

Explanation of Fractal-Like Geometry in Context-Oriented Structure of the Persian Bazaar

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Abstract

The lack of continuity of the values of Islamic art and architecture in the design of new structures in the historical context is a limitation and threat to the life of these precious urban areas. Among these, contexts of traditional Iranian bazaar, as valuable but problematic areas which have been subjected to the crisis of functional-physical constraints of new and uncontrolled structures, are the fields whose recognition of their qualitative features is essential for the emergence of coherent interactions with context. In this paper, therefore, aimed at explaining the language of the context-centered pattern of traditional market as an outstanding example of traditional Iranian art and architecture, first the analytical-descriptive method, as the subset of the qualitative research methodology, is used to collect and analyze the necessary information. In the second part, using the visual fractal analysis method, the correlation between the context-oriented quality components of the traditional market elements, was examined with a fractal geometry pattern, with emphasis on open and closed spaces. The findings suggest the context-orientation of traditional markets in urban, neighborhood and domestic scale in such a way that the visual analysis in three macro-, medium and micro scales confirms the overlapping of quality values of context-orientation with a fractal-like geometric pattern manifested concretely in conceptual mentality of traditional architect. Fractal geometric scales embodying behavioral-functional scales reflects the semantic integration from unified and dynamic Islamic worldview. The patterns similar to (chambers) Timcheh and pattern for open spaces as strong centers of medium provides the junction and integration of macro and micro scale and corresponding to law of reverse power of fractal dimension, the more scalable the micro components are, the greater they are in number.

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objectives:

1. Explanation of context-oriented pattern language in traditional Iranian market for use as design productive in context. 2. Study of the position of fractal geometry in the pattern language of traditional Iranian market.

questions:

1. Can the traditional Persian market be considered as a context-oriented architecture? 2. What is the pattern of manifestation of context-oriented concepts in traditional market?

KeyWords: Traditional Market, Contextualism, Historical context , Fractal Geometry, context Scale

Introduction

Bazaar is one of the main economic, social, cultural and physical pillars of Iranian traditional city and urban space that embraces social interaction in cultural historical context and partakes high quality artistic values (Habib, 2006: 27). The context of traditional markets in most cities of Iran, despite the differences and physical similarities of climate and ecology, have meaningful similarities derived from the shared outlook of the traditional society and plays an important role in religious ceremonies, in addition to their economic role whilst having emphasis on the bazaar, mosques and religious tekyes. This self-evolving, homogeneous architecture with its surrounding urban context, like other municipal settings, is not immune from the outcomes of modern life and surrounding areas, and on the other hand, the transformation and creation of new structures for the continuity of historical textures is inevitable; Hence, this requires a profound meaningful and physical knowledge of areas such as the traditional marketplace that is essential for the continuation of values in contemporary times

Recognition of the past is not about returning to the former, it is about being aware of the process of previous transformations in order to take useful actions in the future (Hanachi, 2011: 16). As art has always had an exceptional place in the emergence of artworks, the field of architecture and urban planning has been of primary importance (Grotter, 1996). In other words, the past is a rich and influential context for the present design and organization of future urban structures. The field should be considered as an active and passive context which in terms of its natural and artificial components, will never have a passive state of influence and will always have an impact on the role and effect it dwells upon (Masoud, 2012: 26).

In the context of historical contexts due to the meaningful and identity burden of the context, the challenge of new and influential structures of the textures is intensified, and

for any conservation and developmental action, the context must be identified and its pattern and grammar extracted. It came up with suitable solutions to maintain the language of traditional architectural paradigm in contemporary design. Salingaros (2000) suggests that patterns have already been explored as a solution and tested in different contexts and that the time frame for their application in architecture and urban planning can be several thousand years. The beauty and perfection of Islamic architecture is also crystallized by linking deep concepts with an understandable level of phenomena. In such a set, the relationship between the components and their interconnection is also important, and what is valuable is not the components themselves but how they coexist in a balanced and coherent composition (Islam, 2012: 46).

Traditional man sees all creatures as manifestations of a single being and along the path of inspiration that nature shares, he attains a similarity in structure and proportion that is measured by mathematics (Ardalan, 2011: 51). Salingaros (1999b) introduces mathematics as the knowledge of patterns and considers the higher structures of the past to have a similar mathematical sense. Therefore, there are similarities of patterns in these types of architectures, one of the most important of which is fractal. All native architectures made by people tend to be fractal features, and cities are at least the most attractive and fractal ones. This shows that there is an intrinsic and real mathematical structure behind each of the driving puzzle combinations. This sequence is essential to the attraction and attraction to the building and forms the fractal concept. When approaching and impending a building, there must always be a smaller scale, more attractive details that illustrate the whole concept of composition. Fractal geometry is the study of such a hierarchy of self-similar details, from large to small (Van, 2005: 2). In order to explain the position of quasi-fractal geometric pattern in traditional market-based contextual model language, the concept of contextualism and its scaling dimensions are first discussed and then the traditional market context is considered as a historical context based on the proposed model.

Conclusion

In the first part of the study, the contextual components were examined at three scales: urban, neighborhood and interior, with the aim of explaining the language of the traditional market pattern. The results show that this texture is an axially contextual quality that is capable of spreading through the communication joints and evolving over time in a reliable and consistent manner; furthermore, paying attention to the tangible and intangible aspects of the environment from the macro to the micro scale forms the contextual model of the traditional market-based model. In the second part, we investigate the position of fractal geometry in the objective manifestation of the traditional Iranian market pattern language.

The results illustrate the shape order resulting from quasi-fractal geometry, including the functional order at the macro, mid and micro scales, the central pattern manifestation of the traditional market context. Such an order leads to the realization of a sustainable human scale that has been forgotten in modern architecture.

After visual analysis, macro-scale fractals are observed to include functions of strong association with the surrounding texture and functional-physical cohesion at this scale. At mid-scale, the specific performance of geometrically similar fractal centers and its replication in the market context include indoor and open centers based on market functional needs, modular repetition of linear paths with retail performance, rotational revolution in quadrants, indicating functional-physical adaptation. The scaling hierarchy includes a number of large-scale functions (Timche and plaza) and a large number of microscale functions (repetition and rotation of linear stores). The accumulation of distinctive trade guilds in the teams is a combination of the body and its specific function, of a kind of "gathering" and of being in and focusing on space. At the micro-scale, a greater number of shaping components include the repetition of the brick modulus for final structure and coating, the repetition of the arches in the body of the Timche and plaza areas, the repetition of the arches and their skylights in the linear order of modes, the modulus of muqarnas decorations of the ceilings from large to small to the side of the skylights that ascend into the sky and move from matter to light and infinity that indicates a strong fractal dimension. Such a fractal and intuitive geometry is not merely the ultimate goal but, by adapting to the functional scales, reflects the meaningful coherence arising from a unified and dynamic Islamic worldview.

The results of traditional market analysis indicate the existence of a hierarchical fractal species in this traditional city architecture phenomenon. Fractal geometrical scales incorporating behavioral-functional scales derived from Islamic worldview are becoming increasingly fragmented, with similar patterns of the Timche and open-air patterns of the plazas, strong mid-scale centers to connect macro-scale components and scales. They are rational and introduce deep concepts from the historical, human, and socio-cultural context into a quasi-fractal physical manifestation as a unified whole. All of these illustrate the traditional market-based contextual structure and the objective manifestation of this central context through a fractal structure. Therefore, in contemporary peripheral constructions, the perception of pattern language, not merely superficial polish, both in the formulation of the design criteria in the context and by the designers will lead to the continuity of the coherent nature of the historical context of the traditional bazaar.

Traditional market fractal scaling	The visual similarity of fractal components	Functional Scaling of Components	Fractal Repeat Rate
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Large Scale: Relation to texture around and residential neighborhood (communication geometry)	Similar, interconnected tissue arteries with surrounding arteries lead to the creation of a unified whole Similarity of Residential Yard Module with Residential Yard	Traditional backbone Market connection with residential neighborhoods Market adjacent to mosques and religious-political practice	Low A whole unit
Medium scale: The integration of various functional components within the traditional market set (Two-dimensional planar and three-dimensional spatial geometry)	Indoor Timisoara Outdoors Linear paths of the cells In the order and at the intersections in the rectangle	Commercial performance for each team Gathering on religious occasions Retail distribution in the cells in the order of orders	Medium A number of large indoor and outdoor space interconnected with more modules of smaller cells and spaces
Micro scale: Two - dimensional geometry and decorations 3D interiors	Spare Brick Module Muqarnas module and ceiling arches Ceiling Lighting Module Forms of pop-ups in the inner body	Functional components of structures Acoustic performance natural light Climatic protection	High Lots of micro-scale components with a tendency towards human scale

Table 7. Summary of components of the quasi-fractal structure of the traditional Iranian market, Reference: Authors

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