XXVIII International Seminar on Urban Form
ISUF2021: URBAN FORM AND THE SUSTAINABLE AND PROSPEROUS CITIES
29th June – 3rd July 2021, Glasgow

The effect of new urban design action on promoting the public space vitality in the inner city

Mr. Momen Foadmarashi[1], Prof. Dr. Francisco Serdoura[2]

[1] DUA Lab, CiAUD, Lisbon School of Architecture, Universidade de Lisboa, Portugal

[2] DUA Lab, CiAUD, Lisbon School of Architecture, Universidade de Lisboa, Portugal

Abstract

The pedestrian movement across the public space is a key factor to investigate the increasing capability of growth of public space vitality, its interaction between people, land uses and economic activities in the inner city as a compact urban area. Vitality of the public space is based on how friendly and attractive an area is to walk; has an important role in Persian culture through the time and it reaches to highly importance when the social interfaces in the inner city mostly take place in spaces like Bazaar. For the Persian urban society, Bazaar is a place formed by covered and uncovered spaces work as a centre where public life transpires because of social-cultural and economic interactions.

The Urmia Bazaar had played this substantial role as a place for daily/weekly interaction between different socioeconomic classes for centuries since the city was inside walls and through the new modernizations changes in inner city following the growth in 20th century. New urban planning movements in the beginning of last century following the rapid growth of the city and changes in the urban fabric of the inner city affect the uses of public space in both covered and uncovered spaces.

This study tries to develop on one hand, comparing the pedestrian mobility based on the proportion of urban natural movement resulted by the urban network configuration as Hillier et al (1993) defined. On the other hand, it studies different periods of the inner city, surrounded by wall and after of the new changes in the layout of the city to analyses how these changes affects the pedestrian movement and the liveliness increase the vitality of the Bazaar and the surroundings public spaces. It allows to understand how new urban configuration affects the soft mobility and the vitality of the public space.

Keyword: *Public Space, Urban Form, Urmia Bazaar, Vitality, Space Syntax*

Introduction

Cities as a concentration of the power and culture (Mumford, 1961) constructed by regularities and irregularities (Alexander, 2002). It is noticeable that the city as a dynamic system is always under changes in the city network as a coherent hierarchy and further down new effects and alterations but with complexity tails during the time (Salingaros, 2014; *Krier, 1993*). and impressed a reach correlation between the city configuration and the use of the space (Gehl, 2011; Hillier, 1996). Also the fact has been accepted that any changes in the street network reorganize/alter the identity/characteristics of the spaces mostly in the city public spaces (Ghalehnoee, et al., 2020; Tibbalds, 2000).

Urmia as the capital of the West Azarbaijan located close to Urmia Lake in northwest of Iran, is one of the longstanding cities in the region (figure 1). Now it has more than 750 thousand of population. The

city has its story started more than 4000 years ago. like most of the old cities it is rooted more organic centric. But the new modernization movements of the 20th century brought about new imposed transformation/changes of the inner city and later growth, development in the city configuration/form.

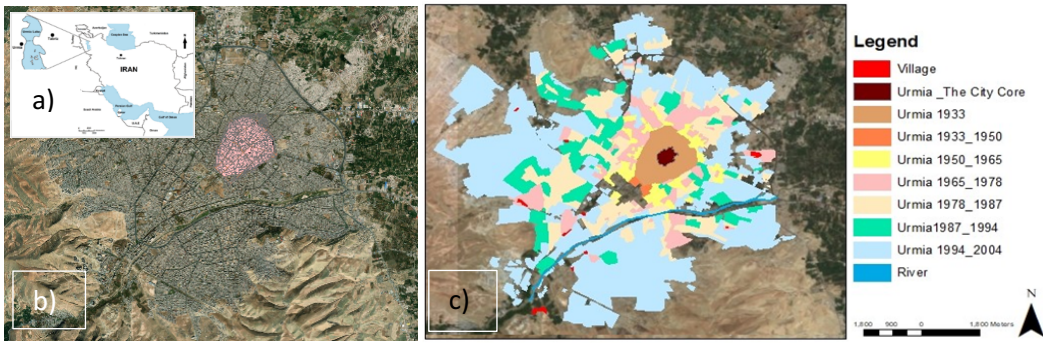


Figure 1. *Location of Urmia in Iran(a), Location of the inner city at present(b) and Urmia city through the History (Foadmarashi, 2018)*

Literature framework

It is believed that the city is a system of movements in different directions which is not only the form can be seen in bird view or landscape perspective (Bacon, 1976; Hillier, 1996). On the other word as Jacob (1961) stressed the more use of the city space has a well correlation with the city grid or urban form. Truly, it shows that the urban designers has to be aware of the space rather than form (Seamon, 1994).

Streets as the main spatial connector of the city spaces considering the hierarchy of the network in different levels of the city from neighbourhoods to city level in old cities (Tavassoli, 2016). Many scholars confess the importance of the streets with high reputation parameters in the city construction, shape, form and more usable public spaces of the city; considering their share in the city, use and role as connectors of other urban spaces and as the socio-economic-cultural representation scene of the city activities (Ghalehnoee, et al., 2020). Following this, the main roots of Bazaar and or the main street of the city is the most usable/integrated pass of the city which helps to define coherence, integration and connecting of different neighbourhoods in the inner city (Ghalehnoee, et al., 2020; Porta & Latora, 2007; Tavassoli, 2016).

It was confirmed by Hillier (1996, 1993, 1984) Gehl (2011), Jacob (1961); more connections announce more dynamic in the streets and there is relation between human behaviours and public-space/urban-form transformation in the city (FoadMarashi & Serdoura, 2021; Hillier, et al., 2015; Madanipour, et al., 2014; Gehl, 2011; Hillier & Hanson, 1984). Indeed, more attraction for retail shops and it also has a reflection on inviting more users to the streets. This phenomenon read easily in old fabrics mostly

in Bazaars as one the important and ongoing example of the Iranian urban structure (Ghalenoee, et al., 2020; Soltanzadeh, 2011) and usually happened in the main roots and mostly direct passes. Raasteh Bazaar as the main pass of bazaar - despite of being covered or not- has the same role in the inner city in old Iranian cities. Having small connections and pedestrian pass which is more interact as active social space for connecting different parts of the city, is very outstanding point in old Iranian cities (Soltanzadeh, 2011; Tavassoli, 2016). Undeniably, any changes in the layout can affect all the characteristic of the neighbourhood such as vitality and social interactions and subsequently city network integration and/or coherence.

Research Methodology and case study

This study based on the descriptive analytical research tries to find out the link between urban transformation considering the changes in layout of the city through the time and vitality of the space. It is stayed by the spatial analysis verified by the space syntax methodology as linear representation of the inner city of Urmia in two different periods before and after falling the city wall between 1928 and 1948 on the map prepared by the Iranian army. Maps were built and geo-referenced in ArcGIS and AutoCAD. Some editing applied by using Google Earth with support of historical documentaries for representation of the city inside the wall. The ultimate representation was processed in Depthmap X, version 0.80.

Following the scale of the study, which is the whole city of Urmia, global topological measures of the space syntax were applied. Also, angular segment analysis (ASA) was used for deeper study of the inner city mostly, the city core in the period was analysed. “Integration” as a potential of the announcement of the social/pedestrian movement in the network and as the normalised measure of segregation/coherence of any space of origin to other spaces (Hillier & Hanson, 1984) in one side; and syntactic measure of “Choice” as representation of the flow of people who use the space and measure how pedestrian flow affects and/or state how likely any street segment is passed through all routs from all spaces to all other spaces (Hillier & Hanson, 1984) in other side; were studied. Also, since the case study is one of the monocentric old organic contexts in middle east, it seems using the term “Entropy” as a secondary measure in space syntax which explains how spaces were distributed in relation to the depth and states how various layouts culturally have different topological differences (Hillier, et al., 1987), can help to describe how any changes in urban fabric affect the coherence, segregation and followingly the people mobility.

Considering the previous study by Hillier, et al. (2012), Normalized Angular Integration (NAIN) which aims to normalize angular total depth by comparing the system to the urban average and Normalized Angular Choice (NACH) aims to solve the paradox that segregated designs add more total (and

average) choice to the system than integrated ones. It divides total choice by total depth for each segment in the system (as citied by FoadMarashi & Serdoura, 2021). So, the less selected street segment (considering the meaning of the choice) is related to the ones' the choice value decreased by being calculated/related by a higher total depth. It expresses the choice value in a cost-benefit way (Hillier, et al., 2012). Indeed, NACH and NAIN for each period were calculated and examined.

Urmia as the oldest city of the northwest of Iran embedded to 5000 years ago, but the oldest part of the city which can be studied as the core of the city is belonging to the last two centuries (figure 1c) Urmia network structure experienced soft changes through the time and the main core of the city was not changed very much (figure 2a). But as the effect of the rapid modernisation in the first half of the 20th century, new streets imposed in the old fabric. It changed dramatically the structure of the city, identity, and coherence of the built environment. It is the first step that changed the structure of the city from monocentric to a new crossing network which had not been experienced before (figure 2b).

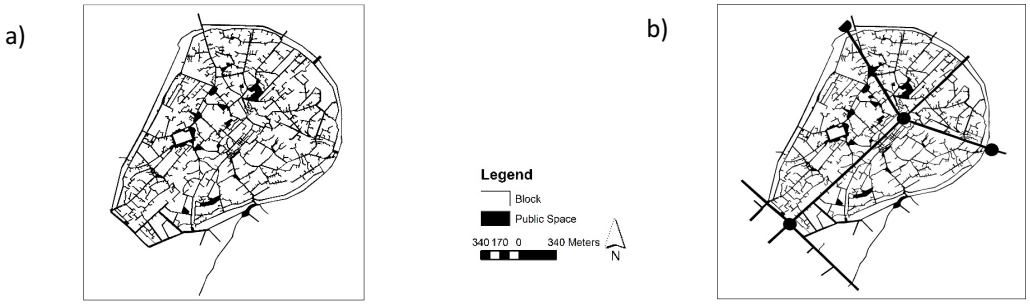


Figure 2. *Comparison of the Urmia transformation between 1933 (a)- and 1948 (b) –(authors,2021)*

Analysis and Results

The changes of the inner city in Urmia mostly in the context of the time, was very exciting which addresses the transformation of the form and use of the public space. The city through the time announced the center as the most important economic and social fabric with identified special characteristic of the city. Axial lines as a linear representation of the city, stated the city as compact fabric in the center. The inner city containing small blocks with dead ends (figure 2).

Integration as a measure to defines how accessible and usable the streets are in the fabric as it comes in the figure 2(a) shows how pedestrian/people movement happened in the city mostly in the center and before the falling of the city wall. But because of imposing new streets to the fabric, it can be read from figure 4(b) that how building new streets until 1948 in the middle of the old fabric affected and caused changing the more usable parts of the city and how the presence of the people in the fabric changed since the all the measure experienced an understandable increasing in 1948 (table 1).

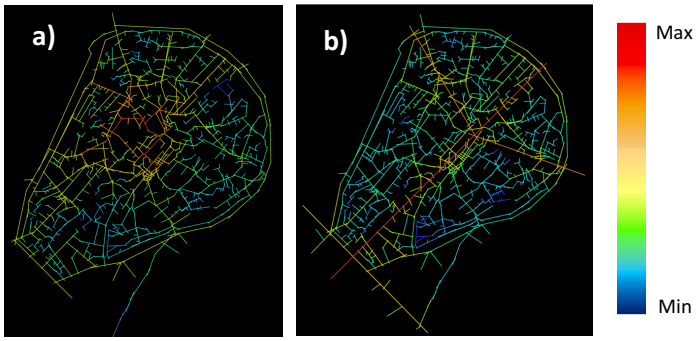


Figure 3. *Axial Map representation of Urmia announcing Integration HH for 1933 (a)- and 1948 (b) – (authors,2021)*

Table 1. Comparison of the topological measures in Urmia Inner City through the time.

Measure	1933			1948		
	Minimum	Average	Maximum	Minimum	Average	Maximum
Integration HH	0.44836	0.746992	1.09856	0.511218	1.12763	2.16774
Choice	0	8049.66	120491	0	5554.42	415338
Connectivity	1	3.03515	13	1	3.1401	46
MeanDepth	7.47816	10.769	16.8726	4.28537	7.71635	14.9311
TotalDepth	6162	8873.66	13903	3544	6381.42	12348
Entropy	3.44371	3.64052	4.07174	2.91147	3.18506	3.55462

It is announcing how people mobility changes following the use of new and direct passes through their new journeys. To signify the pedestrian mobility in the urban system, a segment map with ASA were produced. The comparison between global NACH which displays the chance of any space be used by people and NAIN which calculate how people try to pass through the spaces or even part of them that other people also go through, in 1933 and 1948 applied (figure 4; table 2).

Deeping in the results shows there is significant increasing in both global measures of NAIN and NACH. It is attention-grabbing when comparing the segments according to the correlation between these two global measures.

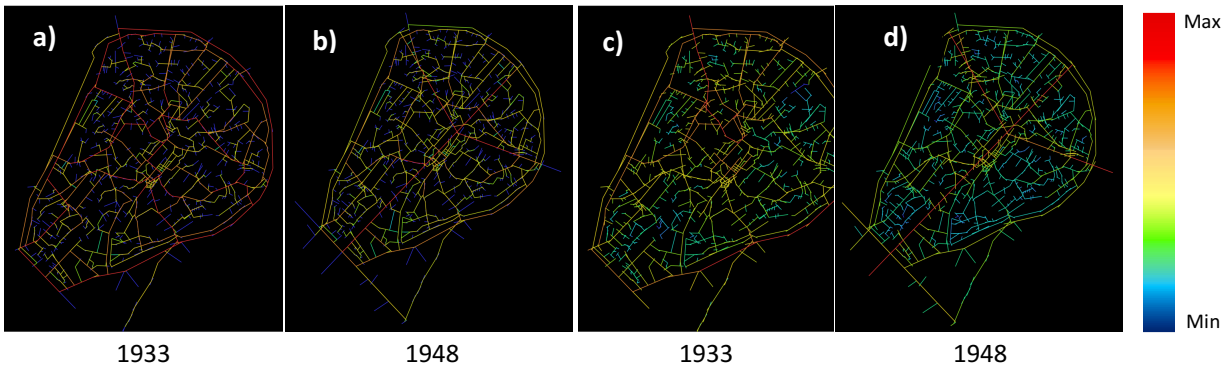


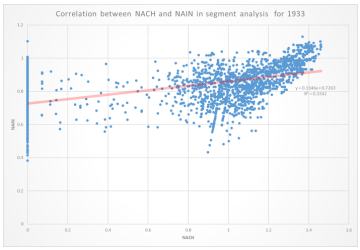
Figure 4. *Segment Map representation of Urmia: (a) and (b) are announcing NACH; (c) and (d) are announcing NAIN in 1933 and 1948 (authors, 2021)*

Table 2. Comparison of the angular measures in Urmia Inner City segments through the time.

Measure	1933			1948		
	Minimum	Average	Maximum	Minimum	Average	Maximum
NACH	0	0700324	1.46234	0	0.723283	1.62926
NAIN	0.382524	0820616	1.13024	0.495843	1.05965	1.73499

Although all of there is a significant increase in all the radii and distances and global measures of NACH and NAIN, but the correlation decreases from $R^2 = 0.3342$ to $R^2 = 0.2956$. which can translate to the changing in the distribution of the chance of the location of the spaces which is almost more than 10 percent higher in 1933 than 1948 (figure 5).

a)



b)

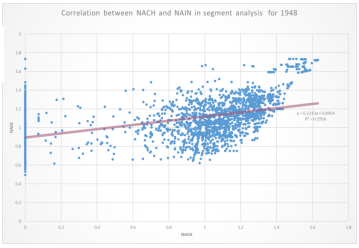


Figure 5. *Comparison of the Correlation of the NACH and NAIN in 1933(a) and 1948 (b).*

Discussion

Axial representation of the Urmia clearly presents a compact, mono-centric city which has more connected spaces in the center but cut by the modernization movements in city shaping in the first half of the 20th. century. Following the literature stated before by Hillier et al. (1987, 1993, 2012, 2015) Seamon (1994) synthetic measure calculated by the space syntax methodology for two periods before and after falling of the city wall. It announces that streets as walkable moving passes, in the old fabric of the city, confirm the monocentric city core, which attracts more people to use and presenting in the spaces/activities that are more focus in the center and were accessible from various places. The increasing values of global measures of NACH and NAIN after imposing new streets, confess the new changes in the city configuration which is starting to new model of the growth for the city. The new style changes the accessibility and distribution of the chances of the passes in the city core. Following that the more used space in the city, now, is the most liner and direct one as the longest street of the new deigned network. It is a starting point of changing the city network from monocentric to liner and mixed network model.

Also, considering what was expressed by Karimi (2002), Gehl (2011), Donegan et al. (2019) and Zumelu, et al. (2019), about any changes in the city configuration, can affect the people movement in the streets and the city network. This study, considering the syntactic measures of integration and choice values, announces the changes in the coherence connection of the spaces to the center and or

to the new lay out imposed to the city but improve the mobility of the people in the network. While at the same time, it is not confirming well distributed chances to attracting people to the new lay out.

Although the inner city was well interconnected area to all other spaces in the city and mobility through those paths make the city core the most livable and more socio-economic interacting space in the city; but imposing new modernization changes in built environment altered the characteristic of the routs. Succeeding how city form constructed by Tavssoli (2016) and Krier (1993), also results over people dynamics, it announced the new lay out could also interact to attract more people to the center, but it was not completely on the same way and changed the model from concentrated center to liner one.

Conclusion

This study highly distinguished the more use of the inner city in past which explain the city model as monocentric city. Indeed, more use, more vitality and more interactions took place there. It also reflects more coherence in the city network and how it was distributed. Spatial characteristic of the old fabric after imposing the new streets on the context changed and the centric model of the city transferred to the liner model. This study shows increasing values in new global and local measures in the new fabric. Subsequently, more use of the spaces expresses more people interaction in the public space which announce more people presence and more vitality in that. Although, the new design changes the concentrate model to linear one, but it expects to attract more people to be present and more accessibility for reaching the inner-city as a livable and more socio-economic interacting space in the city.

Acknowledgements

To the Portuguese Foundation of Sciences and Technology (FCT) for the PhD scholarship of the first author.

References

1 Alexander, C. (2002). The Process of Creating Life: Nature of Order, Book 2: An Essay on the Art of Building and the Nature of the Universe (1st edition). Center for Environmental Structure.

2 Bacon, E. N. (1976). Design of Cities: Revised Edition (Revised ed. edition). Penguin Books.

3 Donegan, L., Silveira, J. A. R. da, Silva, G. J. A. da, Donegan, L., Silveira, J. A. R. da, & Silva, G. J. A. da. (2019). Under and over: Location, uses and discontinuities in a centrally located neighbourhood in João Pessoa city reflecting current urban planning effects. Urbe. Revista Brasileira de Gestão Urbana, 11. https://doi.org/10.1590/2175-3369.011.e20180123

4 FoadMarashi, M., & Serdoura, F. (2021). Public Space Use: An Approach to Livability in Urmia Bazaar, Iran. In S. Eloy, D. Leite Viana, F. Morais, & J. Vieira Vaz (Eds.), Formal Methods in Architecture (pp. 231–240). Springer International Publishing. https://doi.org/10.1007/978-3-030-57509-0_21

5 Gehl, J. (2011). Life Between Buildings: Using Public Space—Jan Gehl—Google Books. Island Press.

6 Ghalehnoee, M., Mokhtarzadeh, S., & Bahrami, A. (2020). Evaluation and Analysis of the Impact of the Constructed Contemporary Streets on the Structural-Spatial System of the Historical Fabric in the District 3 of Isfahan. Urban Planning Knowledge, 3(4), 73–90. https://doi.org/10.22124/upk.2020.14846.1326

7 Hillier, B. (1996). Cities as movement economies. Urban Design International, 1(1), 41–60.

8 Hillier, B. (2015). Space is the machine: A configurational theory of architecture. CreateSpace Independent Publishing Platform.

9 Hillier, B., & Hanson, J. (1984). The Social Logic of Space. Cambridge University Press. https://doi.org/10.1017/CBO9780511597237

10 Hillier, B., Hanson, J., & Graham, H. (1987). Ideas are in Things: An Application of the Space Syntax Method to Discovering House Genotypes—B Hillier, J Hanson, H Graham, Environment and Planning B: Planning and Design, 14(4), 363–385. https://doi.org/10.1068/b140363

11 Hillier, B., Penn, A., Hanson, J., Grajewski, T., & Xu, J. (1993). Natural Movement: Or, Configuration and Attraction in Urban Pedestrian Movement. Environment and Planning B: Planning and Design, 20(1), 29–66. https://doi.org/10.1068/b200029

12 Hillier, B., Yang, T., & Turner, A. (2012). Normalising least angle choice in Depthmap—And how it opens up new perspectives on the global and local analysis of city space. Journal of Space Syntax, 3, 155–193.

13 Jacobs, J. (1961). The Death and Life of Great American Cities (1st ed.). Random House.

14 Krier, R. (1993). Urban Space. Rizzoli.

15 Madanipour, A., Knierbein, S., & Degros, A. (2014). Public space and the challenges of urban transformation in Europe. Public Space and the Challenges of Urban Transformation in Europe. https://eprints.ncl.ac.uk

16 Porta, S., & Latora, V. (2007). Multiple centrality assessment: Mapping centrality in networks of urban spaces. In Urban Sustainability Through Environmental Design. Taylor & Francis.

17 Salingaros, N. A. (2014). Principles of Urban Structure (2nd edition). Vajra Books.

18 Seamon, D. (1994). The life of the place: A phenomenological commentary on Bill Hillier's theory of space syntax. NA, 7(1), Article 1. http://arkitekturforskning.net/na/article/view/719

19 Soltanzadeh, H. (2011). A Brief History of the City and Urbanization in Iran (ancient Era to1976) (1st ed.). Chahar Tagh.

20 Tavassoli, M. (2016). Urban Structure in Hot Arid Environments: Strategies for Sustainable Development. Springer International Publishing. https://doi.org/10.1007/978-3-319-39098-7

21 Tibbalds, F. (Ed.). (2000). Making People-Friendly Towns: Improving the Public Environment in Towns and Cities (1st edition). Taylor & Francis.