Int. J. Architect. Eng. Urban Plan, 27(2): 127-136, December 2017
DOI: 10.22068/ijaup.27.2.127

Research Paper

Presenting a Conceptual Model for Integrating Urban Space Network with "Living Community" Approach

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Received: 21 May 2015, Revised: 6 December 2016, Accepted: 22 October 2017, Available online: 30 December 2017

Abstract

Undoubtedly, public spaces can be considered as an essential factor, which could contribute to urban arrangement, create and maintain a strong local center and enhance the quality of superior environment and the sense of citizenship. Moreover, integrity has always been the most basic structural qualities and one of the key principles of cities. Integrated urban spaces exhibit the integrated structure of spatial organization in a city where, not only conjunction and space functions are considered, but also identity finds its place in the complex urban system. Therefore, the processes of planning, designing and construction of urban spaces could be helpful for solving structural problems in urban models such as lack of integrity in cities and their spatial analysis. The main purpose of this study is to present a conceptual model of an integrated network for urban spaces in the process of decision-making. Undoubtedly, such networks that strengthen the structure and integrity of a city bring about socio-economic growth and prosperity for inhabitants. Therefore, this study seeks to propose a conceptual model for developing integrated urban spaces network. The main research methods are content analysis and inductive reasoning. The main approach adopted in the analysis and design is that of "living community" in New Urbanism movement. The results reveal that urban spaces are located in a logic network as transects, and to achieve spatial integrity, the continuity of transverse parts of the city must be maintained, as provided in the form of a continuity matrix.

Keywords: *Urban spaces, Network logic, Spatial integrity, Urban transect, Living community.*

1. INTRODUCTION

There is a growing and expanding body to literature on the concept of urban space as a structural element in the cities. Many authors have undertaken extensive studies in this area, with the results indicating that urban areas play a key role in the urban structure and life of its inhabitants, and have a significant effect on promoting urban integrity. Public spaces are crucial elements with the ability to increase cohesion and urban systems, foster natural ability to create and maintain a strong local centrality, improve the quality of superior environment and economic competitiveness and enhance the sense of citizenship. Hence, special attention has to be paid to processes of planning, designing and construction of urban spaces as a way of finding an effective solution to solve structural problems in urban patterns including the lack of urban integrity that contains a spatial analysis.

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2. STATEMENT OF THE PROBLEM

A study of the current situation of most major cities in developing countries suggests that the quality of urban spaces, despite its pivotal role in city life, is still overlooked by many experts. Topical projects in public spaces are often focused on a single space and aim at beautifying the appearance and improving pedestrian traffic areas [1]. In another study, neglected issues such as the transformation of space structure tailored to the functional demands at the level of urban system, spatial integrity, spatial distribution in proportion to the functional scale and urban hierarchy at micro and macro scales, the integrity of relationship between spaces, as opposed to a single space, in the process of planning and urban design of most major cities are addressed. It has raised issues such as lack of efficiency, merely communicative role, spatial discontinuity, isolation and separate space design, and exclusive use of space. On the other hand, Rafieian and Syfayy argue that these spaces, as the hub of public places, should be appropriate in terms of functionality and possess distinctive features compared to

other urban spaces [2]. The position of urban areas at different levels of decision-making is still unclear and the lack of an appropriate theoretical basis regarding the planning and design of coherent and continuous spaces have contributed to the inefficacy of the current design of urban spaces. These issues highlight the importance of developing an integrated network of urban areas in this research. A continuous network of urban spaces shows the coherent structure of a city context, which not only is concerned with the form and function of spaces, but also seeks to find its place in a complex urban system. Such a network design and urban planning will result in socio-economic growth and prosperity due to consolidation of city. Carmona [3] studied the formation of public spaces in London over different periods. In his view, the context, process and power exhibit an integrated framework of public spaces in different time periods that have influenced its formation. Carmona argues that to create cohesion in urban areas, setting criteria should be placed in a logic network [4]. Trancik introduced the integrity of urban spaces in form of an integrated network as one of the three principles of urban design. Urban Living Community is one of the new approaches that pay special attention to the design of urban spaces that are attractive to people [5]. The intellectual foundations of modern urbanism are based on metropolitans, towns and in the urban design [6]. In this paper, using the above approach, a fundamental research according to the most recent theoretical developments in the world is undertaken. The main question is how to create an integrated network of urban spaces. The aim of this paper is to introduce components that affect the formation of urban spaces and provide a model of integrity.

3. METHOD

This is a qualitative study with a theoretical background. To serve its purpose, it is categorized into fundamental and applied research and the interpretative approach is adopted. The research is exploratory - explanatory in its decision-making process and the context analysis provides the main method of creating intellectual foundations of the research. In the following table, the ssphere, approach and method of research are shown Table 1.

Table 1 Chart of methodology

Sphere	Approach	Method	Technique	Procedure
Theoretical	Interpretative	Meta-analysis Comparative analysis	Context analysis	Taking notes

4. THEORETICAL STUDIES AND BASIC ANALYSIS

In this part of the study, the theoretical assumptions including urban areas, spatial integrity, and integration of urban are evaluated from the perspective of different theorists, concluding with the evaluation and analysis of the discussion.

4.1. Integrated urban spaces

According to John Lang [7] all definitions of urban design deal with public realm and its constituents. Madanipur [8] defines urban design as the relationship between buildings, and how they are related to streets, squares, parks, waterways and other spaces that constitute the public domain and movement patterns and activities, which summarizes the complex relationships between elements of built and non-built spaces. Urban space is made of two main parts, form and content. The form refers to its structure and the content represents the social life and what happens within it [9]. Richard Rogers posits that urban spaces are streets, squares and other routes that people have the right to pass through them as well as other spaces with free access intended to connect with new people [10]. Jahan Shah Pakzad, divids urban spaces into 5 categories: Entry, Squares, Gate-pathways, Water's edge and stairs [11]. Trancik in his book “Three theories of urban spaces” postulates that the network of streets and squares is the most important urban spaces [12]. Bahraini regard streets, squares and parks as major urban areas in a city. He writes, “These dynamic spaces, as opposed to fixed and sedentary work space constitute major and vital components of the city and provide motion systems, communication centers and public recreational spaces in the city [13].” In another study, public open spaces (With emphasis on private development) are classified into five categories and the physical characteristics of each are listed. In another study, [14] it is concluded that the term public space is a cluster concepts that incorporate multiple definitions of interaction. He identifies three concepts that should be distinguished between these spaces, including ownership, access and inter subjectivity, noting that a particular category of this group would be difficult. Based on the views of Matthew Cremona regarding categories of public spaces, this new typology uses functional aspects, cognitive and ownership to distinguish different types of spaces. Identified urban areas are placed in 4 groups which cover a continuous range of public to private spaces [15]. Public space is a mixture of the physical milieu with various activities whose purpose is to demonstrate the social life visible for all [16]. In a recent study, Jonathan Barnett stated that, “Theories of the urban design based on urban spaces studies are shallow.” To enrich the theoretical foundations, attempts have been made to include special case conditions in the research. Table 2 shows urban spaces classification proposed by different theorists.

4.2. New urbanism and living community approach

New Urbanism approach is aimed at criticizing modern urbanization and the associated problems caused by the urban humanist approach against Car-oriented urbanism. Today, this approach is has been used for guidance and

leadership of the post-modern generation of planners and designers. Live community is one of the latest approaches that focuses on the important role of human beings in urban areas [17]. In this approach, systematic and continuous system of the metropolitan (area) at the micro units (and buildings blocks) are introduced. In this integrated system, urban areas are defined relative to with each other and other urban elements. The introduced cross-section is a system of classifying urban design components that is used for coordinating changes in perception of the urban and organizing an effective system in this area (country to city). Cross-section is a system of natural order so that each urban element has a special place in this chain. [18]. This process involves logical segmentation, which is presented as cross-section, and is considered as basis of public zoning system [19]. The categories of rural to urban areas are: rural, suburban, public city, urban center and urban core, respectively [20] In the "living community" approach in the New Urbanism, the duality of Humanistic Design vs. Car-oriented design is a key principle of planning and designing that preserve continuity of public transport routes, cycling and walking in different transects of the city.

4.3 Network logic

It is argued that public spaces should be planned and designed as a systemic network, i.e. as elements of a large system like a city, where they develop relations of complementarity and interdependency. The concept of network is not new, and several authors have already applied it to different scientific fields. It is believed that this concept is originated in the continuous model where strings and knots are attached. In the urban context, “knots” are generally associated with urban elements (facilities, services, buildings, etc.) and “strings” are linked to the road network, through which flows circulate (e.g. roads, railroads, pedestrian, etc.) [21]. However, upon a closer scrutiny, the urban network can be understood from two dimensions: (1) a physical-formal dimension, which consider various urban elements as well as their links and relations, and (2) a formal-functional dimension, which represent the population as the user of urban functions and their relations / interactions. These two dimensions cannot be adopted separately, as there is a strong overlapping between them, and they forge important relations with the social-cultural network of the city [22]. In this study, it is contended that a network of public spaces is not merely composed of isolated spaces (a square, a garden, a street, etc.), and the links between various public spaces and their complementary relations should be considered. It is association and overlapping of these relations that influence how people perceive and experiences the spaces and how they move within the cities. It can be maintained that programming, planning and designing public spaces based on the systemic network logic is underlined by a “top down, as opposed to “bottom-up”, approaches, since the starting point of this method is diminishing urban scale into public space scale. It is this kind of approach that allows promoting territorial cohesion of urban space, where the planning of public spaces network is one of the main tools. By understanding the characteristics of the network of urban public spaces, it is possible to improve the relations of continuity and complementarity between spaces, generate regenerative social dynamics or even create dynamic functional logics. It is important to note that planning and designing public spaces, as part of a urban network, provides the opportunity to not only restructure the existing spaces but also develop new public spaces in the expanded urban areas (especially relevant in new developing areas) so that they can create cohesive cities and promote urban sustainability [23].

4.4. Integration and connectivity

A study by the Venezuelan Ministry of Environment reported that cohesion and hierarchy of streets is necessary to strengthen the integrity of urban spaces. In this study, it was stated that interconnected street system presented several options to the public. That is, roads and streets connected to in a proper network rather than dead-end streets facilitated commute for all children, adolescents, adults and older people in the surrounding areas, thereby fostering the integrity of community and non-separate areas [24]. Habibi and Alizadeh consider spatial character and sense of place as the main elements of integrity, introducing it as a factor for creating historical association [25]. Transic categorizes views of the pioneers of urban design into three theories. According to the second of theory, connection or integration is based on a linear combination with an element joining another element. Here, the line refers to the street, sidewalk or open space. Here, the debate is over creating a system of connections and spaces and their linking elements [26].

4.5. Open space systems: hierarchies

Spaces are connected to provide wider corridors that allow the movement of air masses in a similar manner. According to the views of urban users about urban spaces, spaces are connected and networked to provide safer mobility and easier access to each open space based on their integrated nature to an overall network. In this study, green spaces, gardens and public parks are proposed as important urban spaces that their hierarchical connection to the communication space enables air transfer to high-density urban centers [5].

The results of debates about theoretical principles and different theories discussed above are summarized in the following table, Table 2.

Table 2 Theorists, evaluation and criticism of urban spaces integration theories

Indicators related to the nature of integration	Criticism and assessment of theories about cohesiveness and integration of urban spaces	Type of space	Theorist
The combination of static and dynamic spaces in view of the performance scale and hierarchy	Rogers refers to the network that is formed based on a combination of urban nodes and communication spaces that connect them to each other. The components of this network, during their movement, have different hierarchies according to their performance scale.	Avenue Square Other public spaces	Rogers
Connected street patterns, the integration of bike and pedestrian path with each other and with the hierarchy of new communication links	The emphasis on constructive relations between buildings, roads and open spaces; in other words, integration of design in a single scale and urban design as a factor of stability. Constructive relationships between buildings, roads and open spaces have been emphasized in this study.	Parks-gardens and other green spaces Roads and other transport routes Open residential spaces and residential landscape Historic open spaces Water routes Outdoor spaces in relation to the building - Suburb	Ministry for the Environment Manatu
Public green spaces, public parks associated with the road network to create air corridors	In this theory, the logical relationship between different types of urban open spaces is considered. The integrity of urban green spaces and other urban civic spaces leads to environmental sustainability.	Public parks, playgrounds, squares and mansions-Open social spaces-commemorative monument Green ways and parking paths Domestic commerce store / molded spaces / common regular spaces Beaches and docks	Car et al
Communication of public spaces through special path like bike - walking - resorts - linear routes	In his view, definition refers a system of created from the integration and binding of spaces which eventually is transformed into a structure, Where movement and performance are desired and activities are linked.	Road network Square	Transic
The introduction of urban open spaces to positive-negative-vague- and private spaces	Cremona introduced a continuous string of fully public open spaces to completely private open spaces in 4 main categories and 20 sub-categories. According to him, 20 introduced sub-ccategories covers total positive and negative urban spaces.	Urban spaces, natural / unnatural - civic spaces-public open spaces-service space- motor spaces-abandoned spaces-undefined spaces-exchange space-private space-public-observable space-internal public spaces-retail spaces-third place spaces-the "public" private space-interface spaces-private visible space-user selection space-open private space-external private spaces- internal private space	Cremona
Communication urban spaces on an integrated network	According to this research, urban space integrity only makes sense as a network, which is consists of two dimensions :(1) a physical dimension that considers various urban elements together with their connections and relations (2) the function dimension, which considers the target population as users of different parts of the city and created relationships or interactions.	Green rural areas Green Urban areas Squares Roads and major passageways Sub roads	Ana Júlia
Connections-hierarchy-spatial variation in the total composition	What the theory presents of integrated urban spaces is attention to the order, hierarchy and spatial variation in the composition of spaces that lead to the formation of the network.	Parks, boulevards, street-market-entrances-square-play ground	Hepcan et al
Continuity of public transport-bike-walk in all urban transect	Special attention to the TOD, taking into account the humanist continuous routes Maintaining the integrity of public transport and continuity in all urban transects The definition of public spaces in each section and its relation with the space proportional to the dimension of other section scale	In the suburbs (abandoned areas, farm, green belt, green path, grass (meadow)- In the neighborhood (playgrounds, Squares, Plaza, community gardens, communal gardens In blocks (indoor, garden, square space, playground) In pieces of land (garden kitchen, terrace, courtyard) In the building (porch, roof gardens (green roofs))	New Urbanism "approach"

5. RESULTS AND DISCUSSION

5.1. Developing a theoretical framework and conceptual model

Based on the analysis of above theories about urban cohesion and urban spaces integrity, the conceptual model of integrated urban spaces network was proposed. The model was derived from the theories related to the integration of urban spaces.as discussed earlier. According to Alexander theory, models could be responsive to design problems, although any scheme can employ a solution only once [27]. The model includes two levels. The first level, i.e. the main field, into which the spaces network is set, is in direct interaction with the other level.

Level 1: Operating system

Normally, the entire decision-making system is covered at this level in the process of planning and designing. According to the Gestalt theory and also Fractal formula, the complex whole is derived from decision-making process in the original structure. A complex and integrated whole consists of integral, interactive and joined components and their interrelations with the environment. A whole is a steady flow which is gradually formed or changed to maintain its compatibility with the environment; moreover, it is ruled at any level of complexity [28] which creates the conceptual network . According to the theories of spatial integrity discussed in the previous section, streams and nodes would be the product of this network, the basic integrity of which would be obtained through the intersection and interaction [29].

Generally, different urban units are combined by means of intersections or boundary elements and components. In fact, the interfaces, rather than internal elements and components, are responsible for communication between different units. These elements are able to move freely and communicate with each other through intersections [30]. According to this rule, boundary elements of one module are related to elements of another module with some components being connected like pieces of a puzzle. Moreover, contradictions may lead to the connection of elements. In some cases, a third factor is required for binding. The success of an urban space depends on the physical and visual connections of the person who walks in the surrounding areas. It is possible to obtain the desirable borders of an urban space, provided that proper visual principles derived from the basis of geometry are considered and these principles find their way to the second level [31]. The interplay of these phenomena is the result of geometry interplay and their functions. This action depends on the information on shape, texture, pattern, color and detail of their elements, which are placed in the second level like an intersection. The interaction between flows and nodes helps detect lost and damaged areas. Finally, to maintain its integrity and reinforce, the spaces are guided to the first step, which is the decision-making process, in a cyclic process to be modified.

Level 2: Urban spaces and their features

This level introduces the urban space. The urban space covers two spheres: index, content and structure (form). According to Barnett, it is important that each space is defined according to its environmental characteristics [15]. The Space includes subsections such as socialization, time, functional and identity [32]. The importance of this subject is that when the integrity of urban space is achieved when each of these spheres are in a logical relation with other spheres and integrity with the entire complexity (urban space on a certain scale) is established. On the other hand, every space is set in the network logic along with other urban spaces and the integrity is maintained at its full complexity at the city scale.

The network is scheduled to shape complex wholes and integrate space components with any urban space at the First Level operating system, which generally form the intellectual base of system.

5.2. The proposed conceptual model

The characteristics of urban space such as socialization, identity, physical properties were gathered through indicators of integrity in an urban system. The above discussion can be summed up as a conceptual model Fig. 1.

The proposed model shows the levels of decision - making and decision-taking in the spatial integrity. To shed further light on the model, integration matrix is presented. In this matrix the position of urban spaces in each transects is determined. The following figure shows the position of spaces in any transect Fig. 2.

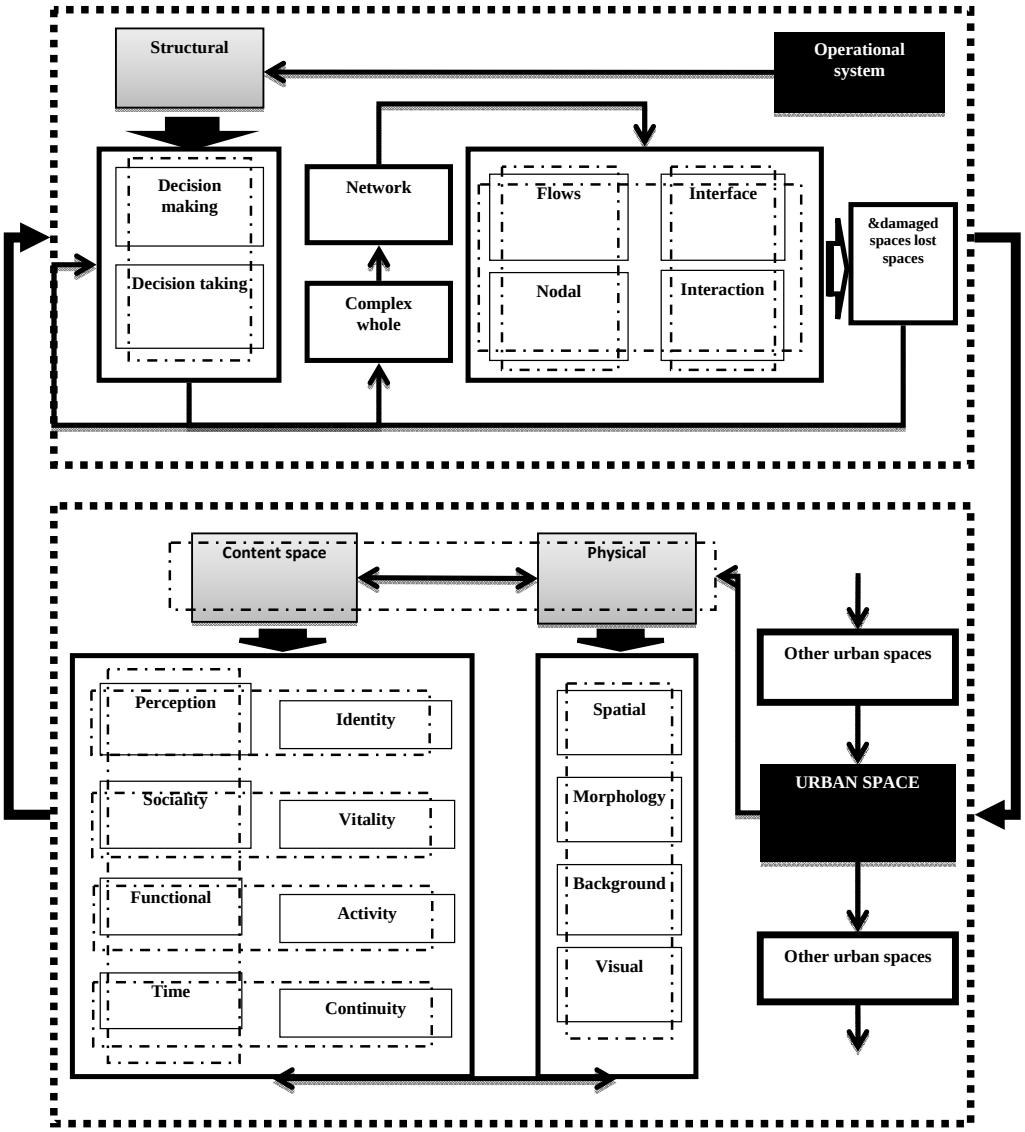


Fig. 1 The proposed conceptual model

5.3. Presentation of integration matrix

According to the above subjects and the table below, theorists have proposed various theories of urban spaces integrity Table 2. What can be gathered from all of these theories regarding how to achieve urban spaces integrity is that this feature is only realized in a systematic, urban integrated network. To create integrated networks, urban areas at different scales, from neighborhoods to the larger scale, should be introduced hierarchically and connected logically to each other. According to the following table, Cremona conducted a research that introduced full coverage of open spaces, including positive, negative, private and vague spaces. In other theories, public green spaces, public parks and public gardens are also considered as urban spaces, as creating environmental sustainability in cities should be directly associated with other static and dynamic urban areas [33]. On the other hand, he introduces new urbanization of the city in various sections, with each section being categorized in different urban spaces [19]. By combing the above theories and approaches regarding the new urbanization of integrity and cohesiveness index, a matrix can be achieved, which introduces urban areas at different scales of the city Fig. 4. The "living community" approach in the New Urbanism, emphasizes the positive urban spaces, including natural urban spaces, public open spaces, and civic spaces and sharing spaces as nodes in the network [34]. In this approach, walkability and livability of the neighborhood and creation of a friendly environment for pedestrians is of paramount importance [35] . This approach emphasizes on the TOD theory, according to which public transport is introduced as the main urban transit with the cycling and walking paths network playing a complementary role. In this approach, rails bus stations and intersections are exchange points of public spaces network. Carmona [36] also refers to the above cases as urban open spaces.

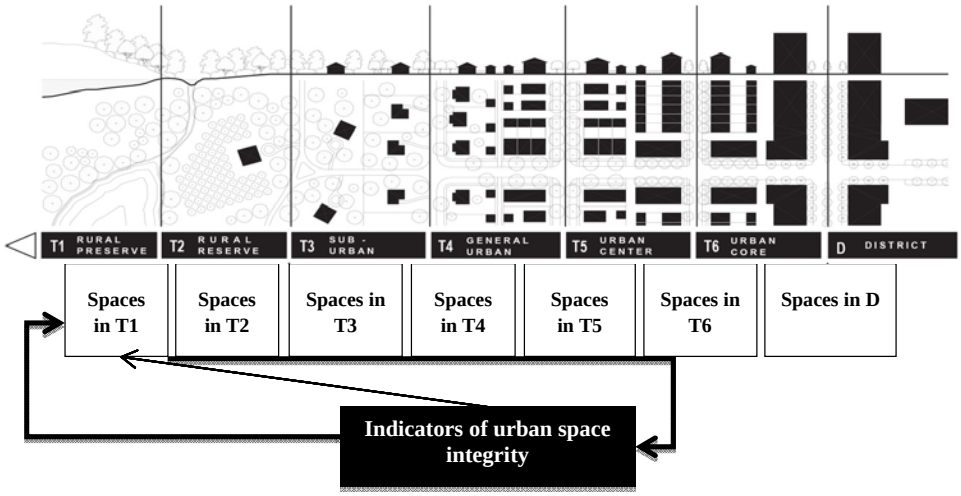
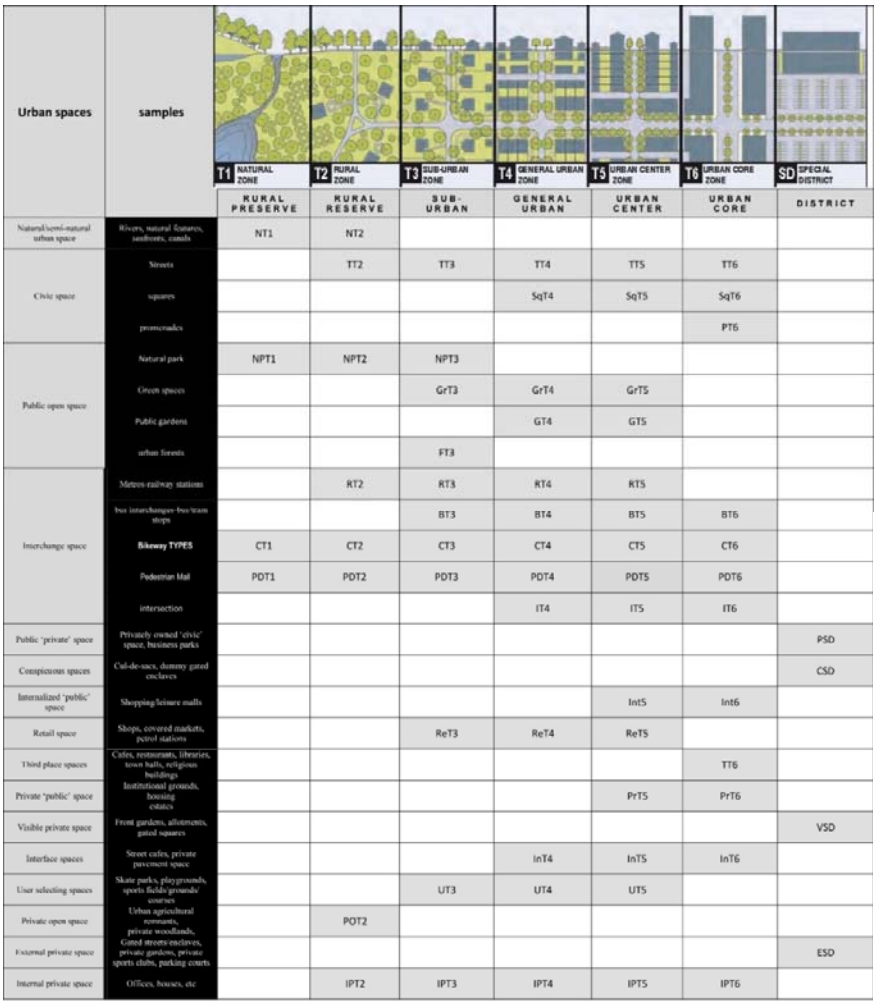


Fig. 2 Position of urban spaces in any transect



Urban spaces	samples	T1 NATURAL ZONE	T2 RURAL ZONE	T3 SUB-URBAN ZONE	T4 GENERAL URBAN ZONE	T5 URBAN CENTER ZONE	T6 URBAN CORE ZONE	SD SPECIAL DISTRICT
		RURAL PRESERVE	RURAL RESERVE	SUB-URBAN	GENERAL URBAN	URBAN CENTER	URBAN CORE	DISTRICT
Natural/semi-natural urban space	Rivers, natural features, seafronts, canals	NT1	NT2					
Civic space	Streets		TT2	TT3	TT4	TT5	TT6	
	squares				SqT4	SqT5	SqT6	
	promenades						PT6	
Public open space	Natural park	NPT1	NPT2	NPT3				
	Green spaces			GrT3	GrT4	GrT5		
	Public gardens				GT4	GT5		
	urban forests			FT3				
Interchange space	Metros-railway stations		RT2	RT3	RT4	RT5		
	bus interchanges-bus/tram stops			BT3	BT4	BT5	BT6	
	Bikeway TYPES	CT1	CT2	CT3	CT4	CT5	CT6	
	Pedestrian Mal	PDT1	PDT2	PDT3	PDT4	PDT5	PDT6	
	intersection				IT4	IT5	IT6	
Public 'private' space	Privately owned 'civic' space, business parks							PSD
Conspicuous spaces	Cul-de-sacs, dummy gated enclaves							CSD
Internalized 'public' space	Shopping/leisure malls					Int5	Int6	
Retail space	Shops, covered markets, petrol stations			ReT3	ReT4	ReT5		
Third place spaces	Cafes, restaurants, libraries, town halls, religious buildings						TT6	
Private 'public' space	Institutional grounds, housing estates					PrT5	PrT6	
Visible private space	Front gardens, allotments, gated squares							VSD
Interface spaces	Street cafes, private pavement space				InT4	InT5	InT6	
User selecting spaces	Skate parks, playgrounds, sports fields/grounds/ courses			UT3	UT4	UT5		
Private open space	Urban agricultural remnants, private woodlands,		POT2					
External private space	Gated streets-enclaves, private gardens, private sports clubs, parking courts							ESD
Internal private space	Offices, houses, etc		IPT2	IPT3	IPT4	IPT5	IPT6	

Fig. 3 Urban spaces communication in urban transect

After determining the location of urban spaces at each transect of city Fig. 3, the connection of spaces with each other is shown in the integration matrix Fig. 4.

This matrix determines which type of urban spaces is directly and indirectly connected to each other Fig. 4.

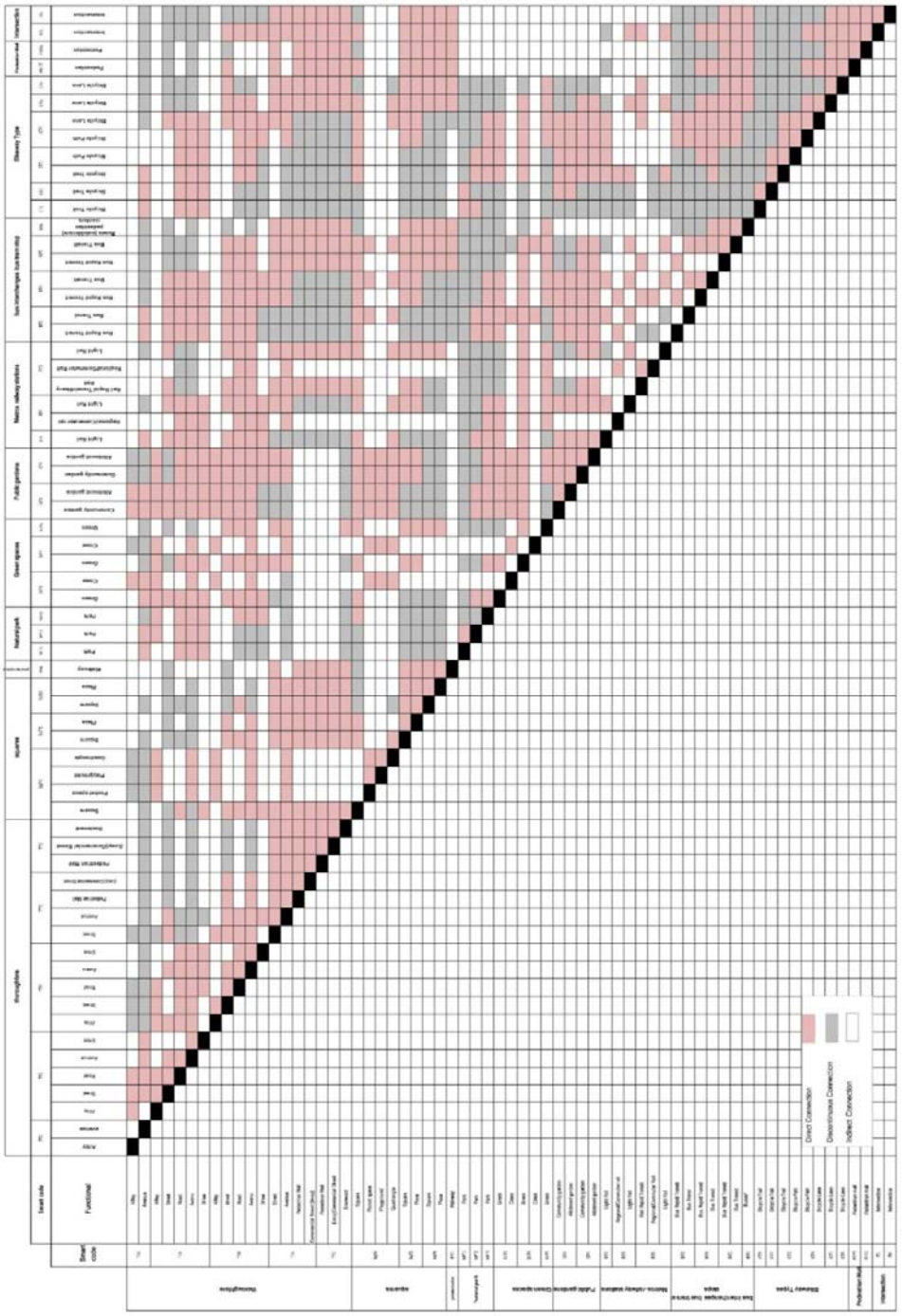


Fig. 4 Matrix of the conceptual pattern of an integrated network of urban spaces

6. CONCLUSIONS

In this study, urban spaces, urban spaces network and integrated urban spaces network were discussed. To create spatial integrity, living community approach has been employed in New Urbanism movement, which requires the integration and continuity of urban spaces in different transects of the city. Living community approach has a special emphasis on Humanistic Design versus Car-oriented design. In this approach, a continuous network of public transport and exchange points creates a fertile ground for fostering cohesion of urban spaces.

In the "living community" approach, maintaining pedestrian-oriented communication with the riding is considered in an attempt to create integrity, in the urban spaces network, between pause spaces such as squares and parks through passageways. Here, rails, buses, pedestrians and bicycle network are the main means of communication and the intersections in the central section, and transit stations act as the main nodes and exchange points in all

sections. In the New Urbanism approach, each space has its own locations, which are hierarchically connected to each other. Fig. 4 shows interactive communication between all spaces in different sections of the city. This matrix presents spaces and how they directly and indirectly communicate with each other.

The major macro and micro achievements of this study are as follows:

1. Introducing determinants of integrity in urban space from the perspective of different theorists and incorporating it into the continuous network presented in the New Urbanism approach
2. Determining the contiguous position of urban space in different transects of the city in form of Matrix 4 in the process of decision-making and drafting urban plan
3. Presenting a model for the conceptual integrated network of urban space in Figs. 2-3 as a guideline for the planning process.

This will yield the following results:

- Considering the spatial continuity between different transects of the city makes background cohesion necessary, and provides an integrated network platform for the creation of a legible city.
- Official continuity of the inner city network (road network, pedestrian network, rail network, cycling, etc.) is necessary for any kind of cohesion. According to living community approach, network connection must be established by the public transport. These stations are urban spaces that serve as nodes in the logic network.
- Improved continuity of the important natural structures and ecological corridors (coastlines, extensive green areas, etc.) creates a larger interconnected network of corridors that allow movement of air masses, On the other hand, interconnected and networked spaces provide safer mobility and easier access to any open space, which are naturally connected to a general network. In this logic network, natural parks, public gardens and urban green spaces are directly connected to the road network and their squares.

The current research represents an effort to make decision for developing a conceptual model. The indicators of the proposed model are placed in the context of city and related to each other. Proposing distinct design, especially in physical-space dimensions for each space indicator in the future research can help resolve many urban problems.

NOTE

1. The current article is developed from the dissertation of Parisa Roshani with the advice of Kyoumars Habibi and supervision of Zahra Sadat Saeideh Zarabadi, professor of the Department of Art and Architecture, Islamic Azad University, Science and Research Branch, , titled " Presenting a conceptual model to integrate urban space network with the living community approach".

CONFLICT OF INTEREST

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

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HOW TO CITE THIS ARTICLE
P. Roshani., K. Habibi., Z.S.S. Zarabadi., (2017). Presenting a conceptual model for integrating urban space network with "living community" approach. Int. J. Architect. Eng. Urban Plan, 27(2): 127-136, December 2017.

URL: http://ijaup.iust.ac.ir/article-1-207-en.html