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Developing a Conceptual Model for Promoting Coherence and Interactivity in Historical Neighborhoods (A Case Study of Historical Fabrics in Neighborhoods of Kerman City, District 1)

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Abstract

Coherence and interactivity are considerable features of historical fabrics that can lead to formation of an integrated city known as a dynamic system. During historical epochs of time, the city was recognized as an integrated whole which comprised a wide range of structures from internal neighborhood structures to communicative and interconnected neighborhood structures in terms of a whole unit known as the city.

- Statement of the problem: The lack of criteria for formulating neighborhoods coherence in new urban development and the emergence of segregated and discrete grains, as well as ignoring the neighborhood connections in major urban planning regulations are the main studied problems in this paper; since numerous research have focused on urban coherence in neighborhood scale, disregarding of the neighborhood interconnectivity. Moreover, urban coherence can be studied ubiquitously in geometric, physical, functional and social aspects that are all reflected in this paper regarding the functional and structural coherence and interactivity.
- Research aim: This study aims at scrutinizing the criteria for coherence and complexity in neighborhood connective structures in order to achieve a conceptual model explaining neighborhood coherence and provide a flexible model for neighborhood adjacencies.
- Research method: Having analyzed the contents that are related to urban coherence and unity, this paper adopts the qualitative research method in order to explain the relation of these contents to the realities of the existing fabrics. The decision-making process in this exploratory-explanatory research is completed using comparative analysis. The intellectual basis of the research is also founded on the basis of content analysis and deductive reasoning. In addition, ANP model has been adopted in the practical stages of this research. Therefore, 18 residential districts have been chosen to be evaluated and ranked according to a formulated check list. Finally, the proposed conceptual model is tested in District 1 of Kerman city according to the mentioned model.
- Conclusion: The studies of this research reveal that if the 5 indicators of spatial organization, continuity, physic, sociability, and meaning of neighborhoods are combined with 11 indicators of spatial coherence, a matrix will be formed that can offer a coherent network of neighborhoods through the interaction of the indicator.

Keywords: *Neighborhood, Neighborhood coherence, Complexity, Historical fabric.*

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Introduction and statement of the problem

The spatial and structural coherence in neighborhoods induces the social, economic and cultural relations and interactions and leads to city dynamism. Formerly, the neighborhoods benefitted from a unique type of interactivity that offered a spatial coherence in the city and interconnected the neighborhoods as an integrated and coherent whole. Today, these valued structures are not obviously distinguished in new urban developments; and the neighborhoods, as the smallest urban units with high levels of participation, are segregated with vivid physical boundaries (without mental boundaries), which lack the influencing environmental structures. In fact, the problems of incoherent cities in the late period roots in the ignorance of these principles (Mohajeri, 2007: 232). The life of a city depends on its connectivity (Perry, 2011: 24). Basically, the geometry of a city offers an interconnected network to motivate social interactions. The connectivity and coherence of graphs formed on the basis of random relationships induce vitality in a city (Castells, 1989 & Meier, 1962). Interconnectivity can be achieved when the neighborhoods are not separated with clear boundaries. In other words, the ambiguous boundaries that gradually separate and connect neighborhoods guarantee interconnectivity (Ghasemi, 2005: 124). The main problem in this area is the lack of assigned structure, patterns and indicators in developing urban structure, as well as the ineffectiveness of urban development plans, such as detailed and thematic plans, that prevent the integration and coherence in neighborhoods in new urban developments in terms of neighborhood and spatial relationships development. This is due to the fact that when something goes grows beyond its size, the coherence will be lost and disrupted (Bohm, 2005: 14). The neighborhoods should be flourished through planning so that they would be perceived as an integral part of the city (Mumford, 1980). The current trend of urban development in form of new neighborhoods development and the existence of superficial non-confirmative models with invaluable indicators that have led to the growth of separate

residential areas necessitates a comprehensive research. The lack of structural interconnectivity between neighborhoods is a problem that results in emergence of discrete urban cells and the disappearance of urban structures (Lee, 2010: 45).

Theoretical foundations and literature review

Alexander has carried out extensive research in 1965, 1977, 1987, in the field of urban area focusing on urban coherence in terms of physical aspects. Trancik, another renowned theorist, has also conducted research on this field of study more specifically. In 1986, he allocated some chapters of his book "Finding lost space" to space integrity and the necessity of coherence in spaces. Other contemporary scholars of have also referred to coherence in their studies (Table 1). This subject is widely considered since 2000. In 2010, Salingaros wrote an article entitled "Complexity and Urban Coherence" explaining the coherence, complexity and interconnectivity of urban fabrics. Tavalayi (2007) has also published his research on urban coherence and integrity of Iranian cities in a book entitled "the image of a coherent city". In his book, he explains the prominent theories and tries to propose strategies for enhancing urban coherence.

Coherence and interconnection concepts

The term coherence means: 1. the quality or state of being arranged and matched. 2. the fluency of the words without any pretension or admiration 3. harmony, adaptation, balance, consistency and conformity. In other words, coherence means integration of diverse elements, relationships, or values into a whole, participating in a larger unit. This term is also defined as "incorporated" and "being a part of a whole" (Bateni, 1998:16). Coherence is achieved when the composition of a whole is proportional and balanced, so that the independence of the components are integrated into a whole (Smith, 2010: 31). Integrity or coherence is the objective condition of the space composition that is measurable and occurs to a small or a great degree in each part of the space (Alexander, 2000:14). In the following, the principles and criteria of the

coherent systems are discussed with an emphasis on coherence and interactivity characteristics in relation to the neighborhoods.

Neighborhood coherence

Coherence and interactivity of neighborhoods are effectively subject to the factors that stimulate the occurrence of these features. Coherence results from the interacting complexity and interconnectivity of the fabric and leads to formation of a whole unit known as neighborhood, district or city (Morris 2012: 15). Therefore, it is necessary to review the concepts of coherence / interactivity and complexity / interconnectivity in the following. The precious historical urban spaces are shaped in a rich and coherent spatial organization (Ardalan and Bakhtiar, 2001:35). The coherence and continuity in distinct urban spaces of historical fabrics in Iran also create a sense of continuity and sequence for the observer, which can be understood by walking in these fabrics (Pourjafar and Ismailian, 2013:42). Iranian experts believe that multiple criteria such as unity, order, association, continuity, proportions, interlocking of mass and space led to the spatial organization coherence in historical fabrics (Tavasoli, 2002:41). There are various definitions and views on the neighborhoods coherence in the surrounding environment, as discussed in Table 1.

Research Method

This paper adopts both the qualitative research method and historical-interpretative research method, and uses library documents and field observation as the research instruments. In the theoretical part, the basic concepts such as coherence and the principles of cohering urban physic is put into deep scrutiny in order to explore the possibility of applying and generalizing these principles to the research sample and investigate the implications of these principles in the studied fabrics. Historical documents and drawings of the studied case are used for this purpose. In the next step, the principles that provide neighborhood coherence are used to present approaches for strengthening the physical-spatial coherence of the contemporary cities.

The present research is considered a qualitative study with both theoretical and practical approaches.

In the theoretical approach, the qualitative methods, including the meta-analysis method, have been adopted using content analysis and deductive reasoning techniques. In the practical approach, positive methods, such as logical reasoning has been used. The experts' views to the subject were also analyzed in the theoretical approach. Eventually, the research results led to the formation of a conceptual model of coherent network of neighborhoods which was tested in ANP model in the practical approach. It should be mentioned that collecting required information also included field observation of the urban spaces in the form of checklists and questionnaires to identify the neighborhood qualities and the indicators of neighborhood coherence.

Proposed conceptual model

The processes that create a network structure in the city follow three main principles which deal with topical relation and analysis. These three general principles are the focal points (modules), communication and hierarchy. Having been combined with three fields of intra-neighborhood coherence, inter-neighborhood coherence and meta-neighborhood coherence, the three mentioned principles form the following conceptual model. Observing this model in all three fields will result in a coherent integrated holistic city comprised of coherent neighborhood modules (Fig. 1).

Case study

District 1 of Kerman city comprises a historical fabrics which is chosen as the case in this research. Being a strategic location, the area is a significant part of the city structure. Fig. 3 introduces the area of the historical neighborhoods. The ANP technique is used to analyze and evaluate the coherence of the historical neighborhoods located in District 1 (Fig. 1). In the first step, the research objectives, criteria, and sub-criteria should be introduced for evaluations (Zebardast & Imami, 2004: 33). The evaluation aims at investigating the coherence

Table1. The concomitant views to neighborhood coherence and integrity. Source: authors.

Scholars	The concomitant views to neighborhood coherence and integrity with the surroundings	Scholars	The concomitant views to neighborhood coherence and integrity with the surroundings
Madanipour, 2013	Preserving interconnection, coherence and social-spatial incorporation	Gaurd, 2013	The neighborhood as a coherence network of streets and blocks
Habibi, 2003	The role of neighborhoods structure in the whole composition musical notes in a music system	Golster, 2001	An attempt for creating the neighborhood outer space neighborhood based on three principles of like congruency, universality and adaptation
Alexande, 1994	Inside the tree structure, none of the unit features is related to the other units	Rapaport, 2001	The confined neighborhood area or areas with functional zonings
Jacobs,	When a city is explained as a complex of neighborhood units, the reliance of the smaller units to each other and to the main neighborhood unit is implicitly indicated.	Lewis Mumford, 1980	The borderlands are the only places that people should all benefit from. In other words, not only the borders support the neighborhood independence, but also they provoke unity intensively.
Koan, 2006	The neighborhoods that perform well don't have any beginning or end. A part of their well performance is due to their overlap and integration	Morvarid Ghasemi, 2004	The neighborhoods should be developed based on planning, so that they would become a part of an integrated city
Falamaki, 1999	A neighborhood is a part of a city with its surrounding area and places as a recognized part of city environment	Inch, 1981	The neighborhoods should not be separated with clear boundaries; instead, they should be transformed gradually
	The especial feature of integration inside the neighborhoods and in vicinal neighborhoods in Iran have caused the residential neighborhoods to be intangibly understandable as inseparable.		Because any good city has a connected and integrated fabric not a cellular one

following steps. Since the indicators of neighborhood coherence are both qualitative and quantitative, it is necessary to homogenize the indicators for further evaluation. Having used the fuzzy logic, the truth value of all the indicators may be any numbers between 0 and 1. In the next step, the 18 observed historical neighborhoods are being rated in accordance with the checklists, and formulated as the following. Indicators of urban neighborhoods were defined by “index a”, and indicators of coherence were defined by “index b”. The sum of the “indices a” indicates that some of neighborhoods indicators cover all the indicators of coherence, while others only cover a small group of indicators. In order to clarify the significance of these indicators, the Delphi technique was utilized. In this regard, a panel of five native and foreign experts with proficiency in urban coherence studies were asked to state their views, which is illustrated in the following formula (Fig. 2).

Findings

Coherence is a prominent principle in sustainable

of the historical neighborhoods which are classified into three categories: indicators of coherence, indicators of urban neighborhoods and types of urban neighborhoods. In the next step, the indicators of neighborhoods and indicators of coherence are interacted with each other in more than 20 matrices. In order to rate the criteria and sub-criteria, the related information was summarized in the tables that compared the status quo and the mentioned design (checklist). Data were collected according to the questionnaires and field observation checklist, in which the views on the criteria were documented. The collected data are summarized in more than 15 tables as a result of data analysis and scrutiny of the status quo. The interaction of coherence and neighborhoods indicators determined the weight of each indicator. The normalized weight was multiplied by the coefficient of significance for each of the status quo indicator, and the studied neighborhoods finally obtained their final weight in accordance with the evaluator checklist, which was the resultant of the observations (Table 2). The neighborhood coherence is evaluated through the

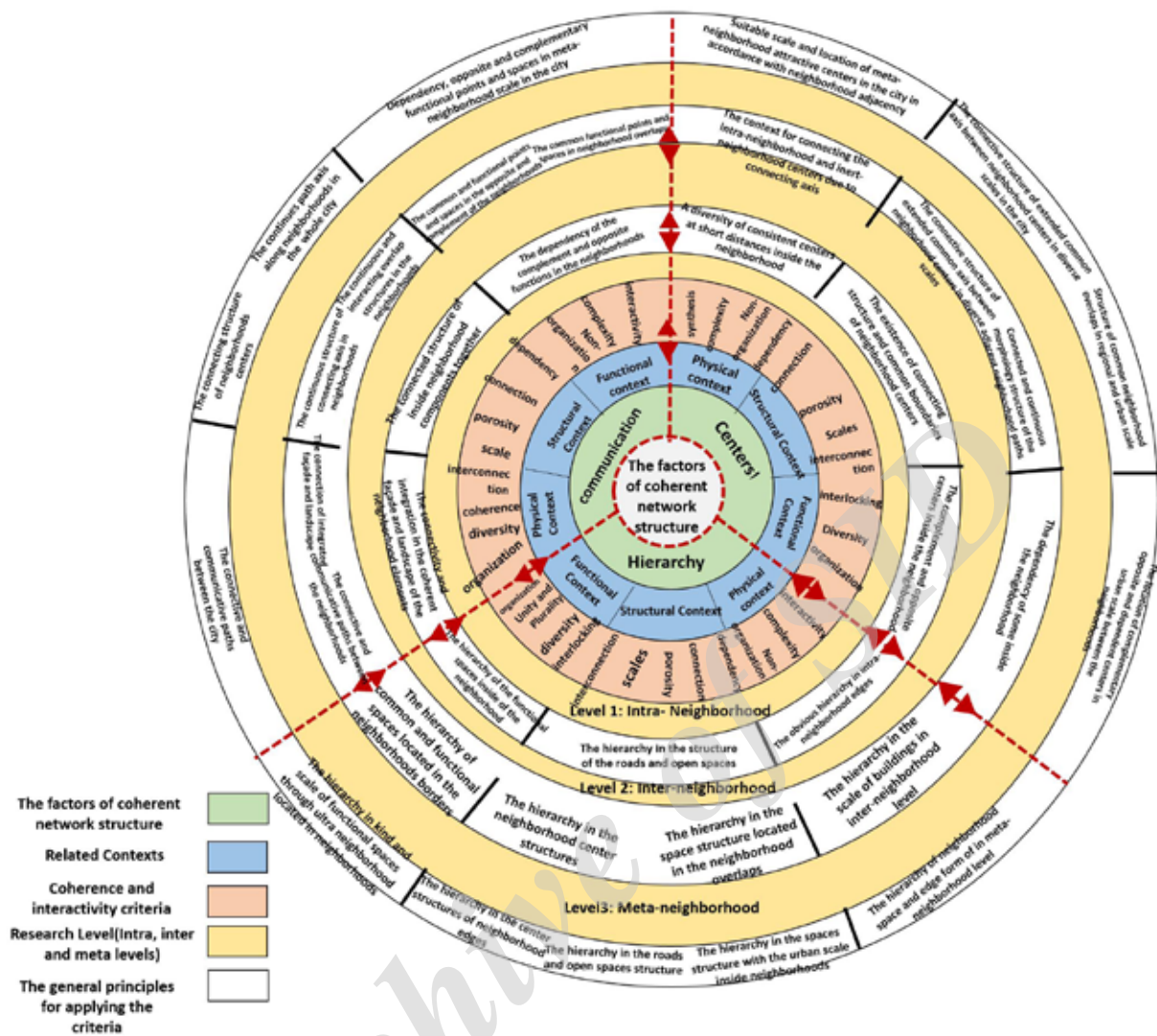


Fig. 1. The proposed conceptual model for neighborhood coherence. Source: authors, 2017.

urban development; however, a small number of studies focus on coherence in urban neighborhoods. The lack of adequate theoretical bases, especially in our country, has led to emergence of improper designs that merely aim at beautifying and improving residential zones in existing neighborhoods disregarding of their coherence. Hence, this research tires to propose a three-level conceptual model that compensate for the theory gaps in this field of study.

The first level, micro-level of the model, investigates the intra-neighborhood coherence focusing on relation between the neighborhood elements. In the second level, the inter-neighborhood coherence is discussed which can be achieved through the interactivity of

adjacent and associated neighborhoods. The third level, the micro-level of the model, mainly focus on meta-neighborhood coherence that generates the integration and interactivity of neighborhoods into the whole structure of the city and provides an integrated unified whole. In contrast to the carried out research on spatial coherence, this study describes coherence as a design and planning principle in urban neighborhoods, which can be considered as an innovative strategy regarding the research background. The studies of this research reveal that if the 5 indicators of spatial organization, continuity, physic, sociability, and meaning of neighborhoods are combined with 11 indicators of spatial coherence, a matrix will be formed

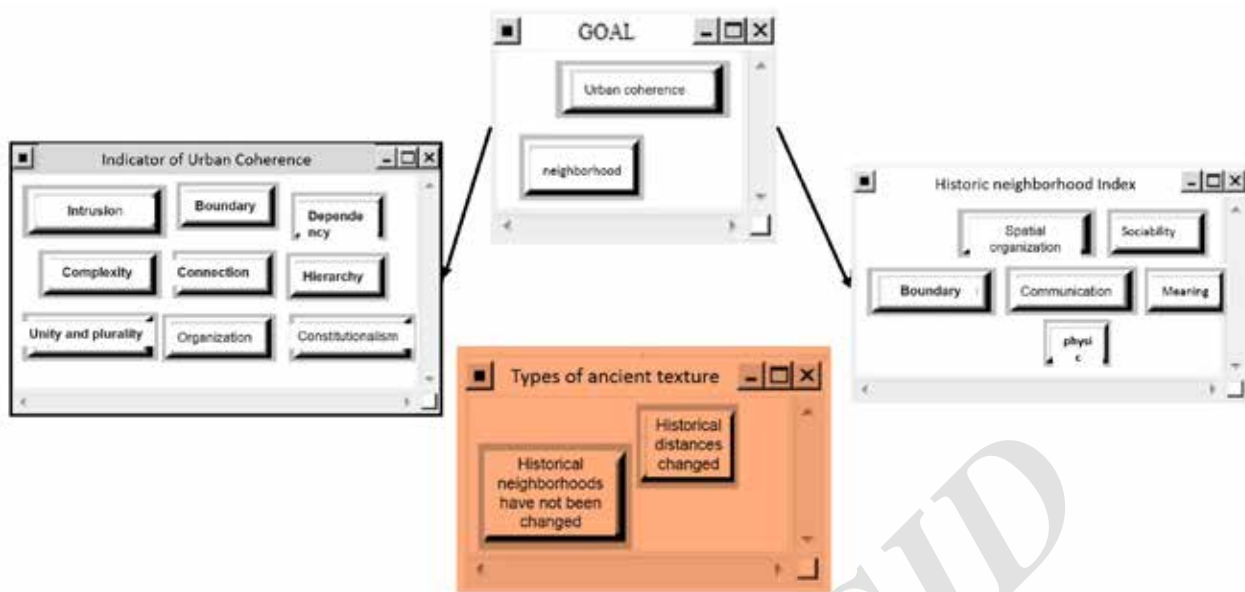


Fig. 2. The primary ANP framework. Source: authors, 2017.

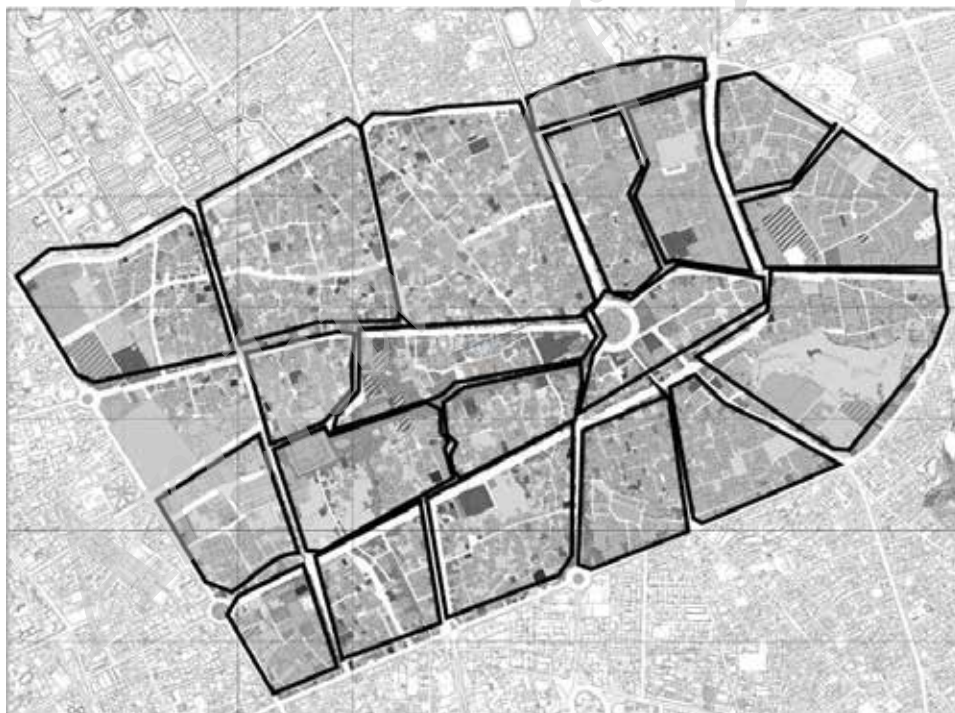


Fig. 3. The studied historical neighborhoods in this research; Scale: 1/1000. Source: authors, 2017.

that can offer a coherent network of neighborhoods through the interaction of the indicator. The matrix is fit into the proposed system and forms the conceptual model in three levels. This matrix has an appropriate mechanism in terms of providing a conceptual model for answering the second research question. The results of the research indicate that the indicators of

coherence can be applied to the proposed conceptual model in various evaluation models, including ANP, through the evaluating checklists (Table 2); (Fig. 4). Fig. shows that neighborhood coherence is essentially dependent on the interventions and transformations of neighborhood structures due to urban development plans. According to the drawings, the central areas of

the district (adjacent to the historical market complex), is more coherent than other areas, which emphasizes on the role and significance of the market in creating unity and integrity between neighborhoods. It is also evident that the neighborhoods located in zones with vaster areas and less separating axis are considerably more coherent and interconnected than the rest of the neighborhoods. In addition, the more a neighborhood has undergone urban projects, including the construction of new streets, the less coherence and integration in neighborhoods is achieved.

Neighborhoods located in the east of the historical fabrics are less coherent than other neighborhoods due to construction of new streets and establishment of a police department in the area (impenetrable blocks). The analysis of regional evaluation in the district level indicates that most deficiencies in offering coherence originates from discontinuity of scales, as well as functional and communicational hierarchy in between the neighborhoods especially along the boundaries and edges and the destruction of the neighborhood fractal structures.

Discussion

• Evolutions from neighborhoods adjacency to neighborhood segregation

The neighborhoods adjacency does not merely imply their contiguity. The neighborhoods adjacency and coherence has long been forgotten. Today, all these

features are neglected in new urban development, and the neighborhood adjacency has turned into neighborhood segregation (due to contractual boundaries). This structural evolution can result in consequent transformations in the social and cultural neighborhood communications (Table 3).

The criteria for formation of neighborhood coherence Coherence is depending on the aforementioned features of focal points and modules from neighborhood to the city scale. However, a meticulous scrutiny reveals that coherence and interconnectivity include a wider range of details explained in Fig. 5 to & and Table 4. In the following, some graphical drawings are briefly explained for better understanding of the applied expressions.

Coherence and interconnectivity through extension and connectivity: In this type of geometric coherence, the morphological extension of the neighborhood paths without convertibility (identical identity from beginning to the end) provides a type of interconnectivity and coherence. This kind of extension leads to formation of a common axis without a crossing boundary in the neighborhoods; an organic and indirect extension that connects the elements and compartments along its path (Fig.5 & Fig. 6). Coherence and interconnectivity due to an intersection: the existence of intersections, boundaries or fractal interfaces were the prominent features of the city geometry in the past (Bovil.1997: 87). Different urban

Table 2. Weighting the criteria for urban neighborhood coherence and interaction. Source: authors, 2017.

Normal Weight	Subject		Normal Weight	subject	Subject
0,19856	Unity and plurality		0,10265	Spatial Organization	
0,22389	Complexity				
0,06129	Organization				
0,07119	Interlocking of mass and space		0,21109	Continuity	
0,09732	Dependency				
0,0546	Overlap		0,2099	Physic	
0,13790	Hierarchy	Consistency criteria			
0,25553	Continuity		014189	meaning	Historical Neighborhood Criteria
0,1475	Organism				
0,09411	Interactivity		0,256420	Sociability	
0,1528	Diversity				

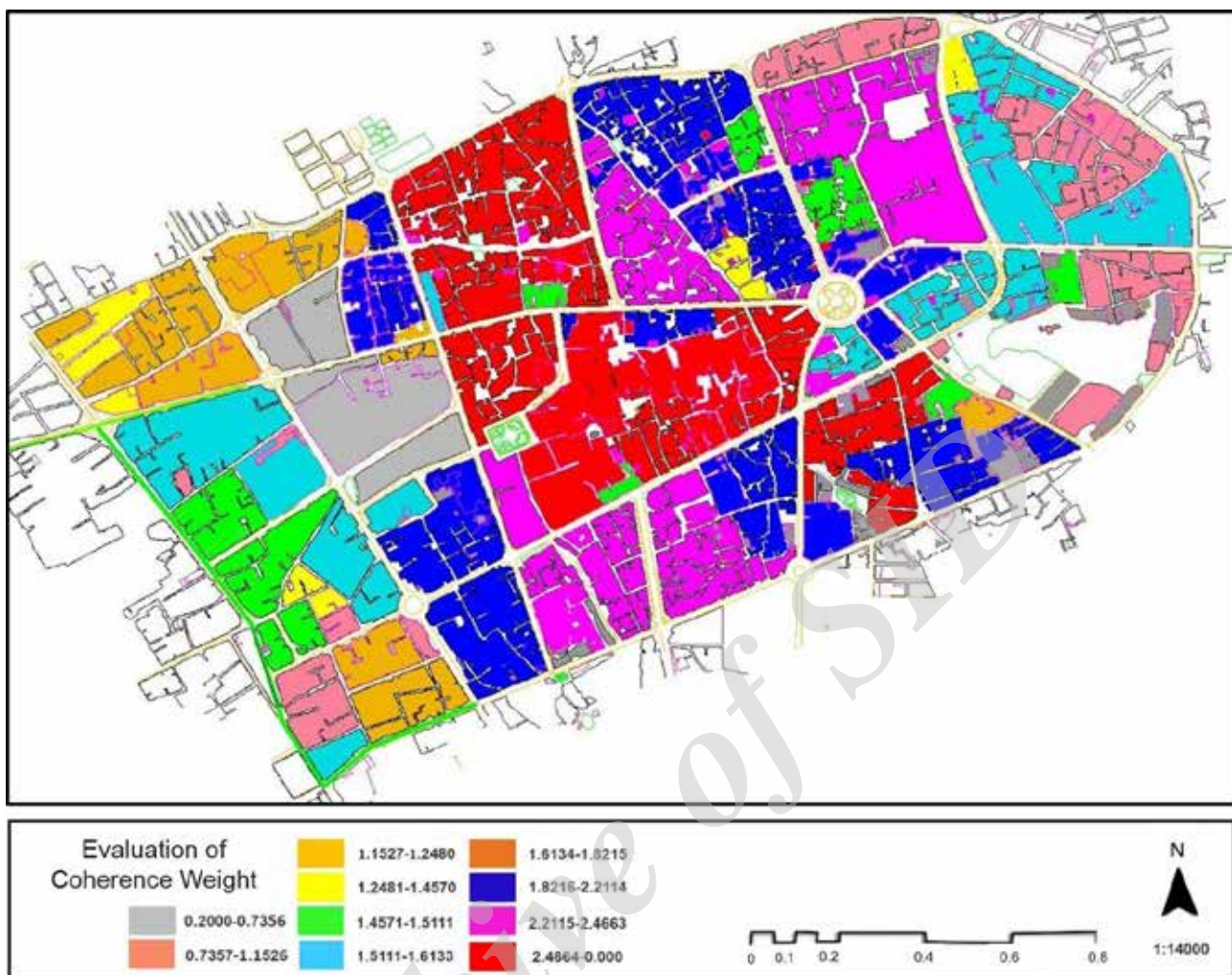


Fig. 4. Evaluating the coherence in historical neighborhoods located in District 1 of Kerman city. Source: authors, 2017 based on the comprehensive plan of Kerman city.

units are interconnected through their intersections or their boundaries. In fact, these intersections were responsible for linking between different urban units, rather than the internal components of each unit (Salingaros, 1998: 37). Coherence due to intersections can be provided in a number of situations. In the first situation, coherence can be achieved when the neighborhoods share a common node or center that enables interconnectivity in the centers or open spaces. This type of interconnectivity is generated along the boundaries and lead to social coherence (Im si, 2015: 23); (Fig. 7). The other type of intersection is provided along the neighborhood boundaries. The boundaries benefit from features that

induced coherence and interconnectivity to a great extent (Campbell, , Henly, Elliott & Irwin, 2009: 23). Coherence due to interference and the multiplicity of common points and sides in neighborhoods: Interference is another factor that offers interconnectivity due to interconnection of elements and boundaries (Barabasi, 2011: 19). Interference consists of interconnecting boundaries (curved boundaris) or interconnecting roads. Moreover, the number of connecting points and sides in neighborhoods influence the interconnectivity as well. The multiple number of shared points and sides in the historical neighborhoods led to more coherence and permeability in the neighborhoods.

Table 3. Adjacency and coherence features in neighborhoods (old, middle and new fabric). Source: authors, 2017.

Fabrics	Features	Sub-criteria	Neighborhoods in photogrammetric
		Existence of overlaps	
Old fabrics	The structural coherence and neighborhood interconnection	Interactivity and interlocking of neighborhoods	
		Unity and universality	
		Neighborhoods adjacency	
		Common continuous structures	-
Old fabrics	The coherent bordering of the neighborhoods	Connection of common mass and space	
		The semantic entity of boundaries	
		Transformability of boundaries	
Middle fabrics	The remained *criteria	Neighborhoods interlocking	The continues common structures
			Coherent bordering
	The destroyed Criteria	Structural coherence	
		Objective bordering	Based on urban division
New fabrics	The substituted Criteria	Structural coherence	Cohering bordering of neighborhoods
		Separation of neighborhoods from each other	
	The destroyed criteria in the old fabrics	Contractual bordering based on municipality regulations	
		Spatial-physical units	

Coherence due to the specific permeability of a particular point within the neighborhoods (porosity): what is meant by a particular point is a specific recognized function that did not exist in other neighborhoods or had a functional radius beyond the neighborhood boundaries. For instance, the central mosque as an attractive function in the scale of the city integrated the surrounding neighborhoods.

Coherence due to interconnection: interconnection can be provided through the following factors: strong connections within the neighborhood (the lack of

factors causing discontinuity in the neighborhood, the simultaneous formation of spaces and masses, the strong connection of the grains and spaces), the perceivable neighborhood geometry, communication of spaces with each other and with the masses, and the strong neighborhood to the context.

Conclusion

The elements and components of a whole are interconnected through contrasting and completing features or through intermediating elements.

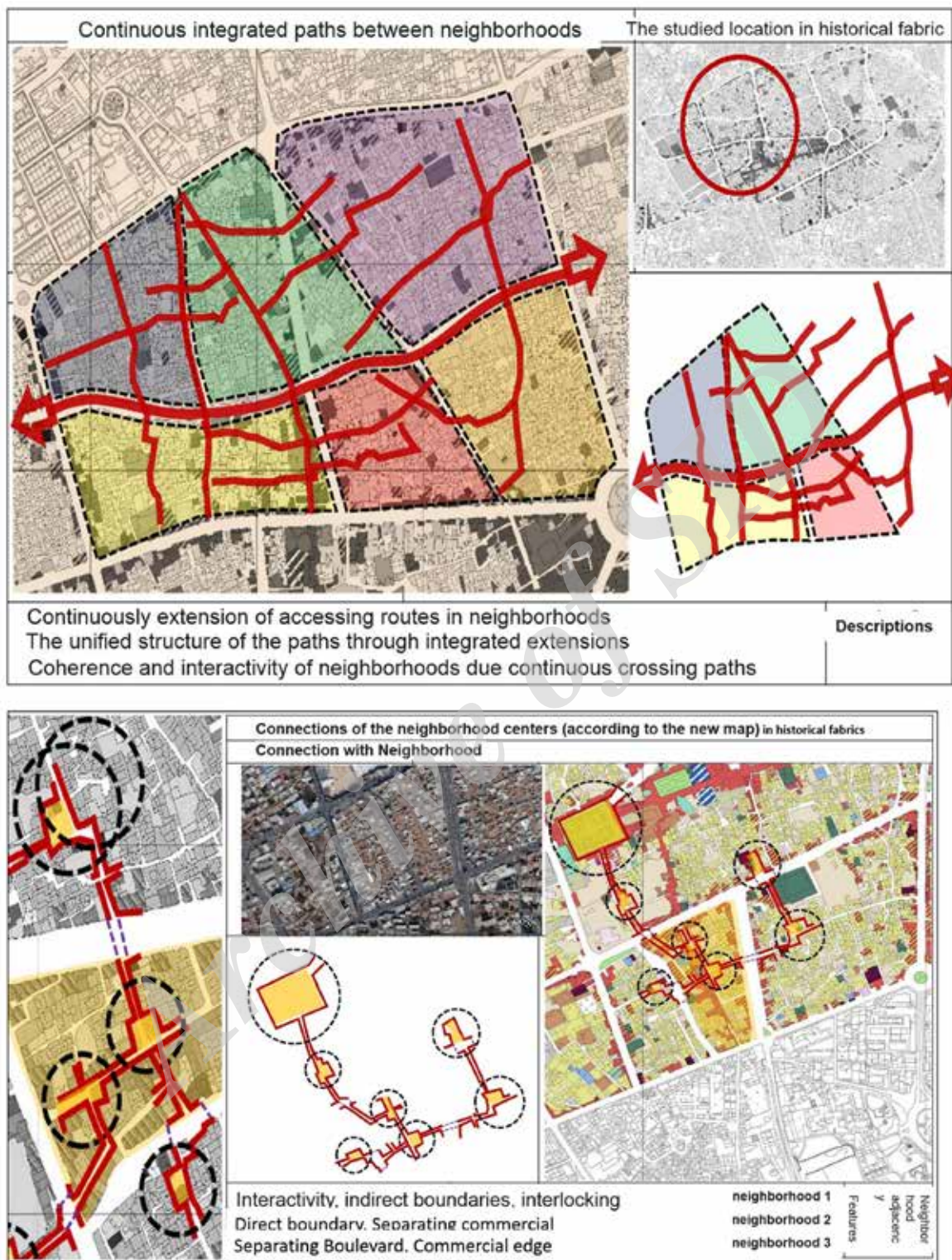


Fig. 5. The physical-functional coherence and interactivity (continuity and extension). Source: authors, 2017.

Therefore, the intermediating elements are considered highly significant not only due to their functional role, but also for relating the elements that cannot not directly interconnect. The boundaries are defined

in a lively city. They link the city regions and induce human processes that lead to formation of a successful city. These functions are all the resultant of the geometry generated by city boundaries; a complex

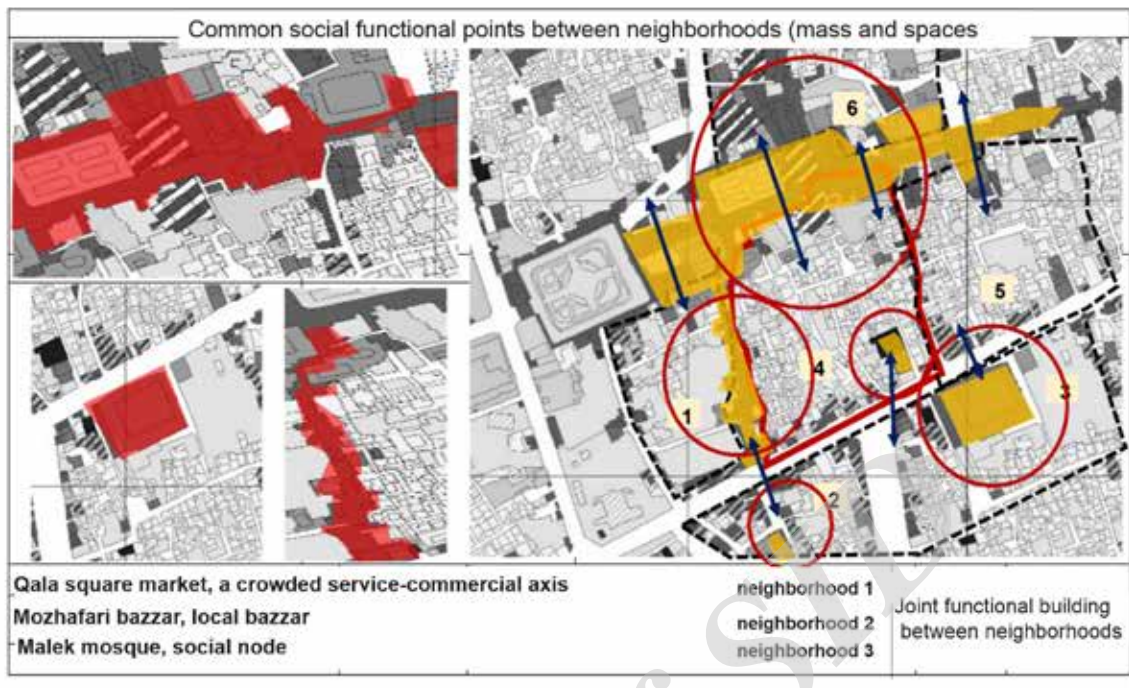


Fig. 6. The physical-functional coherence and interactivity (overlap). Source: authors, 2017.

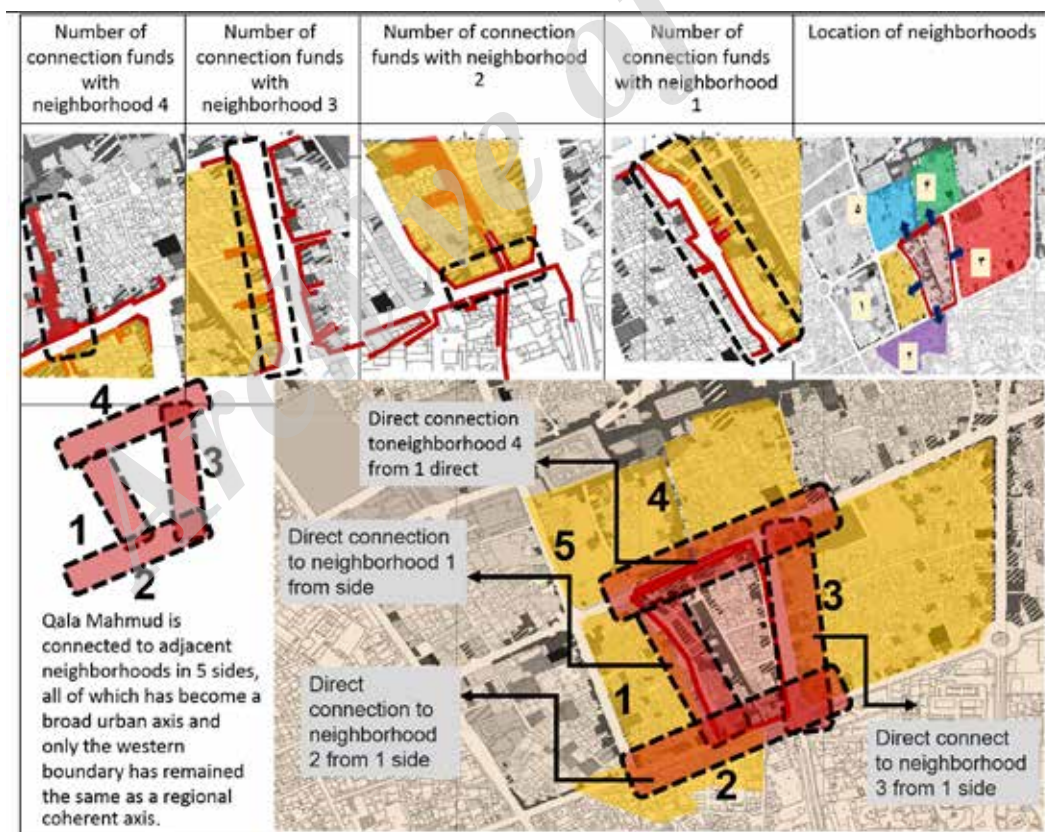


Fig. 7. The physical-functional coherence and interactivity (intervention and joining sides). Source: authors, 2017.

and permeable geometry. The neighborhoods in a holistic city are comprised of strong communicative components. Some of these neighborhoods (not necessarily all of them) are united together.

The elements and compartments of a unit should not be discrete or necessarily adjacent to one another. Communication is the main criterion which can result from the geometric continuity. Stimulating

Table 4. Coherence criteria and principles in the intermediate level, inter-neighborhood level. Source: authors, 2017.

Context	Criteria	Sub- criteria	Explanation
Physical context	Unity plurality	- unity in facades of vicinal neighborhoods -Integrity of the bordering edge -Integrity of the functional components	- Unity and plurality: applying the principles of unity and plurality in the physical principles of the neighborhoods, in a unified and yet miscellaneous façade as well as in the arrangement of the neighborhood components - Connection: Providing connection to create physical and structural relationship between the neighborhoods and their detailed components.
	connection	-connection of neighborhoods boundaries -connection of neighborhood pathways -porosity of neighborhoods edges -complexity of neighborhoods confinements -Reducing the distance between two vicinal textures	Joining the neighborhood boundaries together, as well as reducing physical distances between two fabrics to augment neighborhood connection. - Spatial diversity and contrast: The spatial diversity and contrast is discussed with respect to the neighborhood boundaries. The neighborhood edges and axis should offer distinguishable contrasting edges. designing straight paths is not acceptable -The connecting boundaries: the neighborhood boundaries should act as a joint that simultaneously attach the edges to the neighborhoods and define boundaries to detach the neighborhoods. The boundaries have significant roles in connecting neighborhoods by changing the path form and creating curved paths and openings. The connecting boundaries enable the formation of a hierarchal fractal geometry that increases mass and space connection.
	Spatial diversity and contrast	The existence of connecting and contrasting axis and space diversity of neighborhoods	-Composition principle: In fact, composition principle define the combination of mass and space along the neighborhood boundaries, which led to coherence and complexity. -Visual overlap: the neighborhood façade, the axis façade and the boundary entity should be perceived as an integrated whole in terms of visual aspects. In addition, infinite views should be reduced in neighborhood scale.
	The connecting borders	-boundaries as a joint (attaching and detaching) -Changing the direction along borders -opening the boundary space -porosity along the boundary -multilateral boundary -coherent boundary -connection of boundary edges	-permeability: physical permeability especially pedestrian access are the features that eventually lead to social communication and relation. A permeable neighborhood will induce communication. Moreover, the connecting boundaries allow connection in the fabrics by increasing access through permeable blocks - Proportion and scale principles: the adjacent fabrics that are aimed at being linked should be built in the same scale. This is possible through minimizing the scale, since large scale areas reduce permeability in fabrics
	Composition principle	The interlocking of space and mass	-Connection: two adjacent fabrics should be in a same scale. This situation can be achieved through minimizing the scale of street walls and edges.
	Visual ocerlap	- Boundary façade and landscape coherence - decreasing infinite views	
	permeability	-increasing the pedestrian access -reducing the vehicle access -increasing permeability along edging blocks	
	Proportion and scale principles	- same scale for the vicinal blocks - same scale for opposite -proportion of the blocks to the adjacent street	
	interconnection	-interconnection of the boundaries -multiplicity of common functional points in boundaries -multiplicity of connected nodes in boundaries -the low depth of neighborhoods to each other	- Interconnection: neighborhood interconnection and coherence can be achieved when the boundaries share common functional points and nodes. Moreover, the connected structure of neighborhoods can induce interconnection. - Depth: The neighborhood depths should be low to avoid physical distance and separation. The high depth is only acceptable when it is filled with hierarchical spaces.
	depth		
Structural context	Structural continuity	-the structural continuity of pedestrian or vehicle paths in the neighborhoods -the structural connection of neighborhoods	- Structural continuity: The pedestrian and vehicle paths in every neighborhood whose morphology enables the path extension to the surrounding neighborhoods will inevitably allow neighborhood connections. - Geometric interactivity and geometry: The

hierarchy	-hierarchy in diversity of space forms -hierarchy in space functions	adjacent neighborhood fabrics should have some nodes that offer geometric interconnection and interactivity. This interconnection will lead to partial physical integrity.
Geometrical overlap and interactivity	-the porous neighborhood boundaries -multilateralism of neighborhoods boundaries -Interactivity of neighborhood boundaries - connection of neighborhood edges	- Hierarchy: Modules are connected in a hierarchy from small to large. If a level or more are missed, the final coherence will not be achieved. High differences in street levels prevents their connection through hierarchy. -Interlocking of mass and space: large areas generate enormous forces along the small scaled streets that destructs the mass and space dialogue. The relationship between mass and space along the neighborhood boundaries should lead to creation of a distinct space between the masses. This interlocking of mass and space should be achieved by utilizing complexity.
Module dependency	-dependency of small and large modules in significant paths -dependency of small and large functional components in neighborhoods	- Multiplicity of overlaps: When the neighborhood boundaries have common nodes and points that increase interconnection, higher degrees of coherence will be attained.
The coherence of space and mass	-a diverse and complex composition of mass and bordering spaces -increasing the diversity of mass and space in boundaries	Connectivity: When neighborhoods are connected by larger number of sides, the connectivity rates increase. The connection between neighborhoods also plays a vital role in increasing coherence and connectivity.
Numbers of overlap	The existence of area for association in neighborhood overlaps	-Dependence: If a street detaches two fabrics (modules) with the same scale, the larger module will not be formed since connectivity is lost in smaller scales.
connections	- multiplicity of connecting neighborhood sides -multilateral boundaries -the structural connection of neighborhoods centers	- Increasing functional diversity on the ground level and offering complementary functions on opposite sides of the street will increase the movements across the street, so that intermediating functions act as a connector between two other functions.
Functional connection and relation	-same functions - Complement and conflicting functions	
The existence of common function among neighborhoods	-the common associated functions -the existence of associated spaces in the boundaries	

communications between different urban units in major urban plans is highly accentuated since it leads to formation of coherent neighborhood and cities. In general, the need to consider the principles of totality and coherence in main metropolitan plans, such as comprehensive and detailed plans, can be a step towards creating an integrated combination of interrelated and coherent neighborhoods (Table 4).

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