be used for patterns (Asadpour, Faizi, Mozaaffar, Behzadfar 2015).

Thus, in the representation of patterns at the Sub-level, due to the facilitation of data understanding and more in-depth analysis, the combined method, including morphological representation by an ideogram[10], is used alongside textual representation. Then the conceptual patterns that are more abstract are derived from the juxtaposition of Sub-patterns in a meaningful combination. To represent these patterns, just textual representation is recognized adequate and to make it easier to refer to these patterns in the next step of the analysis; abbreviated letters are defined for each. Middle samples are the first step in extracting patterns due to the richness of the patterns both in the physical part (due to the yard with significant area and complexity) and in the behavioral part (due to the constant presence of residents) and the other two categories are studied comparing with that. Patterns taken from contemporary and middle samples are summarized in Table 1 due to the similarity of the data collecting method. The first line shows the morphological representation of Sub-patterns. The second line, which includes the combination of several Sub-patterns, is related to the conceptual pattern.

In the historical samples of Tabriz houses, due to there is no access to the original inhabitants of the house, it is not possible to capture semi-fixed and moving patterns directly. Therefore, in this category, conceptual models have been obtained in comparative-physical comparison with two other categories of samples. In such a comparison, we encounter five status of patterns: Quite similar patterns in three categories, similar conceptual patterns with some different Sub-patterns in

historical samples, similar conceptual patterns but the result of completely different Sub-patterns in historical samples, altered conceptual patterns (relative similarity) and finally Conceptual patterns are entirely specific to historical samples. These statuses are summarized in Table 2, with a difference from the previous table, the rows of Sub-patterns are briefed, with just patterns that are new in historical samples. In this way, a set of conceptual patterns for historical examples is also formulated.

Pattern analysis

In the integrated analysis of samples by the QCA method, the obtained data in the previous step that were summarized to the conceptual patterns, by being placed next to other components, will be in an integrated analysis as part of the data analysis process. The main elements of integrated analysis, including conceptual patterns (as central data), constraints and environmental concepts (preliminary results of the analysis) as well as the theoretical configuration of the analysis have already been described, integrated into Tables 3 and 4. Abbreviations are used to display the patterns and the filled cells in the table indicate the lack of a suitable pattern in the structure of the comparative table.

Discussion and conclusion

This study, in examining the evolution of patterns, with a critical approach to totally visual analysis of patterns, scales and relationships, brings up the need for a conceptual study of patterns. In this way, it also introduces a humanistic and deterrent view of the extreme role of architects in shaping the built environment. This research also tries to consider human's (user's) decisions from the perspective of his ideals, which lead to the interventions and the formation of the environment. With such a view in the qualitative analysis of three categories of samples of Tabriz that are placed in a time course, it can be seen that the combination of environmental concepts (the deepest layer of analysis), compared to what is in appearance (i.e. Sub-pattern), have

Table 1. Sub and conceptual patterns in middle and contemporary samples. Source: authors.
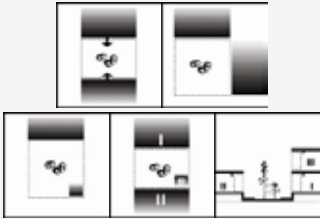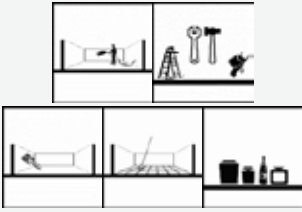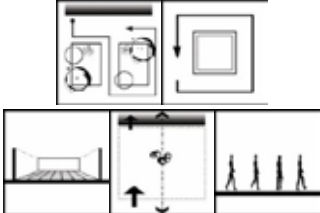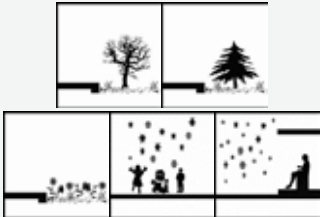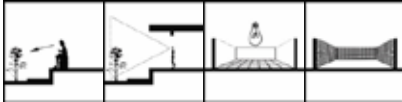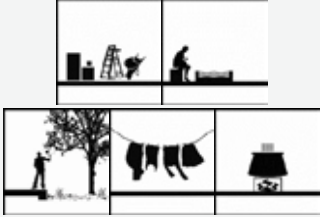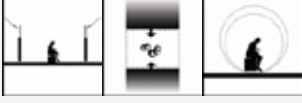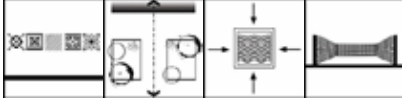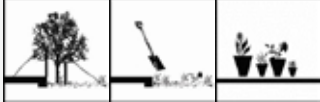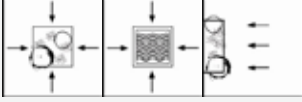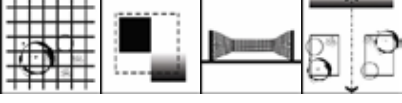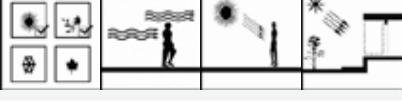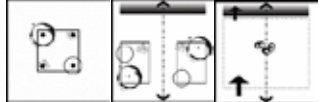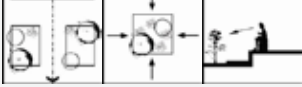
Conceptual patterns		Sub patterns	Conceptual patterns		Sub patterns
1	Collective Space (CS)		11	Preservation & Maintenance (PM)	
2	Free Movement & Presence (FMP)		12	Natural Form of Plant (NFP)	
3	Revealing Natural Process (RNP)		13	Formation of Natural Elements (FNE)	
			14	Time Attention (TA)	
4	Dominance in Perspective (DP)		15	Privacy & Introverted (PI)	
5	User Aimed (Need & Authority) (UA)		16	Individual & Social Environment Hierarchy (ISH)	
6	Sign & Ornamentation Language (SOL)		17	Soft Area (SA)	
			18	Domination of Man Geometry (DMG)	
7	Plant Breeding (PB)		19	Climatic Function (CF)	
8	Avoiding Raw Nature (ARN)		20	Continuing Context & Path(CCP)	
9	Individual & Social Properties (ISP)		21	Pattern & Similarity (PS)	
			22	Live Elements in Space (LES)	
10	Symmetry & Focus (SF)		23	Green Area Centrality (GAC)	

Table 2. Sub and conceptual patterns in historical samples. Source: authors.

Pattern category	Conceptual patterns	Sub patterns
1 — Similar conceptual patterns	Natural Form of Plant (NFP)	
	Plant Breeding (PB)	
	Soft Area (SA)	
	Free Movement & Presence (FMP)	
2 — Similar Conceptual patterns with minor changes in Sub patterns	Collective Space (CS)	
	Revealing Natural Process (RNP)	
	Dominance in Perspective (DP)	
	Avoiding Raw Nature (ARN)	
	Climatic Function (CF)	
	Domination of Man Geometry (DMG)	
	Formation of Natural Elements (FNE)	
	Time Attention (TA)	
	Symmetry & Focus(SF)	
	Individual & Social Environment Hierarchy (ISH)	
	Green Area Centrality (GAC)	

Pattern category	Conceptual patterns	Sub patterns
3 — Similar conceptual patterns with the general change of Sub-patterns	User Aimed (Need & Authority) (UA)	
	Individual & Social Properties(ISP)	
	Pattern & Similarity (PS)	
4 — Deformed conceptual patterns	Sign Language & Monotheism Meaning (SLM)	
	Continuing in Path (CP)	
5 — Specific conceptual patterns	Integration in the context (IC)	
	In & Out Contrast (IOC)	
	Introverted & Subjectivism (IS)	

fewer changes. In lesser proportion, the conceptual patterns although have changed but these changes are small and they are despite the vast changes that occurred in the sub-level. Such a phenomenon

Table 3. Integrated Analysis of Representative Samples. Source: authors
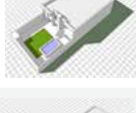
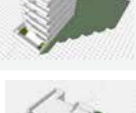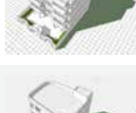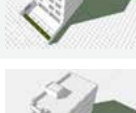| Representative Samples	Sample	Conceptual patterns (as the result of environmental decisions) 18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Constraints
Historical samples	Behnam's house	CF-NFP	RNP-CF	GAC	FNE-ARN	ARN	ISH	CP-CS	ISP	IC	TA	PS	FMP	UA-CF	SA-PB	SLM	IS-IOC	DP-DMG	SF	
	Qadaki's house	CF-NFP	RNP-CF	GAC	FNE-ARN	ARN	ISH	CP-CS	ISP	IC	TA	PS	FMP	UA-CF	SA-PB	SLM	IS	DP-DMG	SF	-Urban fabric
	Koozeh-Kanani's house	NFP	RNP-CF	GAC	FNE-ARN	ARN	ISH	CP-CS	ISP	IC	TA	PS	FMP	UA-CF	SA-PB	SLM	IS-IOC	DP-DMG	SF	-Building technique
	Mojtahedi's house	CF-NFP	RNP-CF	GAC	FNE-ARN	ARN	ISH	CP-CS	ISP	IC	TA	PS	FMP	UA-CF	SA-PB	SLM	IS-IOC	DP-DMG	SF	-Climatic conditions
Middle samples	Taleghani crossroads house	NFP-CF	SA-TA	GAC-PB	FNE	DP-ARN	-	CCP	ISP	-	RNP	PS-PM	FMP	DMG	LES	-	PI	UA	SF	-Urban fabric
	Sahand alley house	NFP-CF	SA-TA	GAC-PB	FNE	DP-ARN	ISH	CCP	ISP	-	RNP	PSPM	FMP	DMG	LES	SOL	PI	UA	-	-Building technique
	Farhang alley house	NFP	SA-TA	GAC-PB	FNE	ARN	ISH	CCP	ISP	CS	RNP	PS-PM	FMP	DMG	LES	-	PI	UA	SF	-Floor restriction
	Rushdieh house	NFP	TA	PB	FNE	ARN	-	CCP	ISP	-	-	PS-PM	FMP	DMG	LES	-	PI	UA	-	-Access restriction
Contemporary samples	Mandana alley house	NFP	SA-RNP	PB	FNE	ARN	-	CCP	-	CA	-	PS	FMP	DMG	LES	-	-	UA	-	-Form restrictions
	Mandana alley house	NFP	SA	PB	FNE	ARN-DP	ISH	CCP	-	CA	TA	-	FMP	DMG	LES	SOL	-	-	SF	-Urban Criteria
	Shahrivar Street house	CF-NFP	SA-RNP	PB	FNE	ARN	ISH	CCP	ISP	CA	TA-RNP	PS	FMP	DMG	LES	-	-	-	-	-Economy
	Beilan-kooh house	-	SA	GAC	-	-	-	-	-	CA	-	PS	FMP	DMG	-	-	-	UA	SF	-Car Traffic / -Housing Trading
Row number of Environmental concepts		18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
Dimensions of Man-Environment		Nature					Society				Background				Origin					

Table 4. Relationship between environmental concepts and patterns transition status. Source: authors.

Dimensions of Man-Environment	Row number	Environmental concepts12	Patterns transition status
Origin	1	Semantic integrity	Total Change
	2	prominence in processes	Total Change
	3	Spiritual Conversation	Total Change
	4	Representation Holy Concepts	Total Change
	5	Responsibility in Environment	Change Position
Background	6	Man-centered Decision making	Continuous
	7	Environmental Freedom	Continuous
	8	Tendency to continue	Change Position
	9	Finality of Processes	Change Position
Society	10	Coexistence in Organization	Change Position
	11	Individual & Social Quiddity	Total Change
	12	Environmental Social Context	Change Position
	13	Continuous Social Environment	Change Position
Nature	14	Man's Supernatural Perfection	Change Position
	15	Completion of Nature	Change Position
	16	Respect for Nature	Continuous
	17	Revelation of Nature	Continuous
	18	Harmony with Nature of Objects	Change Position

suggests that despite major changes, making the place (which is more conceptual than space) has relatively a stable structure or contents over time in societies such as Tabriz, which despite the rapid changes of the present era, can change slowly. Therefore, the evolution of the conceptual level (environmental concepts and conceptual patterns) will be much slower than the Sub-level. Thus, the evolution of architectural patterns in the open space of houses in Tabriz should be sought more in changing constraints. This is because changing constraints on the results of environmental concepts have led to physical changes. top-down urbanization, one-aspect economic vision, the priority of car movement and housing commercialization have replaced urban fabric dynamics, covert traditions in building technology and the priority of coordination with climatic conditions. Based on this, three statuses can be identified for the evolution of conceptual patterns: continuous, change of position and total change (See Table 4).

In the status of continuous, conceptual patterns emerge in the open spaces in the same way as in the past, or at least with a slight change in the Sub-level pattern, they continue to be present in the open space of houses. In the status of change of position, due to the change in the composition of the constraints, the conceptual pattern no longer has the opportunity to appear in open space and emerges with other Sub-patterns in other available residential or non-residential spaces. In the status of total change, conceptual patterns have generally been removed from human relation with the environment and this removing may be accompanied by an alternative to another pattern. Such changes, while small, pave the way for cultural change and change of values. The relationship between these three statuses and the dimensions of human relationships with the environment[11] is also significant. The predominant state in the dimension of origin is Total change, while in nature we are faced with a change of position. There is also relative stability in the background and society. The above formulation of the evolution of the patterns introduces new necessities in future research in this field that although the general overview of the qualitative analysis in the present study reveals new contexts, it does not provide an opportunity to study them in detail and should be examined in separate studies.

Endnotes
1. The interpretive approach to social Research has been introduced by "Norman Blaikie", which is a combination of hermeneutics, phenomenology, ethnomethodology, ethnography, data theory, and biography, in which each study has its own emphasis in the aspect of research objectives, research logic, data collection, analysis methods (Blaikie, 2017, 313).
2. Qualitative Comparative Analysis
3. Merriam-Webster's Dictionary
4. Constantinos A. Doxiadis
5. Spencer founded the doctrine of organisms in sociology. The division

of societies based on organic and mechanical by Durkheim is similar.

6. Small-N is an alternative research method that involves sequential observations of single people or small groups before, during, and after a period of intervention.

7. Historical samples selected in this study: 1) Behnam's house 2) Qadaki's house 3) Lalehei's house 4) Kouzehkanani's house 5) Mojtahedi's house 6) Sehati's house 7) Sherbat-Oghli's house 8) Savojbolaghiha's house 9) Alavi's house 10) Amir Nezam's house.

8. middle samples selected in this study: 1) Taleghani crossroads house 2) Sahand alley house 3) Farhang alley house 4) Maghsoudieh house 5) Roshdieh house 6) Khataei alley house 7) Azarabadi alley house 8) Binesh street house 9) Baghshamal crossroads house 10) Owhadi street house.

9. Contemporary samples selected in this study: 1) Mandana alley house 2) Qarabaghi alley house 3) Ferdows street house 4) Nezami square house 5) Shahrivar street house 6) Beilankooh house 7) Shahid Bakeri street house 8) Baghcheh alley house Ban (Ilguli) 9) Mansour Crossroads house 10) Zaefaranie house.

10. Ideogram is a graphic symbol that displays an idea and can replace a group of letters that are put together based on spoken sounds.

11. The roots of this type of quadruple division can also be found in the opinions of various thinkers such as Muhammad Iqbal (1970, 48), Motahhari (1999, 233-70), and Allameh Jafari (1999, 12). The difference is that in this study, instead of the four element of gods\ history\ society\ nature, the expressions of origin\ background\ society\ nature are used to convey a more general meaning.

12. Environmental concepts have already been studied in another part of another study on open spaces in traditional Iranian houses, which bears many similarities in the findings of this section. This indicates a conceptual connection both in the temporal dimension (the evolution of the patterns desired in this research) and in the geographical dimension of a civilizational range (intended in the previous research).

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