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Second International Conference on
FUTURE OF URBAN PUBLIC SPACES

TARBIAT MODARES UNIVERSITY, TEHRAN, IRAN
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CONFERENCE **FUPs**
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Edited by:

Ehsan Ranjbar
Mohammadreza Pourjafar

PROCEEDING OF THE
FUPs
CONFERENCE



In the Name of God

**Proceeding of the Second International
Conference on Future of Urban Public Spaces
(FUPS2021)**

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Second International Conference on
Future of Urban Public Space
Proceeding of the FUPS 2021 Conference

Tehran, IRAN

8-10 December

PROCEEDING OF THE
CONFERENCE FUPS
2021



In memory of **Dr. Michail Galanakis** from Aalto University who participated actively as our keynote speaker. Micha passed away in October 2022. He is alive with his notable publications on public spaces and culture.

FOREWORD I

In the 21st century, cities are the main places of living, trading, creativity, knowledge, etc. Over half of the global population already lives in cities, and urbanization proceeds at full speed. To solve grand challenges that impact the quality of life regarding employment, sustainable economic growth, security, environment, and overall well-being, we need multidisciplinary approaches, broad-minded thinking, and bold boundary crossings. Concerning the urban design vocabulary, quality public spaces are crucial for contemporary urban life, which is affected by the consequences of urban transformation worldwide .

The sole aim of the FUPS Conference is to welcome the collaboration of experts from different disciplines from all over the world. In the FUPS series, we expect studies that deliberate the concept of public spaces in a changing world through case studies.

Ehsan Ranjbar

Assistant Professor, Department of Urban Planning & Design, Tarbiat Modares University, Iran

Visiting Researcher, Department of Architecture, Aalto University, Finland

Founder and Chair of FUPS Conference

Chair of Arsan Research Group on Sustainable Regeneration of Public Spaces

FOREWORD II

FUPS CONFERENCE; Opening Ceremony speech

Your Excellency, Distinguished Invited Representatives and Speakers, respected Ladies and Gentlemen.

I am very glad to be among you at this opening ceremony. I hope that we can have good presentation of our papers. I also hope, we can have good discussions and compromises on any issue that is mentioned in this conference to achieve an efficient results and efficient conclusion.

Today, our urban public spaces face unexpected problems. Global epidemics, pandemic, carbon pollution climatic changes, socioeconomic & social psychological problems and so on and so forth. Many of these problems are due to our own fault that we have forgotten the philosophy and wisdom of knowledge.

We have welcomed many inventions and discoveries, regardless of our ecosystem, in our biosphere and sphere. It's time to look deeper into all the side effects of technology. There is no doubt that some of the side these effects, today are: air, water, sound, smell and even visual pollution.

Our public spaces are part of the biological realm. We also need to understand and believe that physical planning and design is changing an existing ecosystem. New inventions such as digitization, artificial intelligence, and what all is going on in genetic interference platforms can create terrible situations out of our control.

We were encouraging face to face social introduction in public spaces. So far, we were encouraging public transportation through mass transportation, but nowadays we are discouraging what all we encouraged before. Because, COVID 19 changed the whole scenario.

Once again, we need to think of wise basic theories for efficient design, rather than depending only on financial utilitarianism and being fully realized and merely saving capital.

I hope we all achieve the best results in health and happiness to have calm and cozy spaces in cities free of harmful aspects & objects. We have also worked on some related topics for which my student are going to present them in the related sessions.

Thanks a lot.

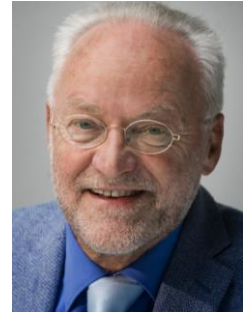
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Emeritus-Professor Of 'Social Conditions For Human Happiness' At Erasmus University Rotterdam In The Netherlands
Director Of The World Database Of Happiness



Mark J Nieuwenhuijsen

Research Professor, Director of the Urban Planning, Environment and Health Initiative
Director of the Air pollution and Urban Environment Programme / ISGlobal; Barcelona Institute for Global Health



Luisa Bravo

Founder and President of City Space Architecture, Italy



Prof. Ali A. Alraouf

Prof. of Architecture and Urbanism. HBK University, Education City, Doha, Qatar
Head of Research and Development - Urban Planning Dept. Doha, Qatar



Hooshman Alizadeh

Associate Professor of Urban Planning and Design, University of Kurdistan, Iran
Senior Postdoc Researcher, ISR Wien, Austria



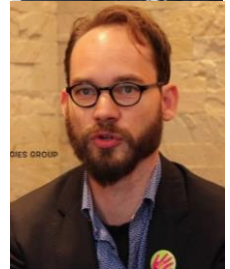
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School of Architecture and Built Environment Queensland University of Technology, Australia
Director Australian Institute of Play
Founding Director Urban Synergies Group



Keynote Panel



Anssi Joutsiniemi

- Professor of Urban Development and Modeling
- Head of Urban Studies & Planning master's program, Aalto University, Finland



Hossam Hewidy

- Lecturer of Urban and Regional Planning, Department of Architecture, Aalto University, Finland



Michail Galanakis

- University teacher/coordinator, Department of Architecture, Aalto University, Finland



Kaveh Hajialiakbari

- President of Urban Renewal Organization of Tehran (URO)



Seyed Kazem Malakouti

- Associate Professor of Psychiatry, Iran University of Medical Sciences



Seyed Mahdi Khatami

- Assistant Professor of Urban Design, Tarbiat Modares University, Iran



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Chartabaghch

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Urban Renewal Organization
of Tehran



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Chapter 1

Public Space and Lessons from the History

Public Spaces in Minas Gerais State, Brazil: A chronology on planned visions in the city of Belo Horizonte

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ABSTRACT

The article explores distinct appropriations of public spaces beyond the planned visions in Minas Gerais, particularly in its Capital, Belo Horizonte. The study focuses on certain moments of the development process since its creation as a new planned city in the end of the 19th Century up to current days facing pandemic times. In this process, concepts related to urban planning ideas were sought by governments considering demands imposed. Between ideal versus real even with the intention of control the use of public spaces was defined by communities. The key issue as a contribution to this pre-event of the FUPS 2021 2nd Conference is to reflect about the concepts of public space embedded in the urban proposals since the creation of the city and their materialisation over time in Belo Horizonte. From past to present with a chronological sense, first focusing on the initial plan defined by a commission of technicians was presented. This period began in 1892, with the work of the Study Commission for the new capital, changed to the Construction Commission in 1894, until the inauguration of the city on December 12, 1897. Next the consolidation process of the city as the new capital in the 1930/1940s was explored. At the end of this period a revision of the initial plan was proposed. Between the 1940s and 1970s the ideal was linked to the Modern Movement with the realisation of the Pampulha neighbourhood and other modern urban arrangements. As an inflection point, in the middle of this period, in 1964, the military coup d'état consolidated restrictions of democracy, already since the beginning of the 1960s. During the 1960s and 1970s a new master plan was conceived to the modern metropolis that was constituted. Next during the 1980s and 2000s the concern with preservation of the Cultural Heritage was placed as well a new master plan was developed with community participation. In this period, a new Federal Constitution was implemented, with the end of the military dictatorship, in 1988, and the democracy reinstalled in Brazil. The following passages inserted the ideas of urban planning in the 21st Century with the paradigm of building cities for people in the first place. Another master plan was developed in this period. Currently, these Covid-19 pandemic times with lockdown, added with several setbacks in the federal government, create new challenges to thinking about public spaces with planning. These issues are addressed in order to continue previous urban studies in Minas Gerais state, Brazil. Written with grants from CAPES, CNPq and FAPEMIG.

Keywords: Urban Planning, Urban History, Minas Gerais, Belo Horizonte, Public Spaces.

INTRODUCTION

The paper approaches distinct appropriations of public spaces beyond the persistence on planned visions in Minas Gerais, particularly in its Capital, Belo Horizonte, referential since its foundation in the end of 19th century. The study focuses on certain moments of the development process since its creation as a new planned city up to current days facing pandemic times. This historical approach on urban planning focuses on a planned city particularly intercepting the public spaces. From the past to the present, different visions of public space were introduced in terms of planning proposals. Ideal

versus real was a challenge in the thinking and practises of citizens, planners and city managers. At the same time appropriations by the community on public spaces were practised in addition to planning.



Figures 1. a/b/c/d. Minas Gerais State with the location of its capital Belo Horizonte and Juiz de Fora related to Rio de Janeiro, São Paulo e Brasília. Source: BRAZIL, IBGE; Urbanismo.mg/FAUUFJF.

In Minas Gerais, the origins of the cities and the state proper was related to the exploitation caused by Portuguese colonisation. At the end of the 17th century, this process involved penetrations into territory named “entradas” and “bandeiras”, in search of gold and precious stones. Firstly, it generates devastation and violent conflicts with the Indigenous originary peoples. The Portuguese crown gradually established stricts controls over the territory. Different from Spanish colonisation, Portuguese occupation was not based on initial plans repeated indefinitely. The urbanisation related to an ex-nihilo creation included general guidelines. Several cities and villages were created promoting an urban network. In this process, the territory consolidated its name, Minas Gerais, officially used from 1732. The city of Mariana located in the centre of the state was the first capital. Subsequently this assignment was transferred to Villa Rica adjacent to this one later named Ouro Preto.



Figure 02. Aspect of the old capital Ouro Preto with its colonial panorama. Source: APM, Demerval José Pimenta, DJP-6-2-002(086), S/d.

Throughout the 19th century the Portuguese references lost their intensity and new paradigms were introduced. Paris takes the lead as an ideal city model. Changing its capital at the end of this century, the state of Minas Gerais followed this model. The option to establish a new city according to a rational spirit of creation, started from a geometrical master plan with prior zoning of functions. For this, an attempt was made to counteract a different arrangement from that which had taken root having in view another urban life everyday. In this way the colonial tradition that referred much more to the period of the Portuguese crown control did not conform to the aspirations of that republic's birthplace. The design of the plan for the "Cidade de Minas", as it was called initially the new capital, was a work that involved detailed studies by a technical commission mainly made up of engineers, with architects and a lawyer also present.



Figure 03. Map of the city of Ouro Preto. Source: APM, FUNDO PRESIDÊNCIA DA PROVÍNCIA - PP, PP-006, 1888.

In this sense, Belo Horizonte was created as a modern city opposing the ancient capital Villa Rica, mentioned before, Ouro Preto nowadays. Following the modernization of Brazilian cities the new capital reflected the influence of Positivism and sanitary engineering. Despite its planning process, at the time of its inauguration, Belo Horizonte reveals strong social inequalities. Houses improvised by workers in some areas and the first favela in the background of the Central Station contrasted with the "Bairro dos Funcionarios" neighbourhood orthogonally designed. Progressively, this situation got worse with improvised huts and new favelas everywhere. Attempts to resolve these urban problems have been unsuccessful. In the first half of the 20th century the general scenario reflects the distance established between the plan and reality.



Figure 04. General Plan of "Cidade de Minas", renamed Belo Horizonte, "Planta Geral" Master plan. Source: Lima, F. J. M. de. (1994) *Bello Horizonte: um passo de modernidade*. Salvador: Dissertação de Mestrado – FAUFBA.

Apart from the lack of quality housing and the uncontrolled spread of the city other serious problems multiply. The urban segregation that was imposed from the beginning will be amplified in the decades that followed in these 124 years as capital. Public infrastructure, circulation systems, etc. made city urban management impossible. This context in the capital was reproduced in the inland cities state. The

emergence of planning generates their progressive attempts of institutionalisation. This process in the field of urban planning consolidated in the 1970s included creation of municipal and regional planning agencies that are being reorganised, and will continue to do so, in the following decades. The ideal of a planned city as a continuous search will remain in the minds of planners and managers who will link to the government agencies created in the following.

Currently urban unsustainability emerges in Brazilian cities which is revealed by the impacts of the historical process of development, particularly in the cities of the state of Minas Gerais. This process faces many urban problems and challenges reflected in the urban reality through cultural and environmental issues. The Pandemic times caused by the Covid_19 changed all regarding sociability. Even so, added to this reality, the numerous problems of cities remain. Social inequality and urban unsustainable are present aggravated by the lack of public policies aimed at the socially disadvantaged.

Nowadays, urban deterioration with slums, rivers polluted, green areas devastated by buildings, streets designed more for cars than people and the lack of the cultural heritage and the community sense. In addition the precariousness of infrastructures in the historical process of development. The use of public spaces, in many of the cases deteriorated by the emphasis on private interests, has been intensely affected. Thus, the research on urban planning, particularly focusing on urban public spaces should contribute to reverse the impact of this reality. Here we need to discuss the relevance of the participatory process in the cities agenda on the issues related to the requalification of the urban public spaces.

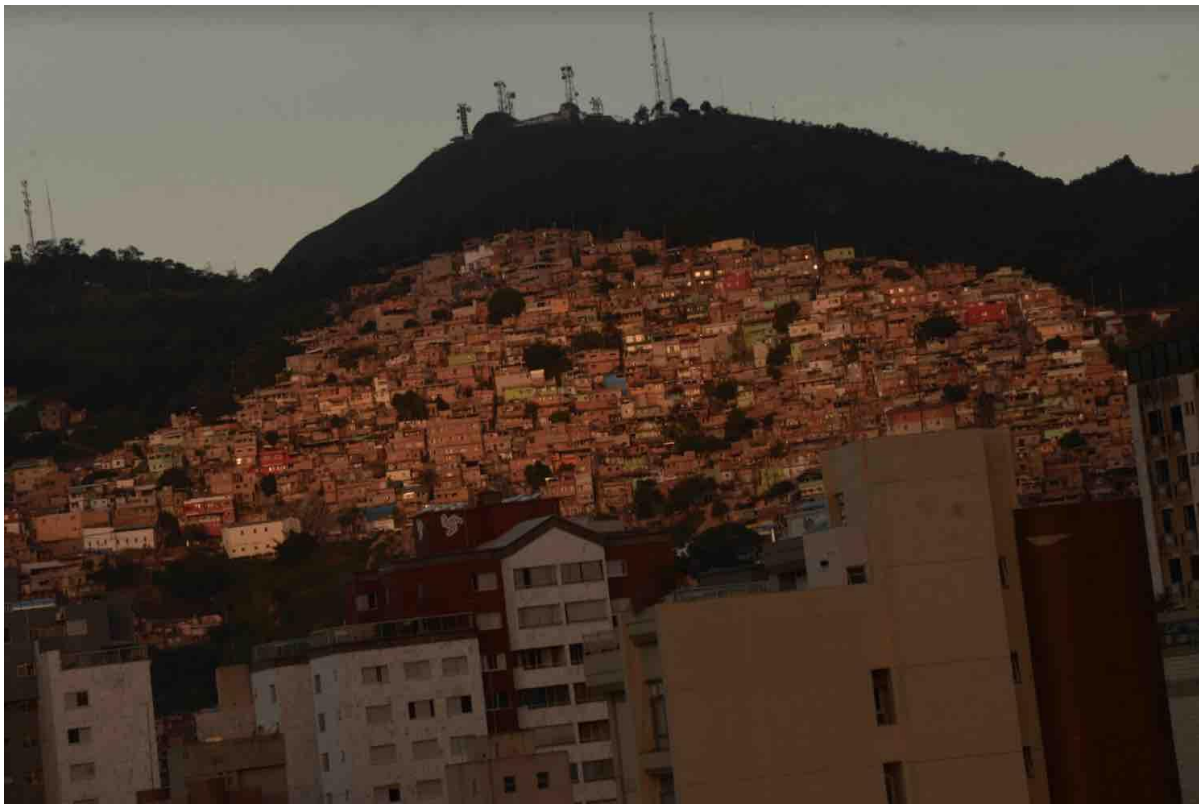


Figure 05. View of Belo Horizonte, 2019. Source: Photography by Fabio Lima; [Urbanismo.mg/FAUUFJF](https://www.urbanismo.mg/FAUUFJF).

In these times of pandemic days Covid-19 extended the restrictions or even the prohibition of the use of public spaces drastically altered the relationship of people with cities and this was no different in Belo Horizonte. The insecurity that was already present due to social inequality as mentioned and differences in income distribution was added to the fear caused by the pandemic. The political situation

imposed by a government that is not concerned with education, culture and health, among others, both at the federal and state levels magnifies the difficulties.

And as planners, we are responsible for rethinking public spaces with quality, mobility and equity, among others, with the mobilisation of communities so that we have a more adequate urban living condition for present and future generations. For this, the continued fighting for the insertion of public policies aimed at solving urban problems that have in their public spaces a path to more accessible and inclusive cities. At the university, teaching has the possibility of graduating professionals prepared to face the challenges posed by cities with social responsibility.

CHRONOLOGY ON URBAN PLANNING IN BELO HORIZONTE, CAPITAL OF THE STATE OF MINAS GERAIS

The comparative approaches on urban planning with focus on the history of cities is placed in a relevant way. Focusing on certain horizons which process is not linear the search involves historical facts and characters connected to the urban transformations. Even though in a search of modernization the proposals neither have always brought progress. Through the analysis specificities can be interpreted on a case-by-case different contexts. That way the research interests do not really involve an approach that includes a remote beginning i.e., an original start point. In the approaches chronologies don't have the sense of an evolutionary process. At the same time continuities and changes have been explored without a search of cause and effects. The studies also consider that the comprehension of the past is referential to the present time in searching solutions to the current urban problems. It is worth noting the complexity is entirely distinct.

The recurrence to the history of cities includes biographies composed by personal trajectories closely connected to ideals and practises focused on urban problems. At the same time, allows a comprehension about the complexity that is part of the historical process. It is worth mentioning that *"... the use of biography reveals itself as a strong narrative expedient: to suggest a unity and at the same time, emphasise the dissolution of coherent identity of a person in the relationship established with the group to which it belongs, or even what this represents in terms of practice or social circle (and cultural). The reconstruction of the life of an individual interest as a study of a network of personal relationships, or also only as restitution about lines of planning thoughts that circulate around the character and interfere with your stance. In short, this approach is put forward as a pretext for the simultaneous construction of many more stories and intellectual trajectories irreducible to a single record."* That way successive approaches have allowed a comprehension of a variety of proposals made by planners concerned with city development.

The questions focused on several moments that characterise the cities growth should be thought of in the context of space and time in which they are linked. The crucial question to the history of cities that arises in the beginning, according to Zucconi, is to interrogate *"... where and when?"* And also according to Calabi should be considered *"... a series of tools and strategies of interpretation"* in the time duration and on its own chronology, with the aim of understanding the specific moments of change. The time is considered as a source of change and permanence, as well. For the history of cities, and in particular to the urban planning's history, this stands as a variable key and a major theoretical issue, each moment can be understood as the synthesis of the times that it converges.

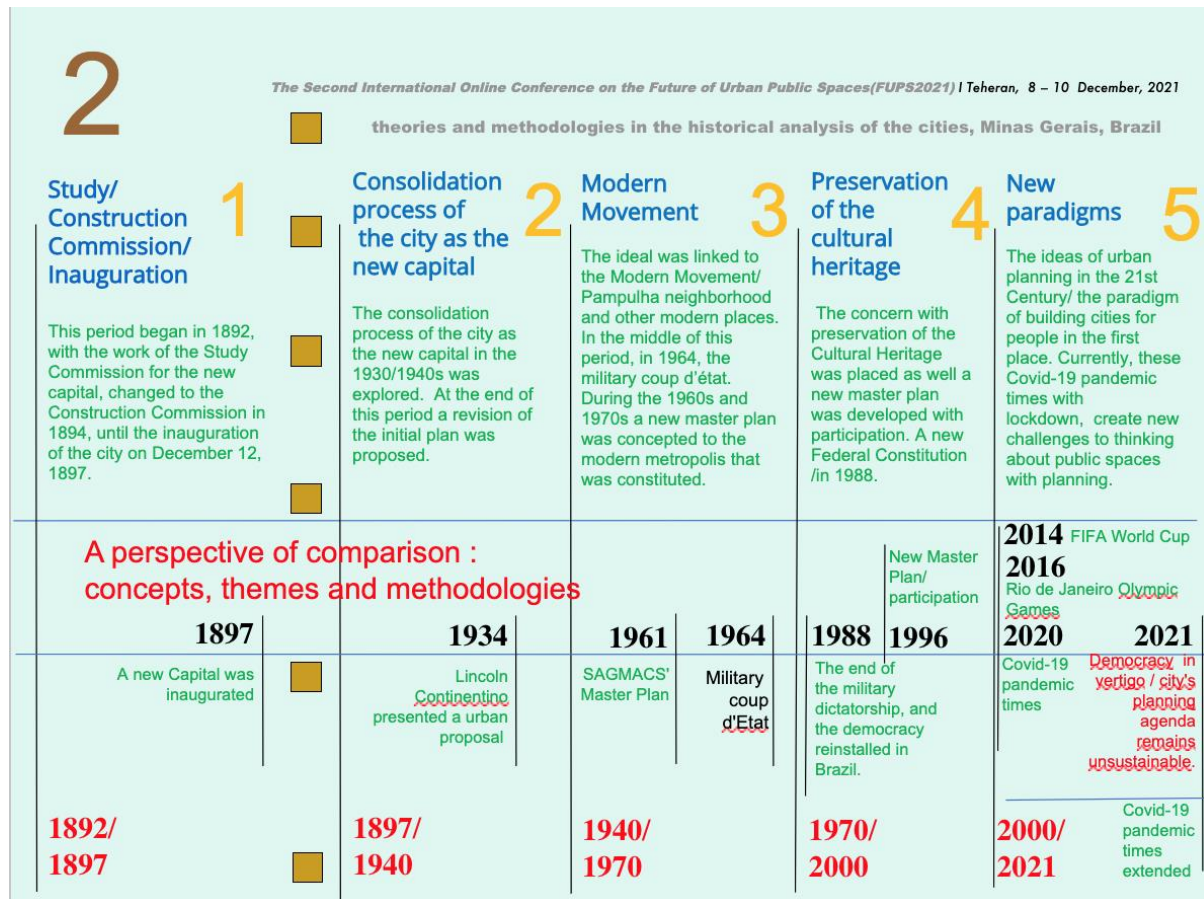


Figure 06. Chronology on Urban Planning in Belo Horizonte, Capital of the State of Minas Gerais. Source: Urbanismo.mg/FAUUFJF.

From past to present with a chronological sense first the initial plan defined by a commission of technicians was presented. This period began in 1892, with the work of the Study Commission for the new capital, changed to the Construction Commission in 1894, until the inauguration of the city on December 12, 1897. Next period, the consolidation of the city as the new capital, in the 1930/1940s, was explored. At the end of this period a revision of the initial plan was proposed. Between the 1940s and 1970s, the ideal was linked to the Modern Movement, with the realisation of the Pampulha neighbourhood and other modern places. As an inflection point, in the middle of this period, in 1964, the military coup d'état consolidated restrictions of democracy, already since the beginning of the 1960s. During the 1960s and 1970s a new master plan was conceived to the modern metropolis that was constituted. Next, during the 1980s and 2000s, the concern with preservation of the Cultural Heritage was placed, as well a new master plan was developed with community participation. In this period, a new Federal Constitution was implemented, with the end of the military dictatorship, in 1988, and the democracy reinstalled in Brazil. The following passages inserted the ideas of urban planning, in the 21st Century, with the paradigm of building cities for people in the first place. Currently, these Covid-19 pandemic times, with lockdown, added with several setbacks in the federal government, create new challenges to thinking about public spaces with planning. The possibilities of a coup d'etat with an implementation of a dictatorship, again in political discussions, leaves our democracy in peril. Regrettably, we are going to have the same authoritarian experience, with this present government. In this regard, democracy is literally in vertigo and the city's planning agenda remains unsustainable.



THE RISE OF A NEW CAPITAL [1892-1897]

The razing of the territory of the Arraial de Belo Horizonte, formerly Curral d'El Rey, where the new capital was installed, therefore, would have this motivation. The evocation of the new and modern, showing the unlimited possibilities provided by the technical progress, with which the protagonists of this city, predominantly engineers, were attuned.



Figure 08. Aspect of the Arraial of Belo Horizonte, formerly Curral d'El Rey, where the new capital was installed. View of the Boa Viagem church and its surroundings. Oil painting by French artist Emile Rovede, on 14 august 1894 photographed by Herculano Júdice in 1922. Source: APM, Municípios Mineiros, MM 048(01), 1922.

The project for the modern capital, Cidade de Minas, foresaw its implementation on the old village, the Arraial mentioned, with an urban area making up its central part, a suburban area, exterior to this first and a third ring proposed for installation of farms. A ring boulevard with a width of 35 meters, would distinguish between the urban area and others. For the central part, there was a geometric layout, configured by two squares, with the intersections of the streets and avenues at right angles broken by diagonals at 45 degrees.



Figure 09. Another aspect of the Arraial of Belo Horizonte, formerly Curral d'El Rey, where the new capital was installed. Source: APM, Municípios Mineiros, MM 048(02), 1890.

The urban dynamics of the old village, linked to the panorama of old cities, built according to the logic of occupation connected to the colonial period, particularly in Minas Gerais, was completely transformed. The configuration following the local topography with organic lines was altered to the orthogonal scheme mentioned. The group of houses were lined up following the same design rhythm with exposed roofs and similar technologies configuring daub houses.

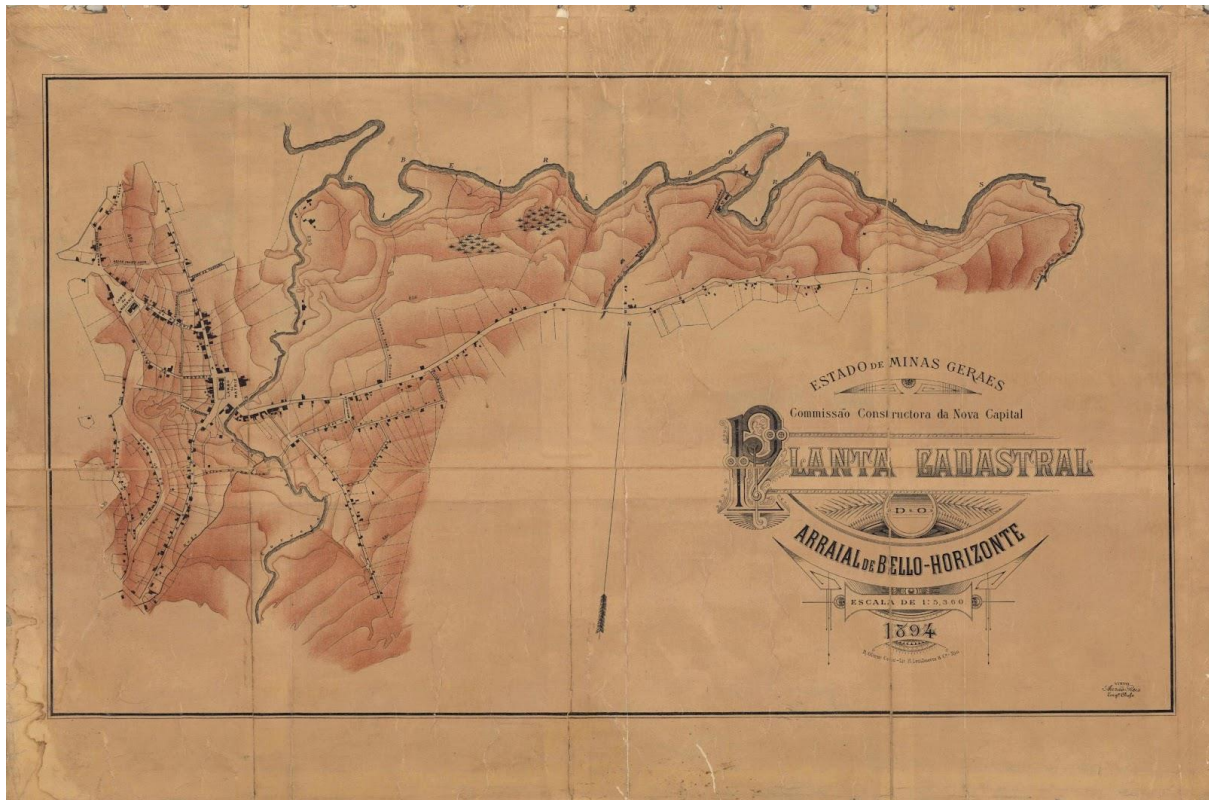


Figure 10. Topographic study by the Comissão Construtora da Nova Capital of the Arraial of Belo Horizonte, formerly Curral d'El Rey, where the new capital was installed. Source: APM, COLEÇÃO DE DOCUMENTOS CARTOGRÁFICOS DO ARQUIVO PÚBLICO MINEIRO - APM, APM-088, 1894.

In this sense a planned city made by a Construction Commission chaired by an engineer, Aarão Reis, was implemented as the future new capital of the State of Minas Gerais. Reis, with his team composed predominantly of engineers, which also included other professionals such as architects, a lawyer and a huge contingent of workers, stood in front of an ideal working circumstance, where they could make sense of an "ex nihilo" creation. It is worth saying that, initially, before the work of this Construction Commission, officially organised by the state government on February 14, 1894, by decree 680, a Study Commission was organised, having also the engineer Reis ahead, with a limited budget, as regulated by government instructions for December 9, 1892. The work was divided by 5 engineers chosen by Reis, José de Carvalho Almeida, in Várzea do Marçal, Samuel Gomes Pereira, in Belo Horizonte, Manoel da Silva Couto, in Barbacena, Eugênio de Barros Raja Gabaglia, in Juiz de Fora and Luiz Martinho de Moraes, in Paraúna. Besides these technicians, the physician José Ricardo Pires de Almeida. As part of the Commission were also a draughtsman, an assistant, five technical assistants and a writing assistant. The challenge of this Study Commission was to make a report considering the locations previously indicated, as mentioned above, in order to choose the most suitable for the installation of the new capital. The work of the commission was implemented with scientific rigour, based on what was most current in terms of knowledge about city planning. In this sense, each location was visited and analysed, covered by references to the experience developed in other Brazilian cities and around the world. Aarão Reis presented his report to the Government on June 17, 1893 that was then submitted to Congress to deliberate on the location where the future capital would be installed. Between Várzea do Marçal and Belo Horizonte the choice was on the second. Following the period, the Construction Commission would settle in the old Arraial de Belo Horizonte, due to the difficulties presented at the beginning of the work. Theoretical and practical activities were developed. The

engineer Reis resigned after 14 months of work having, however, approved the general master plan. Another engineer, Francisco Bicalho, took over as the head of the Commission, to continue the work.

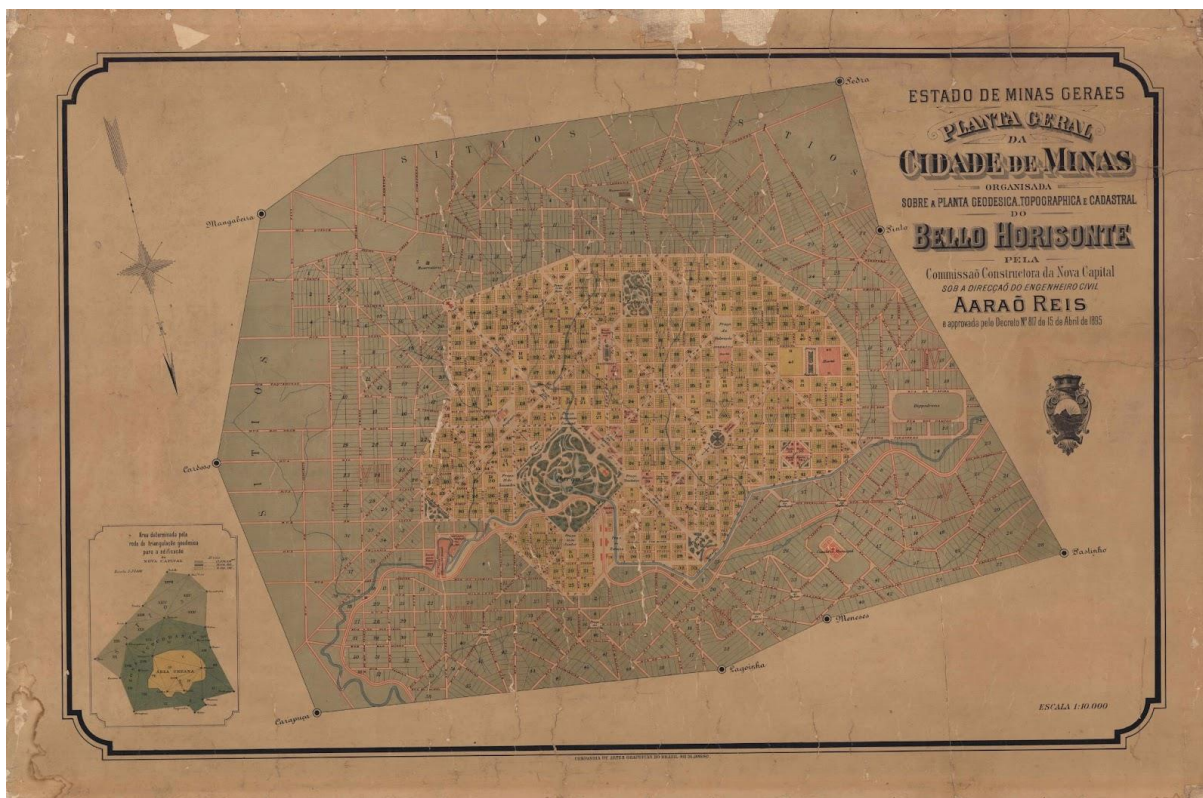


Figure 11. Another representation of the Plan of "Cidade de Minas", renamed Belo Horizonte, new capital made by Comissão Construtora da Nova Capital. Source: APM, COLEÇÃO DE DOCUMENTOS CARTOGRÁFICOS DO ARQUIVO PÚBLICO MINEIRO - APM, APM - 104, S/d.

The public spaces as part of this master plan, named "Planta Geral da Cidade de Minas", renamed after Belo Horizonte, were configured by streets, avenues, squares and parks. The intention was to replace the old obsolete capital Ouro Preto. The ideal versus real imposed itself as a challenge. This would come as the outcome of a secular issue, the change in the capital of Minas Gerais, decreed by the government in 1893. This process dated back to 1789, when it was thought that the capital would move to the city of São João d'El Rei, for being that commercially well-situated.

It is worth mentioning that the new capital emerged, then, from a complex mechanism where social and political forces acted as protagonists, in the occupation and organisation of the space. A creation of a city that was really the work of decision and imposition of the state government and of the political groups that were interested in leaving the old capital, inadequate for the new economic and social directions envisioned. The imposition took place through an agreement between the dominant groups of the state, regarding the geographic location and also the physical design and ideology planning to be, at the same time, the centre of political power and the pole of the economic development. The political and ideological instance as essential topics in urban policy from urban coexistence, to coexistence and the relationship of related social groups necessarily even for contradictory interests was missing in this process.

The city of Ouro Preto was formed in the consolidation of old mining paths during the period of exploration carried out when mining began in the State of Minas Gerais. Its origins go back to the foundation "...at the end of the 17th century, (where) Ouro Preto (Black Gold) was the focal point of the gold rush and Brazil's golden age in the 18th century. With the exhaustion of the gold mines in the

19th century, the city's influence declined but many churches, bridges and fountains remain as a testimony to its past prosperity." In this sense, "...the old Vila Rica is one of the fruits, perhaps the greatest, of the admirable Portuguese expansion in the new world."



Figure 12. Another aspect of the old capital Ouro Preto. Source: APM, MUNICÍPIOS MINEIROS - APM, MM-189(26), 1880 - 1890 - DATA PROVÁVEL.

One of the justifications for the process of moving the capital was the strong link to the colonial and imperial past. This condition went against republican thought, as well as the modern image of the cities, which is related to the Parisian panorama. During the period of the change of the capital, eclecticism predominated in terms of language for urban sets with the modernization of cities based on the paradigms of aesthetics, hygiene and circulation. The new capital should mirror these transformations in line with these airs of modernity.

The conception of the plan of the "Cidade de Minas", as the new capital was initially called, was a work that involved detailed studies, composed of several graphs, tables, photographic surveys, building projects, cadastral plans, etc. It is from these structural components, as well as from the plan drawn up by the technicians of the Construction Commission, in charge of this realisation, as mentioned, that this studied route is re-established. The city that was intended, already had an aprioristically determined size, and the establishment of 150 to 200 thousand inhabitants should be foreseen, a population expressive, when thinking about the urban population of most Brazilian cities, at the end of the century.

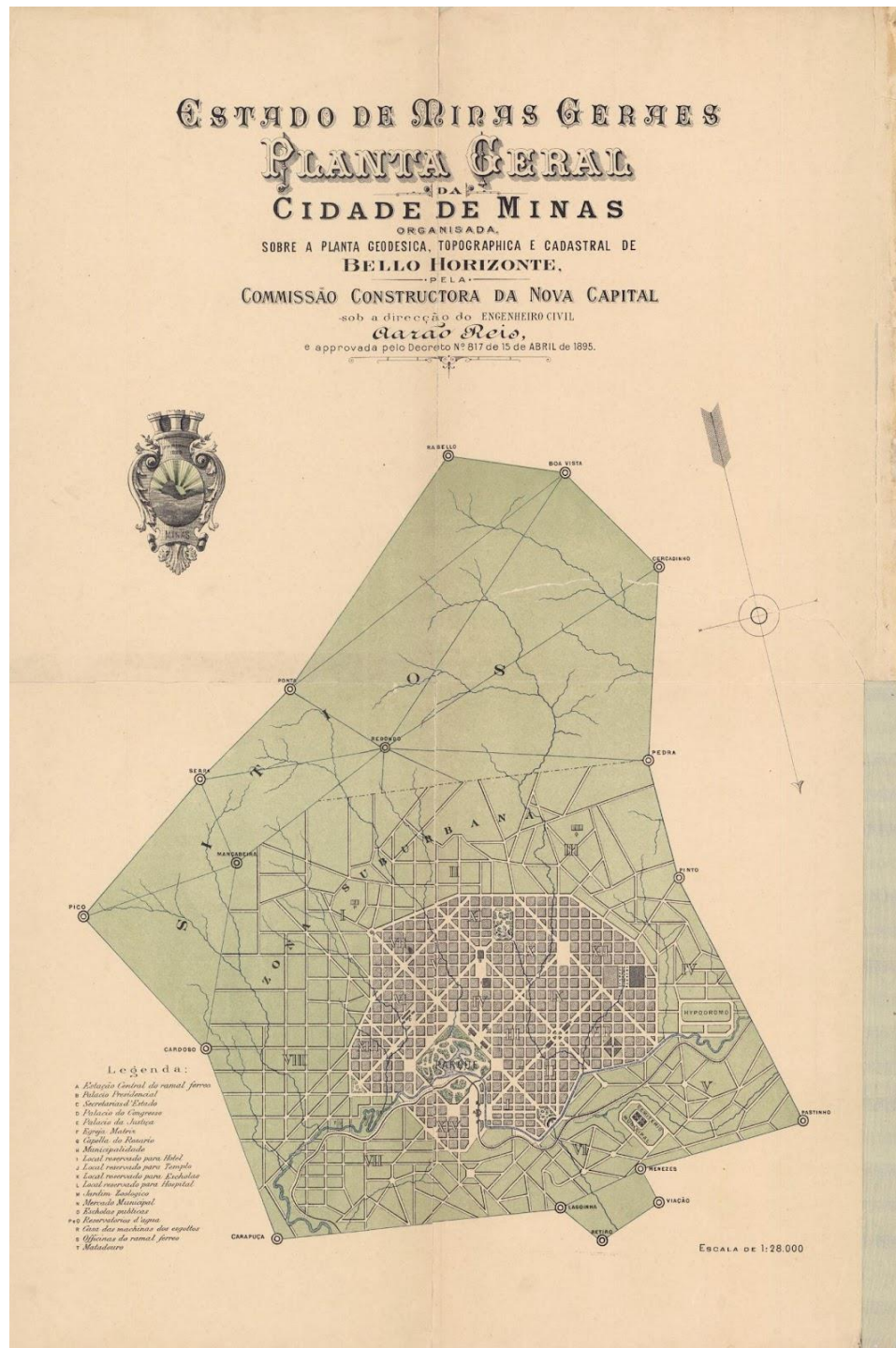


Figure 13. Another representation of the Plan of "Cidade de Minas", renamed Belo Horizonte, new capital made by Comissão Construtora da Nova Capital. Source: APM, COLEÇÃO DE DOCUMENTOS CARTOGRAFICOS DO ARQUIVO PÚBLICO MINEIRO - APM, APM-098, S/d; Urbanismo.mg/FAUUFJF.

The new capital was planned with an area that would be subdivided into blocks with 120 by 120 metres. The streets, arranged orthogonally, would have a width of 20 metres with a row of trees in half and at 35 metres they would cut diagonal avenues with a double row of trees on the side. The 50-metre avenue that would connect from North to South the commercial district of Alto do Cruzeiro would have a

double central rank of trees. The idea was linked to a vergel layout to demonstrate the advances of engineering, particularly in the science of building cities. The urban area would also have a park of large proportions, with 800 by 800 metres, bordered by the great avenue, on one side, and by other avenues of 35 metres wide that would define its limits. This Park was designed by landscape architect Paul Villon. It would be up to José de Magalhães, the architect engineer of the commission, its definitive organisation. In this huge central park, some constructions, artistically composed, and in a higher corner, a lookout tower would be installed, so that it could be enjoyed the beautiful panorama of the entire city. These constructions include a Casino, an Observatory and a Restaurant. The Park, which was intended to be the most important and grandiose of how many there are in South America, would be one of the attractions of the new capital, as an area of recreation and entertainment for its future inhabitants.



Figure 14. The Municipal Park and its composition as a counterpoint to rationality. Source: APM, Secretaria da Agricultura - Comissão Construtora da Nova Capital, SA2 003 020, 1895.

The layout of the suburban area had another sense, combining a design chequered, also orthogonal, with a freer weft, however, with the same geometric rigidity. The streets should have 14 metres, not necessary afforestation being provided for farms, farms and sites with extensive orchards. Its part, outside the contour ring, was defined to its extremes, with the larger blocks, generally 250 by 250 metres. The batches varied in size, depending on its proximity to the urban area, they measured 50 metres in front by 125 metres in depth.

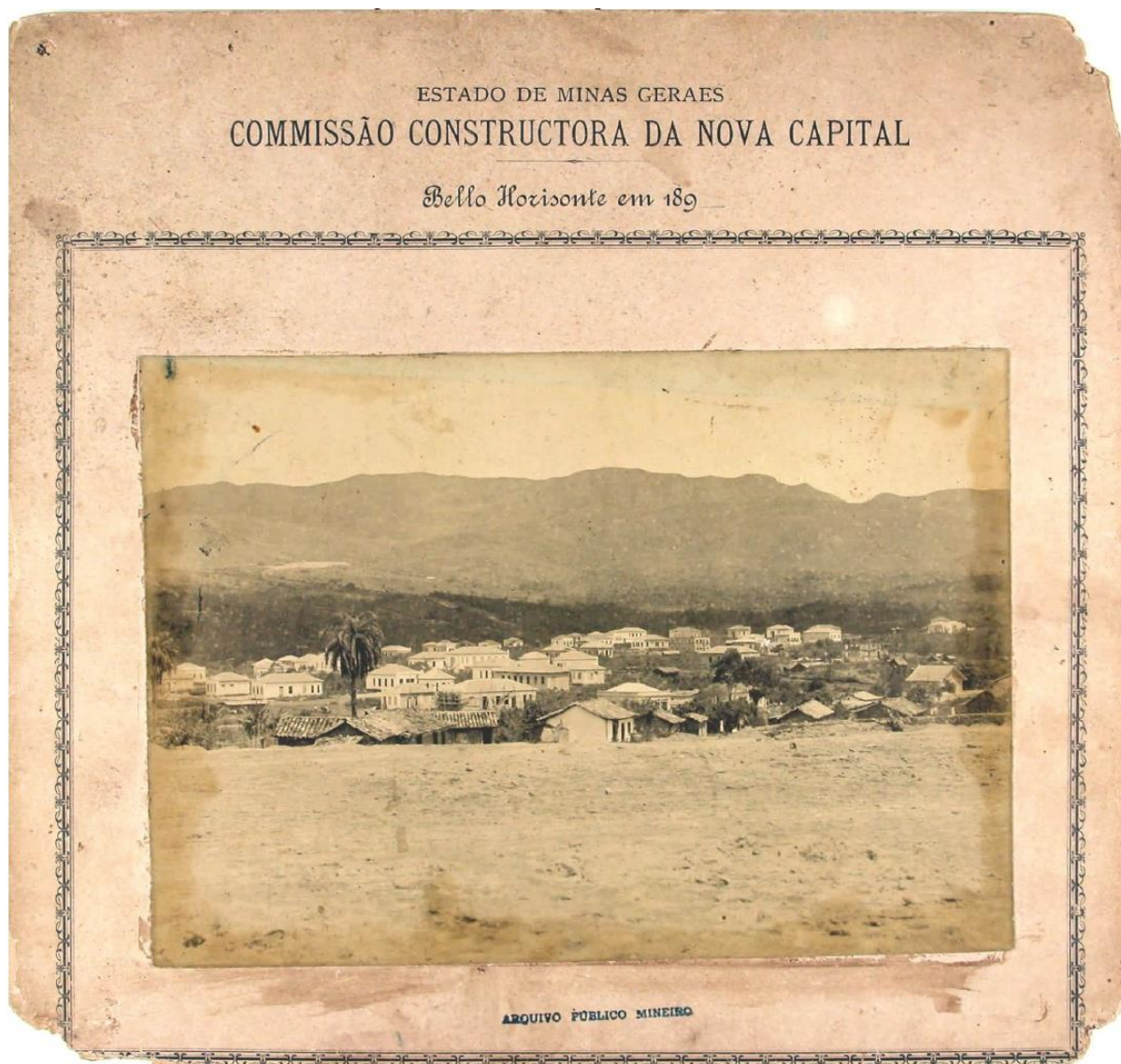


Figure 15. New neighborhood for the public servants named *Bairro dos Funcionários*. Source: APM, *Secretaria da Agricultura - Comissão Construtora da Nova Capital*, SA2 004 005, 1894/1896.

The intention of Aarão Reis and his team, in accordance with the guidance of the government, was to harmoniously compose the city as a whole, to the limit of 200 a thousand foreseen souls, even if its construction was elaborated in parts. The configured plan was drawn at various scales, showing the beauty and the comfort of what was understood as a modern city. The wide streets and avenues and well oriented, alleys and boulevards, par excellence, in right angles cut by diagonals. The geometric blocks had the equipment and buildings leased serving as a parameter for the construction that was already underway. The future Cidade de Minas was portrayed there and the Construction Commission concluded the project for the new capital, a period that, in the words of engineer Reis, was the most laborious and, also, the most important of the thorny tasks he had been given.

As mentioned before, the resolution of hygiene problems was on the agenda of reflections on life in cities, at the time the new capital was being idealised. This concern would be reflected in the design adopted for the urban plan, whose layout of the streets and avenues would come to oppose the order established for the old cities, such as it can be seen in its orthogonal scheme and cut by diagonals. The

monuments architectural and buildings in general should be constructed according to the rules of good architecture which would complement this rationalist disposition pre-established.

Belo Horizonte was built with an interest in a view to the future, but with the past experiences stored and used in parallel. The modernity that it would settle down with her was synonymous with progress. In its spatial organisation the regularised street and the right angle would combine with the technical innovations in force. With the new city, an order based on principles would be introduced normative. In its design the assumptions of the colonial construction tradition were put aside. The city would come as a criticism of everything that had been done until then in urban terms. In the planning methodologies of the engineers, words such as order, method, discipline, regularity, would be used by technicians to justify the thoroughness and accuracy of the services involved there.

The public spaces as part of the monumental scheme in the planned city were designed with the modernity related to the reforms made in Paris in the mid-19th century. The three zones were initially designed, the Urban Zone, the Suburban Zone and the Farm Zone with a large avenue that crossed the Urban Zone from North to South. In the original plan this avenue connected the Municipal Market to the new parish church. Adjacent to this monumental boulevard, the Municipal Park reiterated the sense of nature, as a counterpoint to the general plan, which was outlined in terms of superimposed straight squares displaced at 45 degrees. In the three areas defined for the city, the blocks for public buildings were also designated, temples, hospital, cemetery, park, zoo, slaughterhouse, market, sewers, electricity, municipal laundry, schools, police, theatre, fire, etc. The configuration was adopted prior to the reserve of lots to homeowners in Ouro Preto and former owners in the new city. A new neighbourhood for the public servants named Bairro dos Funcionários was planned. In this neighbourhood were defined seven types of standard houses.

The planning also included numerous squares that revealed the modern panorama, such as the administration square, the theatre square, the market square, the station square, among others. The new capital introduces modern urbanism in Brazil. The breadth of the operation that characterised its creation puts it as its first application. When designing the plan, an anticipation of the city's future was included. In this sense, the Construction Commission visualised a beginning, a middle and an end for the future capital, intending to prepare the city for distinct moments.

The city principles according to a plan governed by hygienist ideas were synchronised to nineteenth century urban planning thinking and practises. In this task, interspersed with actions in the field of theory and practice. In addition to mobilising several technicians, as mentioned, the construction of Belo Horizonte involved a huge contingent of workers, including a considerable portion of European immigrants. There were rigorously combined urbanistic ideas that were already announced, that is, in a theoretical or practical way, what was projected for Belo Horizonte, had already been tried out in the main Brazilian cities. The formulation of a new city allowed the experiences developed in these centres throughout the century to be synthesised.

The new city was configured with a system of parks and gardens, with the Municipal Park, as the possibility of immersion in an environment designed as a simulacrum of the natural environment. Thus, this park was designed as an organic space in contrast to the geometric environment in the rationality of straight streets and avenues. Tortuous alleys, lake, stream and stream with waterfalls, rustic bridges, stones, gardens and trees, plus support equipment such as bandstand, municipal theatre, administration and snack bar marked the park's scenery. At one end of Avenida do Comércio, another boulevard, the Central Station was placed, in front of a square, which marked the entrance to the new city. At the other end, the Municipal Market, already mentioned. The station square added to the equipment valued the public spaces in front of the entrance and exit portal of the new city. Its monumental placement was designed initially 200 by 170 metres, then being defined with the dimensions of 200 by 100 metres. Cutting longitudinally this square the Arrudas River modified with elegant bridges. The system of parks and gardens combined with squares, streets and avenues valued public spaces and revealed harmony with the urban reality sought at that time.

The connection with other regions through a railway line was created attaching the new capital from the Central Station to another one named Entroncamento Station, 15 kilometres along the Arrudas River, near the city of Sabará. The commercial district was located in front of the esplanade of the Station Square with a perpendicular avenue designed, initially as a boulevard with 50 metres. This avenue would have 4 metre walks, next to the buildings, via double track for car and tramways, two rows of leafy trees with sidewalks, and in the centre, a sandy road, 8 metres wide, for riders. This extraordinary width of 50 metres has been reduced to 35 metres. At the opposite end of the avenue, a square was designed, initially placed in front of an imagined theatre. This theatre was relocated and in its place was projected a market.

The sectorized plan defined for the city included a ring avenue with the role of connecting distinct areas beyond defining the limits of the urban area. The planned Contorno Avenue, as it was named, delineated an immense boulevard. Its materialisation occurred, with difficulties, having involved removals from popular occupations, only in the 1940s.

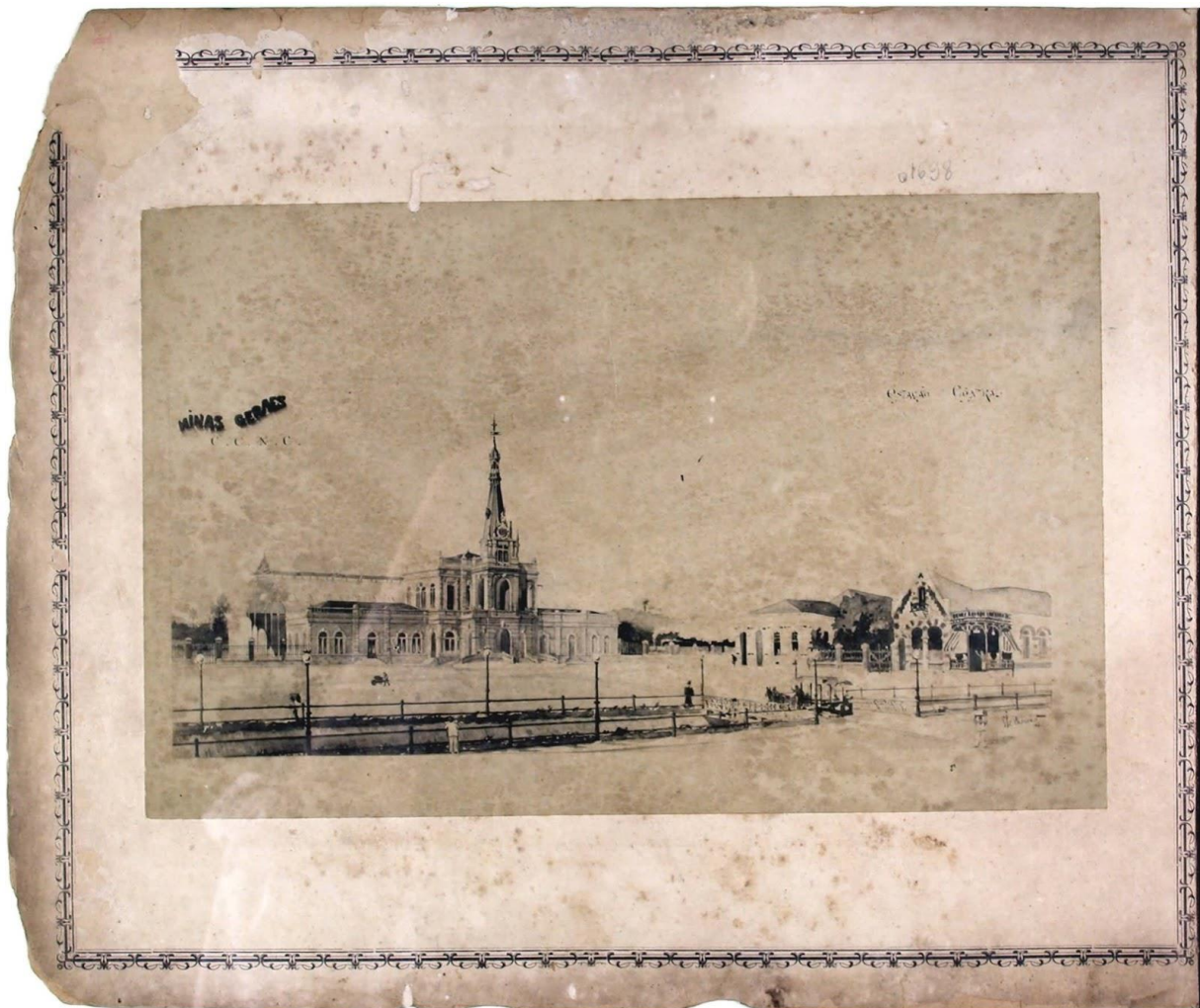


Figure 16. The Central Station and its square with the Arrudas River. Source: MHAB, Comissão Construtora da Nova Capital, CCALB01 057, 1894/1895.

A strenuous and continuous effort was necessary to materialise the idealised new city with the vast majority of buildings, streets, avenues, blocks and squares, under construction at the time of

inauguration. While the planned city persisted as an ideal urban project, another took place on the ground, with a real and incomplete urban dynamic.

The illogicality is present in the first favela in the background of the Central Station while the organicity is represented more as a plan than the reality. The city ruled by art and regularity faded as its opposite took shape. Beyond the first favela, in the surroundings and even in the middle of the urban area improvising buildings were dispersed. Old houses stood like memories of the colonial panorama of the Arraial de Belo Horizonte.



Figure 17. *Favela Alto da Estação, Belo Horizonte*. Source: MHAB, *Comissão Construtora da Nova Capital*, CCFot1896 010, 1896/1897.

In terms of criticism of the plan developed in the works of the Construction Commission, still in 1895, immersed in these works, the engineer Saturnino de Brito raised questions regarding the plan and direction of engineer Reis. Brito advocated the use of a sanitary layout instead of the geometric layout adopted by Reis. He considered such a solution more appropriate to the topography of the region where the city was built.

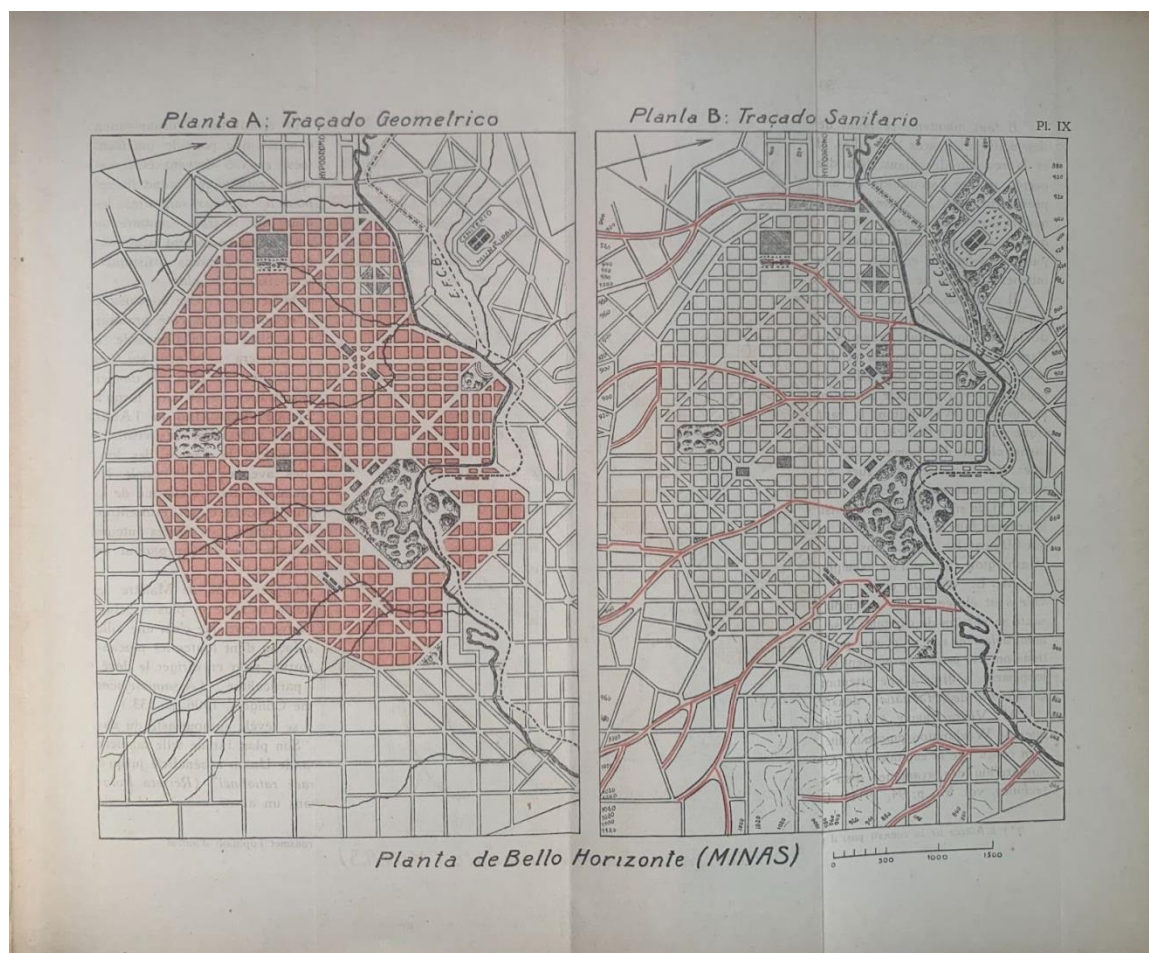


Figure 18. Comparative approach by engineer Saturnino de Brito, “tracée sanitaire versus tracée géométrique”. Source: Brito, F. S. R. de. (1944) *Urbanismo: Traçado sanitário das cidades – Estudos diversos*. Rio de Janeiro: Imprensa Nacional, *Obras completas de Saturnino de Brito*, Vol. XX; Urbanismo.mg/FAUUFJF.

The construction site, the stage for these achievements, which the old village has become, was portrayed by Abílio Barreto, who landed there at the end of 1895. There, “...an immense parade of carts pulled by animals trained in that work, coming and going to the extensive esplanades, in the middle of a cloud of red dust; was a infinity of groups of workers working with ‘chaula’ and pickaxe, at the foot of the ravines, breaking down barriers, filling and dumping earth wagons, land here, land there, land there; were dynamites bursting in the adjacent quarries; they were animals spinning around the kneaders of potteries and these in full activity, in the manufacture of bricks and tiles; were carts and cars of ox grunting under the weight of large loads of wood and others materials; it was pandemonium, in short, the area of land on which the future Capital. And all that dizzying and incessant work developed in them in and around the old houses of the old village and among thousands of ‘cafuas’ and thatched or zinc-covered huts, splashed everywhere, disorderly”.

The city under construction was inaugurated on December 12, 1897. In the following years, despite the technological focus aiming for a rational achievement, the contrasts between the real and the ideal widened.



Figure 19. Inauguration of Belo Horizonte, in 12 December 1894. Source: APCBH, COLEÇÃO DE DOCUMENTOS CARTOGRÁFICOS DO ARQUIVO PÚBLICO MINEIRO - APM, APM-098, S/d.

THE CONSOLIDATION PROCESS: A NEW CAPITAL REPLACING THE OLD OURO PRETO [1897-1940]

In the year following the inauguration, the dissolution of the Construction Commission, still headed by engineer Francisco Bicalho, with creation of municipal services, announced the embryo of what would become the City Hall. At the beginning of 1898, the Commission would be extinguished. The construction works in progress would continue, with a much lower pace of work, in economic difficulties, both regionally and nationally. The economic "depression" that devastated the country, at the turn of the nineteenth century and at the beginning of the twentieth century, interfered in the materialisation of the new capital. The first two decades of the 20th century did not reveal totally the expression of modernity achieved by the planning process. Despite all the difficulties, the modernity of the new capital will reveal itself in the urban configuration adopted and in the equipment inserted.



Figure 20. Municipal market aspect in 1900. Source: APM, NELSON COELHO DE SENNA, NCS-011, 1900.

Numerous modifications were introduced in the master plan. The proposed buildings for the Municipal Park mentioned before did not take place. Other projects did not occur as established. Throughout the formative days the new capital did not reflect the modernity portrayed in the mindset on the day of its inauguration. In the area designed for the first 30,000 inhabitants, approximately half of the Urban Zone, only two streets and an avenue had pavement. Buildings already built, both public and private, reveal the incomplete aspect of the city. At the beginning of the twentieth century, the reality reflects the opposite of what was planned in the completeness of its master plan.

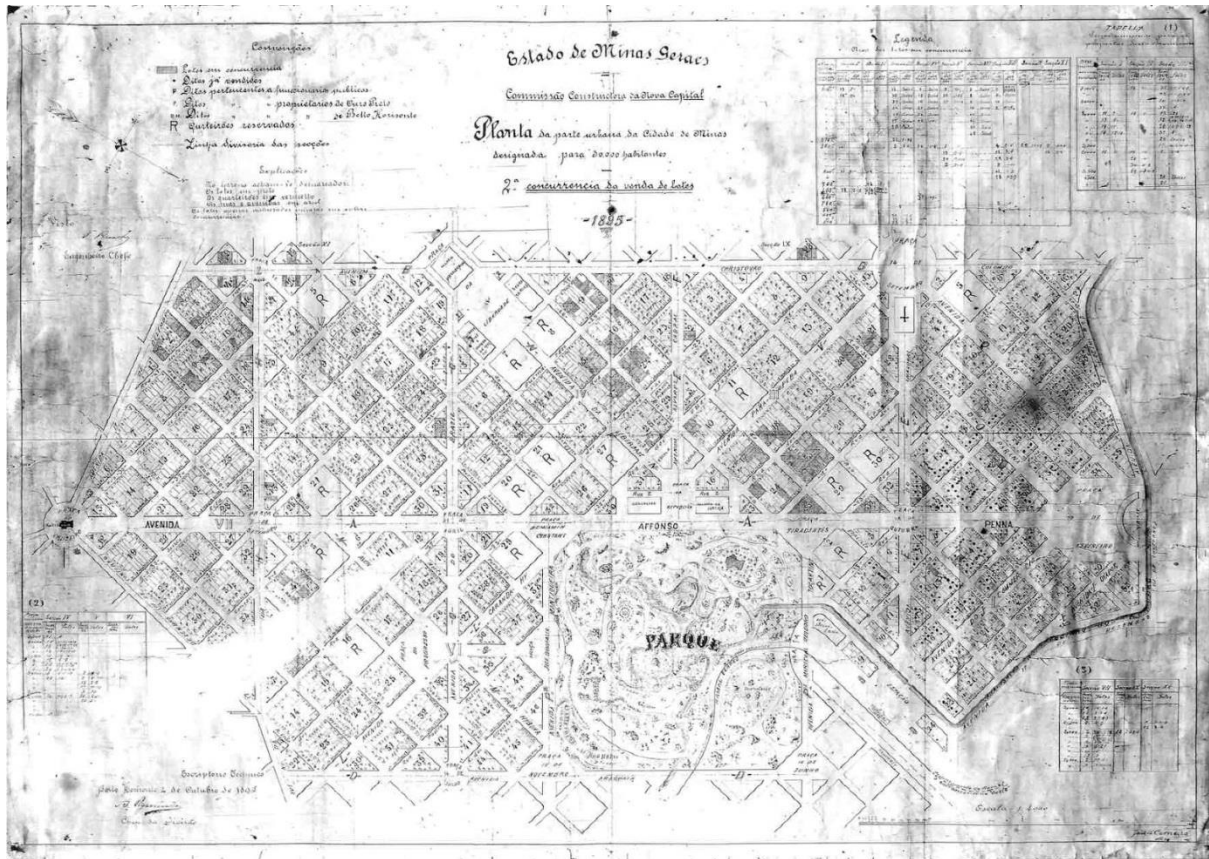


Figure 21. The area for the first 30,000 inhabitants. Source: APM, Secretaria da Agricultura - Comissão Construtora da Nova Capital, SA014, 1895.

In the decades that followed the inauguration of "Cidade de Minas", the transfer of civil servants from the public administration itself, headquartered in the old capital, was progressive. In the planned "Bairro dos Funcionários", the projected type-Houses, these in number of 7 types, changed the scenario related to the colonial language in the mentality of the residents who had been transferred from Ouro Preto. The adopted Eclecticism detached the landscape from the colonial past, which, in addition to the old capital, was also expressed in the old Arraial de Belo Horizonte, demolished for the construction of the New Capital. Still as a major construction site, the city consolidated its administrative role in the decades following its inauguration. The projected public spaces marked the urban scene with perspective effects in an open way without fences or walls. The public spaces in the favelas, on the contrary, reiterated the design of the colonial period with its alleys and alleys.



Figure 22. The Central Station Square in 1898, people waiting for State governor. Source: APM, Nelson Coelho de Sena, NCS/010 1898.

The first decades reveal a panorama that exposes the distance established, in fact, between the planning and reality, concerning hygiene, art and regularity. Progressively, contrasts of the everyday life announced at its foundation become effective in the incompleteness reflected. The consolidation process of the new capital included new neighbourhoods dispersed, predominantly characterised by informality. Lagoinha, Calafate, Pampulha, Cardoso, Pastinho, Menezes, Bom Sucesso among others, were materialised. Added to these new favelas appeared with house types made in wood and dried mud. The Barro Preto, a popular district, was officialized in 1898 to concentrate former construction workers.

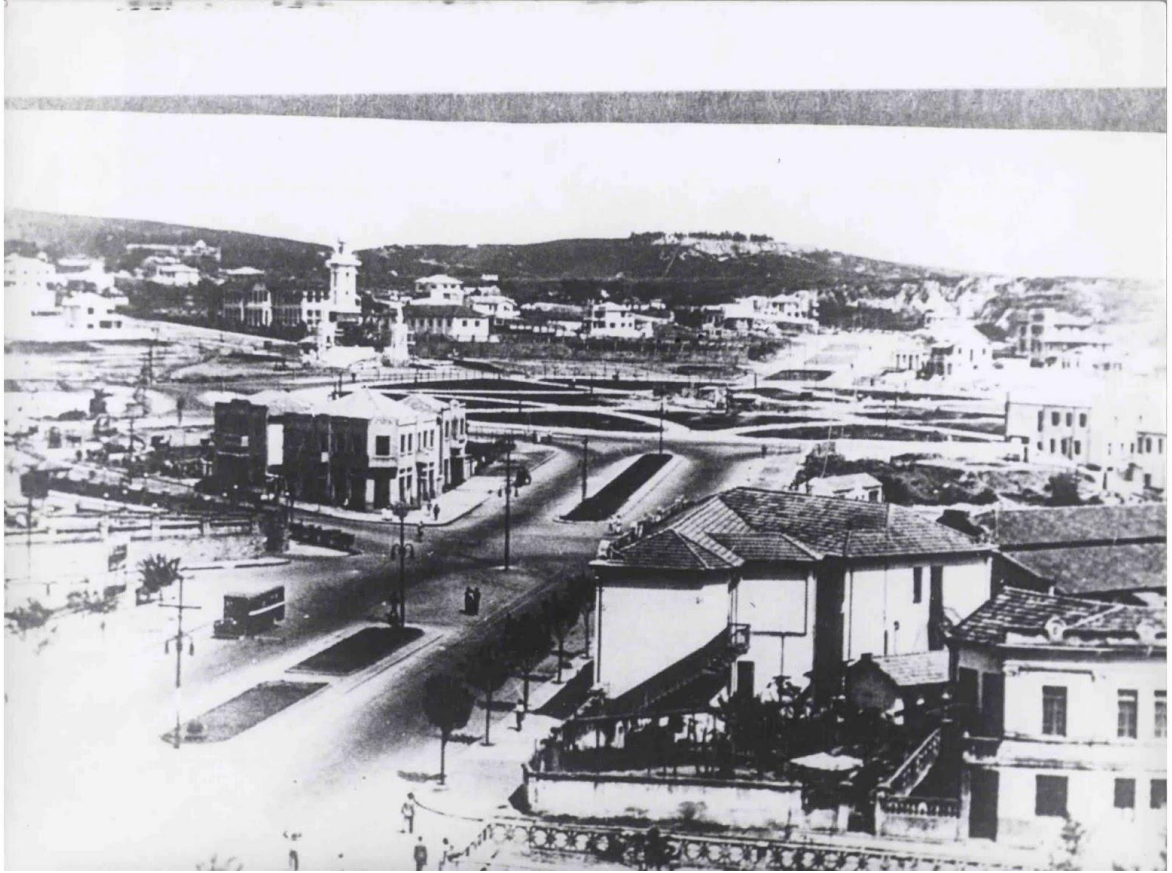


Figure 23. View of Belo Horizonte in 1930, extended urban zone from Raul Soares square. Source: APM, *MUNICÍPIOS MINEIROS*, MM052 (04), 1930.

In opposition to the order of the plan, another order based on improvisation was imposed. This dynamic of informality was also linked to public spaces appropriated and modified by citizens. The contrast between formal and informal spaces was evident, the first, used and controlled by the elite, and the second taken by the popular classes.



Figure 24. View of Belo Horizonte in 1930. Source: APM, OLEGÁRIO MACIEL, OM-2-002(06), 1930.

Outside the Suburban Zone, agricultural colonies configured another type of settlement in the Farm Zone. The purpose of these settlements was the development of small farms which could supply the city with agricultural food. They would also serve to shelter immigrants and, at the same time, they would bring together a workforce that would be profitable to the continuation of the construction of buildings. In the 1930s, the agricultural colonies were annexed to the city.

The failure of the project generated another process that included their land parcelled out in lots, by development companies and by speculators. The conversion of those farms in popular neighbourhoods named villas, generated the spread and extension of the city's urban area. In 1930, there were 25 villas. The expansion of the tram system contributed a lot to this process.

The 1930s represent an important inflection in the history of urbanism in Belo Horizonte, as at that time, the effects of the form of growth that the city had been having since its foundation can be clearly seen, as well as the emergence of a more critical posture in relation to the original plan. In addition to new opportunities for professional endeavours in the field of urbanism and new forums where the city starts to be discussed and proposed again this criticism was imposed. The challenge that was posed to planners and managers was the normalisation of the mentioned “villas” and other agglomerations that sprawled the urban area outside the ring avenue and its articulation with the planned central zone.



Figure 25. View of Belo Horizonte in 1935, Cláudio Manoel Street at "Bairro dos Funcionários". Source: APM, MUNICÍPIOS MINEIROS, MM-075(02), 1935.

As of the 1930s, issues related to sanitation in cities, recurrent with municipal administrations, began to be combined with other themes such as zoning, traffic, urban legislation and leisure. As issues hitherto linked to general hygiene, led by the sanitary engineer guided by the medicine, they were incorporated into the general problems of urban planning translated in terms of global discourses and proposals for cities.



Figure 26. Extract from the Map of Belo Horizonte in 1932. Source: APM, OBRAS PÚBLICAS / DIVERSOS SA, SA - 295, 1935.

The need for the institutionalisation of activities on urban planning reveals a continuous organisation in different governmental levels. Many technicians, some of them urban planners, have been working in the government agencies. From the capital to inland were developed urban proposals with a view on policies to improve the quality of cities. The focus was on sanitation, traffic and transportation systems, infrastructure, favelas and the problems of unlimited spread of urban settlements, among others. Following the years in this period a revision of the initial plan of Belo Horizonte was proposed. In 1934, Lincoln Continentino presented an urban proposal that intends to review this original plan of the Construction Commission. Continent defined its proposal such as a remodel and expansion plan or an improvement and expansion plan, to be drawn from the cadastral plan of the city and what he called the surroundings related to it. The division of the city into specific zones was foreseen, with uses, coefficients and determined occupancy rate, as well as the hierarchy of the road system and the implementation of infrastructure works, in addition to the definition of green areas and leisure, these combined with a recreational system. Other elements included in the plan were airports and public or private services for collective use. Zoning was one of the main components of urban control and North American matrices were evidenced by the use of terms such as housing and park-ways.



Figure 27. An urban proposal to Belo Horizonte by Lincoln Continentino from 1933. Source: LIMA, Fabio Jose Martins de. *Por uma cidade moderna: ideários de urbanismo em jogo no concurso para Monlevade e nos projetos destacados da trajetória dos técnicos concorrentes (1931-1943)*. São Paulo: Universidade de São Paulo, 2003, Tese (Doutorado) – FAUUSP, p.199.

The first, zoning, referring to the various areas of the city, the second, housing, related with the templates and uses of buildings and the third, park-ways, involving the integration of green areas in the city, this translated as park avenues. Continent still highlighted that the problems related to a sprayed city like Belo Horizonte were posed in regional terms, making it necessary to carry out comprehensive studies that would enable the approach to the city and its region. The need to form a commission of urbanism was also highlighted, this one charged with ensuring the faithful execution of the plan, resolving all issues that may eventually occur as a result of it, in accordance with its own legislation.

At the same time as urban development is discussed, in a global vision, the process of renovation of the city's architecture is consolidated, in the search for a "modern style". Therefore, discussions about urban problems were intensified, which, since the first decade of the 20th century, were no longer limited to the issues present in the new Capital. The thinking and practises on urban planning related to the field of urbanism, linked, until then, to the work of engineers, are now of interest to other professionals. Progressively, architects will share and even dispute with engineers, who have always set the tone for urban discussions, the responsibility for the development of cities planning. It is the moment when architects also perceive with greater clarity what these attributions linked to urban problems represent for the profession. Thus, different perspectives appear and expand the possibilities of facing the challenges posed by the capital under processo of consolidation.



Figure 28. School of Architecture, UFMG. Source: Urbanismo.mg/FAUUFJF.

In this period, the possibilities for professional activities were expanded with the foundation of the School of Architecture of Belo Horizonte, in 1930, by a group of architects, with the collaboration of artists, lawyers, engineers and doctors. The school graduated architect-engineers and had as a model of didactic organisation the architecture section of the National School of Fine Arts, in Rio de Janeiro. The course had engineers, architects and artists on its faculty. Engineers were in charge of the chairs of applied sciences and techniques, including urbanism; the architects were in charge of perspective, theory and philosophy of architecture, small and large architectural compositions, analytical architecture and decorative art. Finally, the artists were responsible for drawing and modelling. Among the architects who worked in the city, who collaborated in the creation of the school, we highlight Luiz Signorelli, Raffaello Berti, Raphael Hardy and Angelo Murgel. These professionals had an outstanding performance, either individually or in association, putting into practice certain principles related to urban theories, with affiliations to a greater or lesser degree, to the ideas spread by the Modern Movement, on a world scale through International Congresses of Modern Architecture - CIAM's. The application of these theories extended to the horizons of Minas Gerais, interfering with the development of cities in Minas Gerais. In 1948, the installation of the Urbanism Course at the School of Architecture of the then University of Minas Gerais, aimed at the professional training of urban planners. The course lasted two years and allowed for the systematic study of theories for urban planning interventions, plus cycles of conferences, such as those given by Gaston Bardet, for four months, in the 1950s.

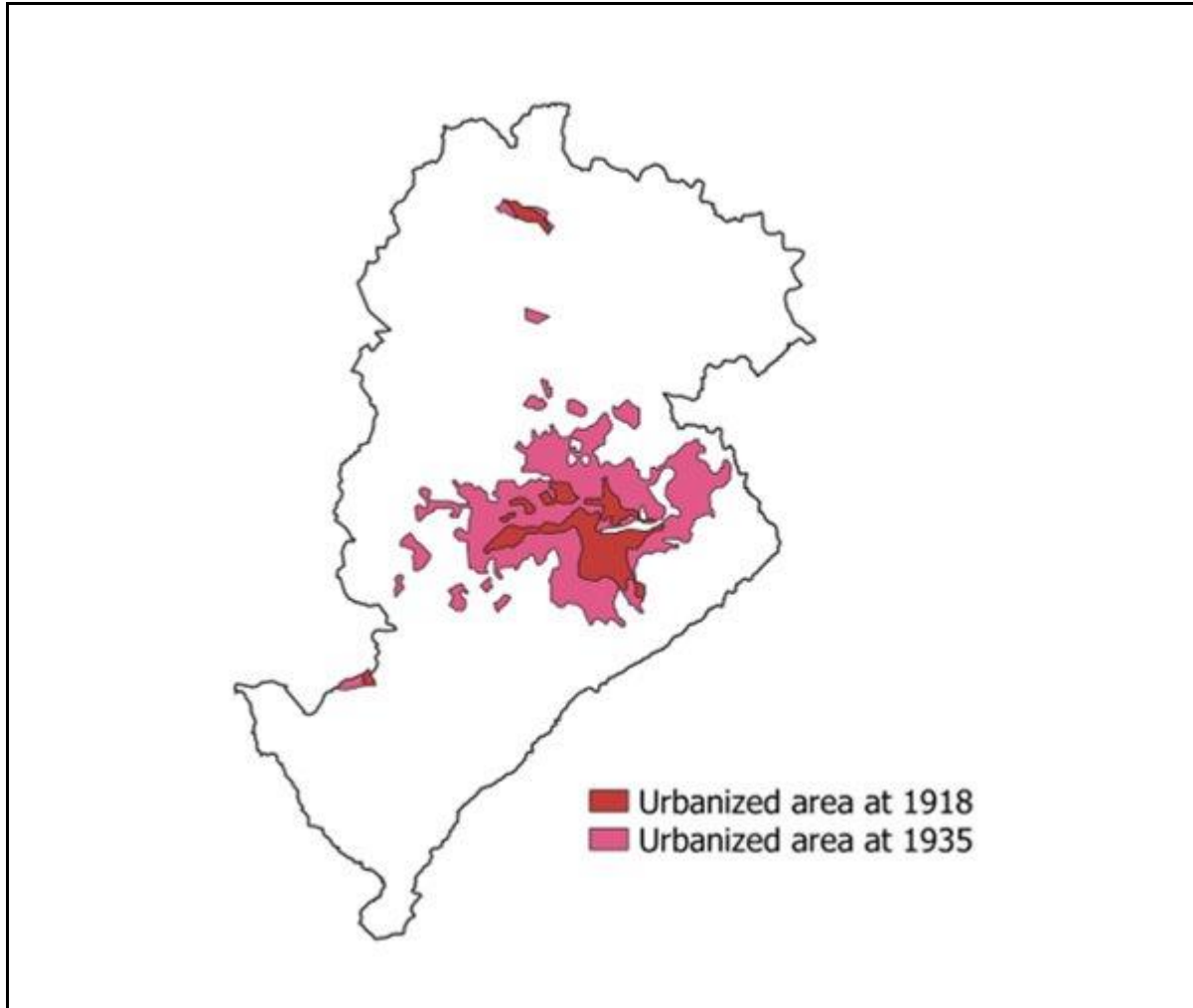


Figure 29. Urbanisation process comparison. Source: BH Map Data.

In the 1940s the modernity announced and materialised through specific achievements with Oscar Niemeyer, reached the dimension of an urban complex. The project for the Pampulha neighbourhood, under the administration of Juscelino Kubitschek, in 1942, involved an extensive program. Casino, Church, Hotel, Restaurant and Dance House, in addition to a Yacht Club and Golf Course were included. The Casino made possible the insertion of the Minas Gerais capital in the tourist circuit of the game and, together with the Restaurant and Dance House, would offer nightly entertainment options. The latter was built on an artificial island opposite the casino, aimed at popular entertainment. Another artificial island was designed with picturesque corners, in the middle of the lagoon, Ilha dos Amores, accessed by boat. The Golf Course would be installed in a huge park. Other support facilities were designed, such as a medical and police post, as well as a water treatment plant. This program was inserted in a new neighbourhood aiming at the development of the suburban area of the city through tourism. The subdivision involved the configuration of "standard" residential lots with a thousand square metres, within a radius of five hundred metres from the banks of the lake, which was created by the damming of the Pampulha stream. The set designed as a "satellite city" would have a tree-lined and illuminated avenue surrounding the entire length of the dam.



Figure 30. Pampulha Lake and its surrounding. Source: APCBH, Achilles Paz, 1953.

The new vision of the city, plus a concern with form, contrasted with the reality of urban occupation in Belo Horizonte. The monumentally dispersed equipment around the lagoon, and the allotment spread out in the middle of the green, linked to publicity around Pampulha, would contribute to these concepts going beyond the horizons of the State. In 1940, Niemeyer had already designed the Grande Hotel de Ouro Preto, which announced, in Minas Gerais, the presence of modern architecture.

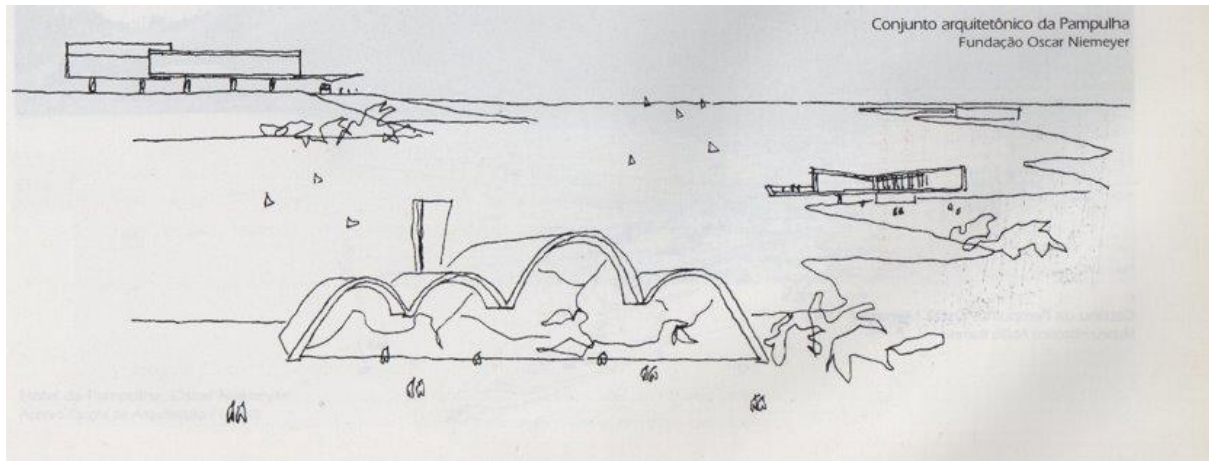


Figure 31. Pampulha neighbourhood, by Oscar Niemeyer. Source: Fundação Oscar Niemeyer.

DESPITE ALL URBAN PROBLEMS: A MODERN CAPITAL [1940-1970]

Modernity is reflected in the planned boulevards characterising the streets and avenues and the municipal park with a tram in the public transport. The Bairro dos Funcionários neighbourhood is the materialisation of the rationality added with the administrative and commercial sectors. The intention of a modern planned city is disturbed by the favelas and vilas mentioned before. The Pampulha neighbourhood mentioned before was under construction with the introduction of paradigms of Modern Movement revealed by Oscar Niemeyer sketches. New public spaces expanded the urban sector with the open ambiences proposed in this planning vertent of urbanism and architecture. At the same time a new industrial sector was planned. The Cidade Industrial sector with fabrics and popular neighbourhoods also expanded the limits of the urban sector of the capital.



Figure 32. Belo Horizonte in 1949. Source: <https://www.youtube.com/watch?v=BMuDF8tS1JU>.

From the 1950s, many proposals were developed by technicians connected to these agencies. In 1950, the establishment of the course of urbanism in the Escola de Arquitetura gave a new impetus to qualify professionals. Attached to the course was the production and diffusion of ideas which allowed a greater theoretical background for technicians. The biographies of the technicians reveal an intense activity connected to academia and governments besides the private sphere, through architectural and engineering and architectural offices. In this sense the course has expanded the possibilities, both in the public and in the private sphere, in view of specialisation. Until the creation of the course the proposals for cities have been made mainly by professionals from sanitary engineering.



Figure 33. Urban centre. Source, Afonso Pena Avenue, Praça Sete Square. APCBH, 1945.

At the municipal level, in 1951, the creation of the Service of the Master Plan constituted an important initiative. The agency was subordinated to the mayor of the capital, during the administration of Américo Renê Gianetti (1951-1954). Among the professionals in the head of this urban planning agency, Walter Machado, Martim Francisco Coelho de Andrada, Radamés Teixeira and Paulo Gaetani. Walter Machado led during the administration of Celso Mello Azevedo (1955-1959). In this period, the Society for the Graphic and Mechanical Analysis applied to the Social Complexes - SAGMACS has been contracted by the city hall to develop a survey in Belo Horizonte. A socio-economic perspective was posed, as well as the multidisciplinary aspects implicit in them. Until then, the physical dimension was prevalent in Belo Horizonte searching for a lost planned city. The SAGMACS was connected to the Economy and Humanism movement, whose founder and theorist was the French Dominican friar Joseph-Louis Lebreton.



Figure 34. Urban centre, Raul Soares square. Source: APCBH, 1950.

Successfully concluding its surveys' report entitled "Urban Structure of Belo Horizonte" the leadership of Benevenuto de Santa Cruz and the participation of Annibal Vilela, Antônio Bezerra Baltar, Antonio Delorenzo Netto, Celso Lamparelli, Francisco Whitaker Ferreira among others. In 1961, the mayor Amintas de Barros (1959-1963), once again contracted SAGMACS. This time, to develop the "Master Plan of Belo Horizonte". Leading this work, concluded in 1962, Antônio Bezerra Baltar, followed the guidelines explained before by Benevenuto of Santa Cruz and Francisco Whitaker Ferreira. In this opportunity participated Cláudio Soares de Azevedo and Flávio Magalhães Villaça, as well as the architects Clementina de Ambrosis, Francisco Whitaker Ferreira and Silvio Breno de Souza Santos. Also collaborating Celso Monteiro Lamparelli and Domingos Theodoro Azevedo Neto, besides the architects Mário Berti and Roberto Sussman, by Escola de Arquitetura and José Raimundo Martins Neves in the City Hall. During the surveys of SAGMACS the Service of the Master Plan collaborated, namely with Paulo Gaetani and Euclides Lisboa. The guidelines of the "Relatório do Plano Diretor de Belo Horizonte" have not been implemented. However, these referentials were partially included in the next decades. In the following years, the difficulties faced by the Service of the Master Plan were reflected in the mayor reports. The need to implement a master plan was mentioned including the view of regional planning.

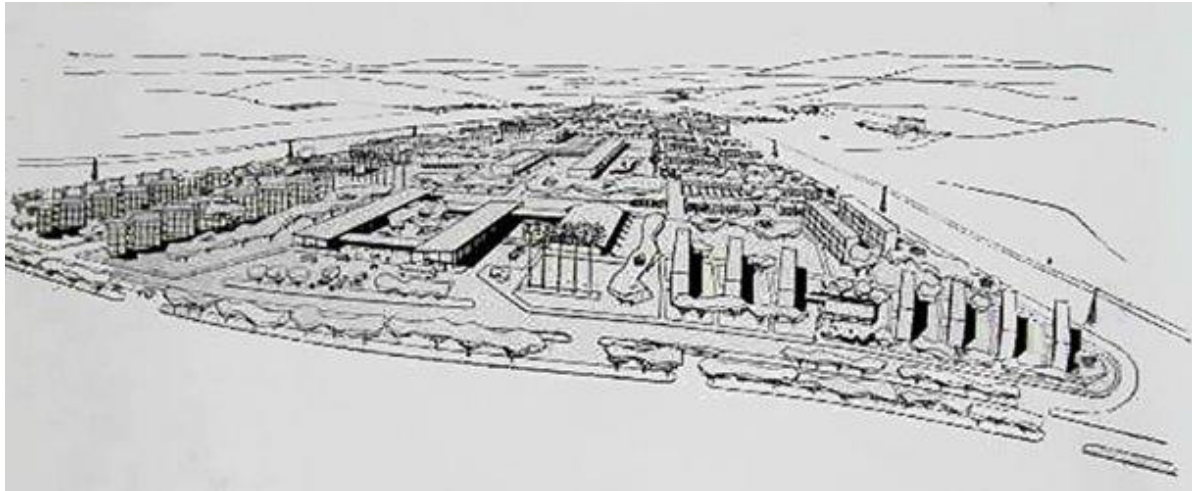


Figure 35. Mannesmann worker's neighbourhood from the 1955's by Henrique Mindlin. Source: Urbanismo.mg/FAUUFJF.

In the 1960s the political scenario was very complicated. In 1961, on federal level the resignation of president Jânio Quadros revealed instabilities in the country. The military ministers' manifesto against vice-president João Goulart tried to prevent him from assuming the presidency. The threat of Communism justify repressive measures against leftists and their sympathisers. In the following years these measures to maintain the public order generated repression against the popular uprisings. Everyday manifestations were usual - on the one hand, those in favour of restrictions plus a military intervention; on the other hand, those against censorship and restrictions of freedom. In 1964, as an inflexion point, the military coup d'état consolidated authoritarianism. The freedom of citizens everywhere was limited. The National Union of Students - UNE denounced the dictatorship implanted that increased the restrictions. This political conjuncture interferes in the academic and professional routine connected to democracy. In this context the criticism was polarised with fierce confrontations.



Figure 36. Students at Federal University of Minas Gerais - UFMG, military coup d'état consolidated authoritarianism. Source: UFMG, 1977.

Progressively, the use of individual cars will be widespread, and public transport will be limited to buses, in the case of urban and suburban areas. These will also be used for regional and national connections in addition to rail transport. Trolleybuses and trams were deactivated during this period. The trams are remembered for the station adjacent to the Municipal Park, which has been preserved, in addition to the waggons exhibited at the Abílio Barreto Historical Museum.



Figure 37. Pampulha neighbourhood, Mineirão arena. Source: BELOTUR/PMBH, 1970.

In 1969, the creation of the Superintendence of Capital Development - SUDECAP, reflects the complexity in the sense of the process of metropolization. In 1973, the Metropolitan Region of Belo Horizonte - RMBH has been defined including respective "[...] municipalities Belo Horizonte, Betim, Caeté, Contagem, Ibirité, Lagoa Santa, Nova Lima, Pedro Leopoldo, Raposos, Ribeirão das Neves, Rio Acima, Sabará, Santa Luzia and Vespasiano." During this period, the Belo Horizonte Metropolitan Planning Region - PLAMBEL was established, which was responsible for "[...] elaborating the Metropolitan Plan of the Belo Horizonte Region and controlling its execution [...].



Figure 38. Urban Centre, Afonso Pena Avenue. Source: APM, MUNICÍPIOS MINEIROS, MM 344(07), 1950.

These experiences in Belo Horizonte and inland cities have provided diverse referentials with numerous technicians involved. Opportunities were offered throughout the process of planning institutionalised in municipal and state levels. The theories were applied in the cities considering its characteristics as a laboratory of thinking and practises. Several urban proposals reveal the process of institutionalisation of planning activities. Plans and projects were elaborated and partially applied in the cities covering diverse thematics. The approaches have been made in different situations as well as new cities or new settlements and also in the existing ones. On one hand, the governmental policies demand, on the other hand private offices and companies demand.

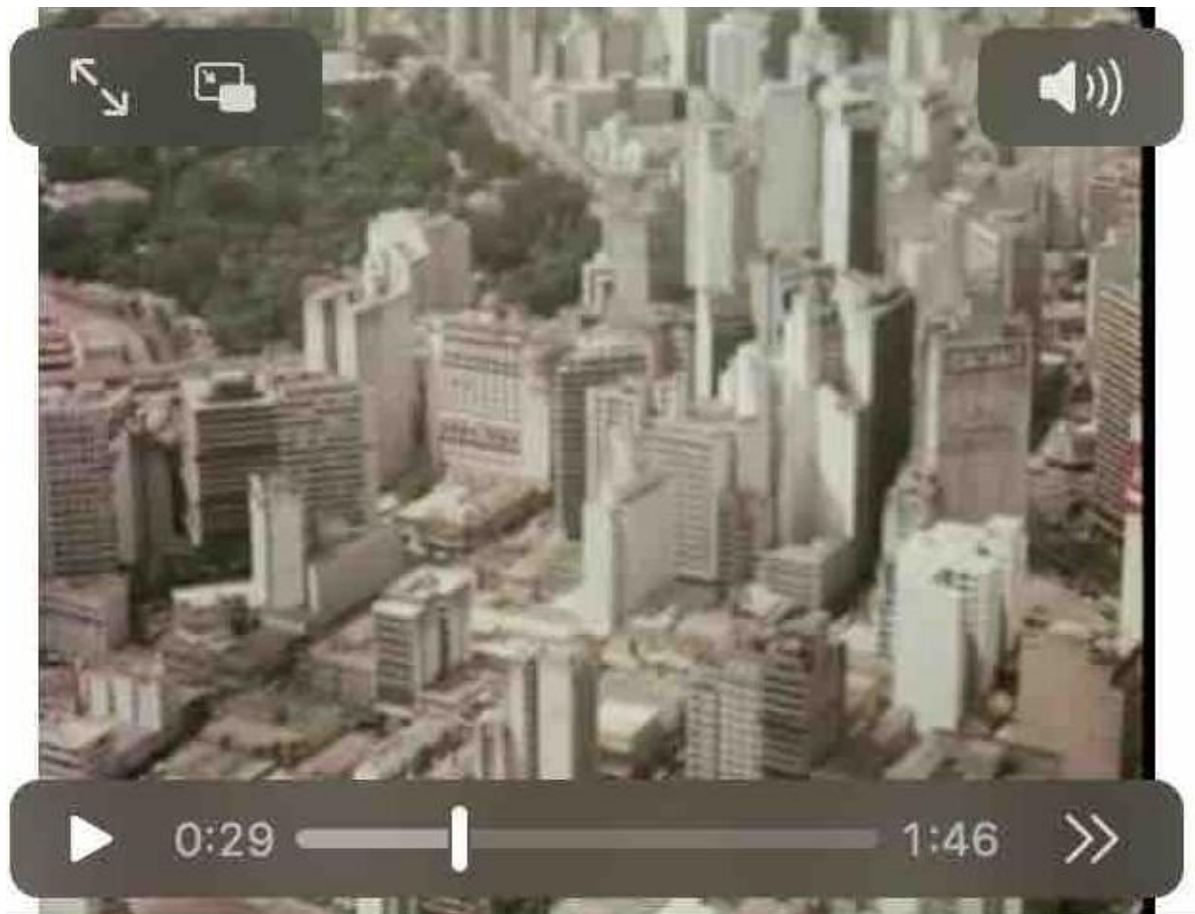


Figure 39. General view in 1970, verticalization, http://www.siaapm.cultura.mg.gov.br/modules/x_movie/x_movie_view.php?cid=Acervo&lid=84. Source: APM, Filme N 70, 1970.

THE EMERGENCE OF PLANNING STILL REMAIN IN THE CAPITAL OF STATE [1970-2000]

The emergence of planning materialised and consolidated the proposals developed in the 60s as master plans with the introduction of metropolitan ideas that reflect the reality of the city and its region. In the 80s the sense of preservation of the Cultural Heritage was revealed after the demolition of an important cinema, the “Metrópole Cinema”. Planning with participation was introduced following the democratic overture after the new Federal Constitution in 1988. The Dictatorship times ended with popular movements and Democracy was established.



Figure 40. Urban Centre, Metrópole Cinema. Source: EM, Carolina Mansurpostado em 28/12/2013.

In the 1970s, urban proposals were placed as interventions, these without popular participation, with the technical and scientific domain defended, in the wake of the authoritarianism still present with the Military Dictatorship. Technocracy was placed as an imposition for decisions related to public policies. During this period, the interference of traffic in the city, through the road corridors created, is accentuated, as well as the transformation of public spaces to adapt to the road system.



Figure 41. General view in 1977, verticalization, http://www.siaapm.cultura.mg.gov.br/modules/x_movie/x_movie_view.php?cid=1&lid=57 . Source: APM, PCB-Filme-012, 1977.

In 1980/90 urban operations in the centre to expand the pedestrian space with the reduction and impediment in some stretches of vehicular traffic. Around the central area in the Praça 7 square, pedestrian walkways were created. Created as a square, it is worth mentioning, Praça 7 went through mutations that turned it into an intersection for vehicular traffic, without having anything related to the environment of a square. The Savassi square underwent similar changes, and in the late 1990s sidewalks were created in its surroundings, following what was done in the central area of the city.



Figure 42. Public spaces consolidated/reevaluated. Source: [Urbanismo.mg/FAUUFJF](https://urbanismo.mg/FAUUFJF).

The implementation of the subway system in the 1980s meant an advance for public transport in the city, even if limited to interconnected sectors from East to West with a circulation line. From East to West, the train went to the municipality of Contagem, where the Eldorado Station was installed in the Industrial City.



Figure 43. Public spaces consolidated/reevaluated, Subway transport system. Source: O Tempo, Fred Magno, <https://www.otempo.com.br/cidades/estacao-de-metro-lagoinha-fica-fechada-apos-roubo-de-cabo-e-curto-circuito-1.2310584>.

In the 1990s, after the political opening, which occurred as a result of social movements, which determined the end of the Dictatorship, participation was the key to urban decisions. That way in 1996 a new master plan considering participatory process was approved and institutionalised as a law. The master plan constitute the “...*basic instrument of urban development policy - under the physical, social, economic and administrative aspect, aiming at the sustainable development of the Municipality, bearing in mind the aspirations of the community - and guiding the performance of the Public Power and private initiative*” The plan includes specific topics related to preserve, protect and restore the environment and the municipal cultural, historical, scenic, artistic and archaeological heritage, as mentioned in the law.



Figure 44. Public spaces consolidated/reevaluated, Raul Soares Square. Source: APM, MUNICÍPIOS MINEIROS, MM052 (01), 1990.

It is worth mentioning that from the 1990s, particularly, high walls and fences, some with electronic devices, became part of the urban scene. The search for security intensified the use of control devices through cameras. Ostensible policing in the suburbs and favelas, in popular public spaces, revealed different approaches in relation to elite public spaces. The difference in approach to policing is also revealed in the matter of infrastructure, on the part of the municipal administration. The contrast in the quality of equipment and furniture in areas considered "noble" in relation to popular sectors is clear.

UNLIMITED CITY WITH THE UTOPIA OF PLANNING AND THE CHALLENGES POSED BY THE PANDEMIC TIMES [2000-2021]

The city enters the 21st century with effective proposals for master plans under implementation. Urban planning follows methodologies aimed at inserting pedestrians and restricting the use of cars. During this period, investments were also made in the "BH-Hypercentro" action plan, which through multi-sector proposals aimed at requalifying the capital's hypercenter. This requalification signalled to the market a redirection of real estate capital to traditional spaces, in a process of devaluation.



Figure 45. Public spaces consolidated/reevaluated. Source: Acervo Pessoal, Fabio Lima, 2011.



Figure 46. Public spaces consolidated/reevaluated, contrasting occupations because of inequality. Source: Acervo Pessoal, Fabio Lima, 2013.

In this context, the city hall, through the “Centro Vivo” program, relocated street vendors to new popular shopping malls, thereby increasing pedestrian mobility on the sidewalks. In parallel, it structured a popular restaurant, popular culture spaces and estimated the production of housing in the centre through flexible use and occupation parameters. Such actions were combined with architectural and urban planning interventions, such as the station square, the rue boulevard, closing blocks in the area of square seven and widening sidewalks, elevated crossings, pedestrian lighting, new paving and the creation of new designs for furniture urban areas in several public places in the hypercenter region.



Figure 46. Public spaces consolidated/reevaluated, MOVE transport system. Source: Acervo Pessoal, Fabio Lima, 2014.

Such interventions changed the dynamics of the central region, which would soon have a new injection of resources in view of the commitments established by the federal, state and municipal governments due to the 2014 Soccer World Cup and the 2016 Olympic Games.

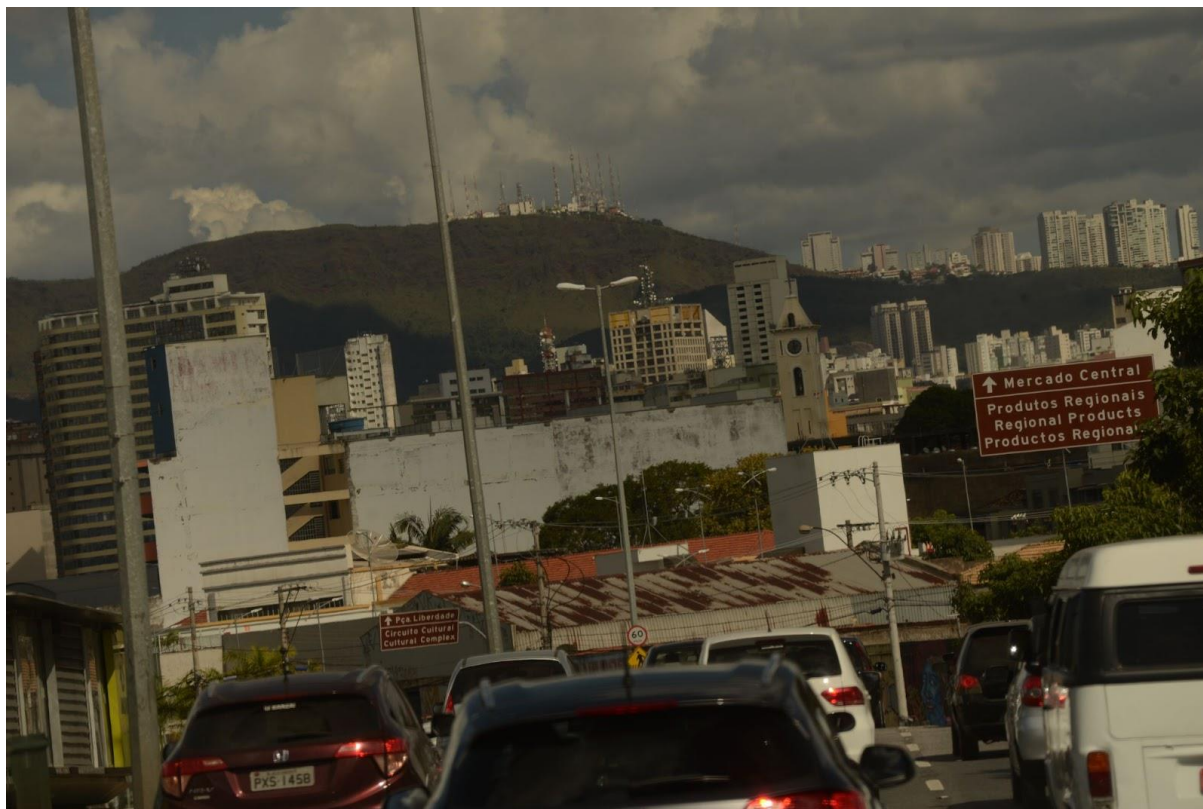


Figure 47. Public spaces consolidated/reevaluated. Source: Acervo Pessoal, Fabio Lima, 2014.

The appropriation process of public spaces in Belo Horizonte has been intensifying in recent years, with the most diverse types of occupations, whether for leisure and enjoyment in the squares, or in the proposal of merchants and hotel owners for the creation of the bohemian district in Guaicurus, whether in political, evangelical movements and popular demonstrations in the “Praça Sete” central square, in MC's duels under the Santa Tereza viaduct, or in the vertiginous growth of Belo Horizonte's street carnival, public spaces were being taken over by citizens.



Figure 48. Public spaces consolidated/reevaluated. Source: <https://www.uai.com.br/app/noticia/musica/2018/12/14/noticias-musica,238812/belo-horizonte-recebe-a-finalissima-nacional-do-duelo-de-mcs.shtml> .

As a demonstration of the recognition of the relevance of the public space as a meeting place, in 2019 the new Belo Horizonte Master Plan was approved, which brought concepts, instruments and parameters that guide urban policy.



Figure 49. Public spaces consolidated/reevaluated, area of the hypercenter's rehabilitation plan. Source: PMBH, <https://prefeitura.pbh.gov.br/politica-urbana/planejamento-urbano/plano-diretor/proposta>.

However, in the same year that the Master Plan pointed out tools to qualify and intensify the use of public spaces, the pandemic grew in an overwhelming way in the world, intensifying in Brazil from 2020. In this context, there was a brutal break in the process of appropriation and structuring of activities in the public space. On the other hand, there was an increase in the occupation of public spaces by homeless people living on the streets. At the moment, with the advance of vaccination and the reduction of contamination, parks have been gradually reopened, bar chairs on sidewalks have increased, and events have resumed.



Figure 50. Public spaces consolidated/reevaluated. Source: <https://g1.globo.com/mg/minas-gerais/noticia/2020/04/05/coronavirus-bh-tem-domingo-com-pracas-interditadas-e-pessoas-praticando-atividades-na-rua.ghtml>.

It is now necessary to understand the size of the fissure generated by the pandemic nowadays considering appropriation by citizens on public spaces in their most distinct dimensions. It is imperative to reflect on the new social dynamics established with the virtualization of activities, rethinking the tools that make it possible to guarantee the reestablishment of fruition in new and old qualified public spaces.



Figure 51. Public spaces consolidated/reevaluated, homeless in the pandemia times. Source: https://www.em.com.br/app/noticia/gerais/2021/07/12/interna_gerais,1285641/moradores-de-rua-em-bh-ja-superam-populacao-de-450-cidades-mineiras.shtml.

CONCLUSION

Finally, some aspects should be highlighted, the first one related to the difficulties to materialise the theories on urban planning. Even with the long process of institutionalisation mentioned before, which included theoretical fields, the cities didn't order its development. Even with numerous proposals referenced on theories and practises the difficulties remained. In the capital, Belo Horizonte, the unlimited spread of irregular neighbourhoods amplifies the complexity of problems. Proportionally, inland state cities have reproduced this process. Overall, the urban problems remained and the thematic complexity reveals a socio environmental tragedy. As mentioned, housing, infrastructure, circulation and transport systems etc. are recurring. The loss of public spaces with quality and the sense of community increase the problems. The specialised knowledge and advanced techniques on urban planning have been applied in an incomplete, contradictory way.

It must have been a disappointment that professionals with several opportunities couldn't transfer and adapt the planning models. Everything could have been so different working into the agencies with governmental support but that doesn't seem to be the case. Ingenuity and lacking in vision on public policies may be considered. Management issues and participatory processes also intervened in the failure of planning. At the same time, on one hand, the criticism by technicians in the debates and forums related to thinking and practises on urbanism and urban planning was conflicting. After all, these professionals were directly interconnected with the activities in the governmental agencies. On the other hand, they were also in the private sector linked to engineering and architectural offices. The contradiction between thinking and practises became evident with the incomplete materialisation revealed everywhere in the cities. In this regard, the absence of an integrated development strategy based on urbanism and urban planning and its consequences remains.

As mentioned before, it is now necessary to understand the size of the fissure generated by the pandemic nowadays considering appropriation by citizens on public spaces in their most distinct dimensions. It is imperative to reflect on the new social dynamics established with the virtualization of activities,

rethinking the tools that make it possible to guarantee the reestablishment of fruition in new and old qualified public spaces.

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Comparative approaches on urban planning: theories and methodologies in the historical analysis of the cities, Minas Gerais, Brazil

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ABSTRACT

The article explores methodological aspects of a research on urban planning and urbanism and discusses the role of planners in the transformation of the cities in Minas Gerais state, Brazil. In this regard, theories and practices used by technicians were analyzed. This recurrence to history in the first half of the XXth century includes biographies allowing a specific vision to improve knowledge on strategies on urban planning facing distinct realities. The approach is linked to a research on public spaces that involves local and regional urban policies with a perspective of comparative approaches. At the same time allows us to search for ways to promote the reversal of the current unsustainable reality considering environmental and cultural aspects. In Minas Gerais state, many cities spread their surroundings, damaging environments with uncontrolled growth. That way irregular new neighborhoods and slums have been expanded limits as well as undesirable polluted rivers and devastated forested areas. In addition planned urban proposals follow the same methodology of devastation even if regular emphasizing design directed to cars more than people. The disregard of history and cultural heritage is present in these new arrangements. The state capital city of Belo Horizonte stands as a clear example of these undesirable transformations. Rethinking these developments is a path to the challenges posed on urban planning research nowadays even more in these pandemic days. And it is worth saying that these issues are addressed in order to continue previous urban studies in Minas Gerais state, Brazil.

Keywords: Urban Planning, Urbanism; Urban History; Public Spaces; Cities; Minas Gerais; Brazil

INTRODUCTION

The paper presents methodological aspects of a research on urban planning and discusses the role of planners in the transformation of the cities in Minas Gerais state, Brazil.¹ On one hand, focusing theories applied to the cities and on the other hand proposals developed by planners facing urban problems. The intent is to amplify theoretical references reinterpreting some cases related to technician trajectories. In this sense focusing on planning proposals has the sense to relate theories used to create new cities and changing existing ones. That way the article approaches the institutionalization of urban planning activities in the first half of the XXth century as an answer to the needs imposed by cities. Over time planners have been working in governmental agencies, educational institutions and private companies. The perspective of comparative approaches is set in a relevant way in order to continue previous urban studies in Minas Gerais state.

Different generations were present in the thinking and practices related to urban proposals that implicated cities' transformations. Proposals are intrinsically linked with personal trajectories that involve academic and professional activities. Theories on modern urbanism were applied in distinct

¹ The paper is part of the activities connected to the Urbanismo.mg research group formed in 2005 at the Federal University of Juiz de Fora which is linked to the Urbanismo.br research network. The paths related to these activities are available at <<http://www.ufjf.br/urbanismomg/>> Distinct versions of this article were presented first in the 14th IPHS Conference Istanbul, Turkey, in 12 - 15 July 2010 and second in the 15th IPHS Conference São Paulo, Brazil, 15 - 18 July 2012: Lima, "Comparative Approaches on Urban Planning Cities' History in Minas Gerais, Brazil", and successively: Lima, Portes and Rezende, "Different visions for the same cities, translations and appropriations of urban ideologies in Minas Gerais, Brazil".

urban realities. Public spaces, equipment, infrastructure, housing, etc. reproduced ideologies linked to Modern Movement, Garden Cities ideas and others. Sometimes the proposals mixed opposed ideologies in the site's pre-existing or in new creations. Modernisation was a keyword in the planning perspectives represented in various drawings and sketches added to theoretical explanations.

The analysis from a historical approach focuses on concepts and themes related to cities. It's worth to say that nowadays unsustainability emerges which is revealed by the impacts of the historical process of development of the cities. This process faces many problems and challenges reflected in the current urban realities through cultural and environmental issues. Likewise over time in everyday cities the deterioration of landscape has been increased. That way irregular new neighborhoods and slums have been expanded limits as well as undesirable polluted rivers and devastated forested areas. In addition planned urban proposals follow the same methodology of devastation even if regular emphasizing design directed to cars more than people. The disregard of history present in these new arrangements directly impacted on the loss of cultural heritage. The state capital city of Belo Horizonte stands as a clear example of these undesirable transformations. Rethinking these developments is a path to the challenges posed on urban planning research nowadays even more in these pandemic days.

In general, the cities in Minas Gerais still reveal an image that cars prevail over people. Attempts at proposals that consider people adding distinct modes of transport, particularly in Belo Horizonte, have been made to reverse this situation but they are insufficient. Proposals still remain in theory rather than in practice. In this sense added to the loss of cultural heritage mentioned, public spaces deteriorated progressively. Considering these issues the research focusing on urban planning theories and methodologies should contribute to thinking about an agenda that includes requalification and renewal of urban public spaces. That way local and regional urban policies with participatory process affect cities' realities considering environmental and cultural aspects which fit on this research.

THINKING AND PRACTICES ON URBANISM AND URBAN PLANNING

The recurrence to the history of cities includes biographies composed by personal trajectories closely connected to ideals and practices focused on urban problems. At the same time, allows a comprehension about the complexity that is part of the historical process. It is worth mentioning that "... the use of biography reveals itself as a strong narrative expedient: to suggest a unity and at the same time, emphasise the dissolution of coherent identity of a person in the relationship established with the group to which it belongs, or even what this represents in terms of practice or social circle (and cultural). The reconstruction of the life of an individual interest as a study of a network of personal relationships, or also only as restitution about lines of planning thoughts that circulate around the character and interfere with your stance. In short, this approach is put forward as a pretext for the simultaneous construction of many more stories and intellectual trajectories irreducible to a single record."² That way successive approaches have allowed a comprehension of a variety of proposals made by planners concerned with city development.

The questions focused on several moments that characterise the cities growth should be thought of in the context of space and time in which they are linked. The crucial question to the history of cities that arises in the beginning, according to Zucconi, is to interrogate "... where and when?". And also according to Calabi should be considered "... a series of tools and strategies of interpretation" in the time duration and on its own chronology, with the aim of understanding the specific moments of change.³ The time is considered as a source of change and permanence, as well. For the history of cities, and in particular to the urban planning's history, this stands as a variable key and a major theoretical issue, each moment can be understood as the synthesis of the times that it converges.⁴

² Calabi, Parigi anni venti, 10.

³ See lecture notes from classes with Donatella Calabi and Guido Zucconi during postdoctoral studies at the Università IUAV di Venezia. Lima, Report from Venezia.

⁴ Fernandes and Gomes, "A pesquisa recente em história urbana no Brasil", 13-28.

Focusing on certain horizons which process is not linear the search involves historical facts and characters connected to the urban transformations. Even though in a search of modernization the proposals neither have always brought progress. Through the analysis specificities can be interpreted on a case-by-case different contexts. That way the research interests do not really involve an approach that includes a remote beginning i.e., an original start point. In the approaches chronologies don't have the sense of an evolutionary process. At the same time continuities and changes have been explored without a search of cause and effects. The studies also consider that the comprehension of the past is referential to the present time in searching solutions to the current urban problems. It is worth noting the complexity is entirely distinct.

Thus, the comparative approaches on urban planning with focus on the history of cities is placed in a relevant way. Several studies discuss the origins of urbanism and urban planning in Brazil focusing on the proposals developed by planners.⁵ These studies highlight the importance of understanding where and when such transformations occurred. In this sense, the trajectories of the planners allow a specific vision facing urban problems. The perspective includes previous studies related to the cities in Minas Gerais with a sense of continuity. That way these methodologies under construction have been used in case studies as well as the creation of Belo Horizonte, the new capital of the state in the late XIXth century among others. Those studies enable the basis for the comprehension of the transformation of the cities related to the planners' trajectories that interfere in the development of Minas Gerais state.

THE ROLE OF PLANNERS AND INSTITUTIONALIZATION IN THE FIRST HALF OF XXTH CENTURY

Multiple and diverse paths reveal the main concern of planners in Minas Gerais, on a search for a theoretical background in urban planning facing the problems of the cities. Many theories have been used for the urban transformations which were applied in distinct realities considering existing cities or the creation of new ones. Translations and appropriations were adapted as a result of cultural exchanges included in the academic and working experiences of the planners. Public spaces, equipment, infraestrutura, housing, etc. reproduced ideologies linked to the current vision of a modern city.

Throughout the XIXth century the Portuguese references lost their intensity and new paradigms were introduced. Paris takes the lead as an ideal city model. Changing its capital at the end of this century, the state of Minas Gerais followed this model. Belo Horizonte was created as a modern city opposing the ancient capital Villa Rica, later Ouro Preto until nowadays. Following the modernization of Brazilian cities the new capital reflected the influence of positivism and sanitary engineering. This time sanitary engineers were in the front bearing in mind the technical field related to the urban problems. This way Belo Horizonte reveals utopias linked to the reform of Paris and the planned Argentinian cities as well as La Plata, both examples referenced in the proposal. The new capital will become a reference in regard to urban planning in practice, even with the difficulties encountered along its implementation. The plan radiates modernity with avenues and streets designed as boulevards conjugated in terms of straight paths drawn on two overlapping squares and shifted to 45 degrees. Parks, squares, neighborhoods, its boulevards and gardens reveal innovations in comparison to the colonial Portuguese references which were present in the old cities of the state as well as Ouro Preto the oldest capital. Inaugurated on December 12, 1897, the city remains as a working site in the first decades of the XXth century.

Over the ensuing years, this distance related thinking and practices revealed in Belo Horizonte will remain in the efforts to organize cities through urban planning methodologies in the Minas Gerais state. Apart from the lack of quality housing and the uncontrolled spread of the city other serious problems multiply. Public infrastructure, circulation systems, etc. made city management impossible. This context in the capital was reproduced in the inland city state. The emergence of planning generates its progressive institutionalization. This process in the field of urban planning consolidated in the 1970s, and included creation of municipal and regional planning agencies. From the 1950s, many proposals

⁵ Among others see: Leme and others, *Urbanismo no Brasil*.

were developed by technicians connected to these agencies. In 1950, the establishment of the course of urbanism in the Escola de Arquitetura gave a new impetus to qualify professionals.⁶ Attached to the course was the production and diffusion of ideas which allowed a greater theoretical background for technicians. The biographies of the technicians reveal an intense activity connected to academia and governments besides the private sphere, through architectural and engineering and architectural offices.⁷ In this sense the course has expanded the possibilities, both in the public and in the private sphere, in view of specialization. Until the creation of the course the proposals for cities have been made mainly by professionals from sanitary engineering.

For the same period, only educational institutions in Rio de Janeiro and Porto Alegre offered similar courses.⁸ The course comprised numerous subjects. In addition, conferences were offered, such as the course coordinated by the French architect Gaston Bardet, during four months, in the 1950s. The invitation by the director, Aníbal Pinto de Mattos, was suggested by José Geraldo de Faria, who had a law degree and taught in the course of urbanism.⁹ In 1963, under the direction of Sylvio de Vasconcellos, the interruption was considered and caused interest in the Escola de Engenharia. Lincoln Continentino made arrangements to transfer the course to that school which did not materialize. The first post graduate students concluded on December 12, 1951, adding 14 urban planners, among them Danilo Francisco Ambrósio, Radamés Teixeira and Sylvio de Vasconcellos.¹⁰ Many professors have passed in the course since its creation. Some of these already mentioned students have an intense performance as urban planners in the government, namely Danilo Francisco Ambrósio, Radamés Teixeira, Walter Machado and Ismaíla de Moura Nunes.

An intensive production of materials such as books, journals, reports, papers, etc. added to lectures and presentations took place in parallel to the course. The diffusion of ideas has been made effectively. On one hand, a specialized production related to academia, on the other hand, a critical view concerning the proposals developed in Belo Horizonte and cities inland the state. These proposals were also exhibited. At the beginning, a key role was played by the Graphic Services implemented in 1957 at the Escola de Arquitetura. At the university, from 1962, "[...]under the direction of Professor Mário Mendes Campos, the publication of a Bibliographic Bulletin for the divulgation published by their teachers. The Bibliographic Bulletin, whose publication was interrupted with the third issue in 1964, was an excellent vehicle for cultural exchange of the UFMG, [...] which is why the Coordination of the University Library, with the support of the Research Council, decided to restart your publication [...]."¹¹ Directly or indirectly this production mentioned activities in the fields related to urban planning. As a planned city, references of Belo Horizonte always connected it to a continuous search for the ideal city. Specialized journals have been recurrent since the 1930s.¹² Scientific events, courses and technical visits took place including national and international interlocutions on federal, regional and municipal

⁶ On April 21, 1950, at the Escola de Arquitetura in Belo Horizonte, "[...] the installation ceremony of the Urbanism course [...] was held, with the inaugural lecture given by Exmo Snr. Mayor Otacílio Negrão de Lima [...]." Lima and Gomes, "Arquitetos e urbanistas". The curriculum remained between the years 1950 and 1956 modified in the following decades until its last offer in 1999.

⁷ About biographies, see: Leme and others, *Urbanismo no Brasil*.

⁸ In 1945, the course started in the Escola Nacional de Belas Artes in Rio de Janeiro, and in 1947 the same occurred in the Instituto de Belas Artes, in Porto Alegre. Lima and Gomes, "Arquitetos e urbanistas".

⁹ The following professionals received the certificate of the Bardet's course: Aluisio Barbosa de Oliveira, Edmund Bezerril Fontenelle, Danilo Francisco Ambrosio, Francisco de Assis Brandão, José Geraldo de Faria, and Luciano Jorge Passini, Palladio Barroso Castro e Silva, Roger Teulières, Newton dos Santos Viana, Ramiro da Silva Pinto, Walter Machado, Wilson Ferreira dos Santos and Benjamim Teodoro. About Gaston Bardet with his assistant Thérèse Moutonnier, see: Leme and others, *Urbanismo no Brasil*, 548; See also: Pontual, *O urbanismo aplicado do mestre Gaston Bardet*.

¹⁰ Oliveira, Perpétuo and Castriota, *Arquitetura numa Cidade Moderna: ensino e produção (1930-1964)*.

¹¹ Letter to Lincoln Continentino in August, 17 1973, in: Lima, *Por uma Cidade Moderna*.

¹² Several fields were explored focusing on urban problems, see: Leme and others, *Urbanismo no Brasil*, 552-553.

levels. Planning models were used as references as well as the practices on urban planning it has done in other cities.

The need for the institutionalization of activities on urban planning reveals a continuous organization in different governmental levels. As well as the “Comissão de Melhoramentos Municipais”, in 1913, linked to the “Secretaria de Agricultura”, coordinated by Lourenço Baeta Neves; and, also the “Divisão de Negócios Municipais”, beside the “Secretaria do Interior”, in 1933, with works by Lincoln de Campos Continentino. This engineer worked also in the “Serviço de Saneamento e Urbanismo da Secretaria de Estado dos Negócios, da Viação e Obras Públicas”, in the 1940s; also in this period, the works of the “Serviços de Estâncias Hidrominerais”, the “Departamento de Assistência aos Municípios” and the “Departamento das Municipalidades”, linked to the “Secretaria de Estado dos Negócios do Interior”; and in the municipal level, in 1934, the “Comissão Técnica Consultiva”, with the head of the engineer Lourenço Baeta Neves. Many technicians, some of them urban planners, have been working in the government agencies. From the capital to inland were developed urban proposals with a view on policies to improve the quality of cities. The focus was on sanitation, traffic and transportation systems, infrastructure, favelas¹³ and the problems of unlimited spread of urban settlements, among others.

In this context of experimentation, the military coup d'état, in 1964, had a direct impact that interfered in the process of planning. As an inflection point, this cup interrupted democracy in the country. The repression justified by the threat of communism progressively intervened on democratic freedoms and civil rights. Many people were illegally detained and tortured in secret government prisons. Meanwhile some professionals, professors and intellectuals were detained and jailed while others would normally work. Also the repressive actions of secure forces have been used against students. The lawsuits involved violent approaches in search of subversive materials in residences and workplaces by security forces. They threatened people and stole money, possessions and also precious jewels. In the universities libraries and offices have been the object of persecutions in finding material related to the communist thinking, particularly Marx, Engels, among others, as well as collections of socialist country magazines such as Political Economy and Philosophy.¹⁴

Several urban proposals reveal the process of institutionalization of planning activities. Plans and projects were elaborated and partially applied in the cities covering diverse thematics. The approaches have been made in different situations as well as new cities or new settlements and also in the existing ones. On one hand, the governmental policies demand, on the other hand private offices and companies demand. In this sense can be listed the “Plano de Urbanização de Arassuaí”, by Edmundo Fontenelle in 1946; the “Plano de Urbanização de Penedo”, in 1951, linked to the “Comissão do Vale do São Francisco: plano de urbanização; Pirapora/MG, Petrolina/PE, Juazeiro/BA, Propriá/SE, Penedo/AL” led by Francisco de Paula Marques Lopes; the neighborhood “Cidade Jardim Eldorado”, by Sérgio Bernardes, in 1954; and finally the “Núcleo do Conjunto de Moradias para a Companhia Siderúrgica Mannesman”, in 1955, by Henrique Mindlin. These experiences in Belo Horizonte and inland cities have provided diverse referentials with numerous technicians involved. Opportunities were offered throughout the process of planning institutionalized in municipal and state levels. The theories were applied in the cities considering its characteristics as a laboratory of thinking and practices.

CONCLUSION

Finally, some aspects should be highlighted, the first one related to the difficulties to materialize the theories on urban planning. Even with the long process of institutionalization mentioned before, which

¹³ The name favela is related to the hill 'Morro da Favela' in Rio de Janeiro. In Belo Horizonte, as mentioned it refers to the origins with lack of housing to the construction workers of the new capital. Then they improvised huts named barracões and cafuas. In the following decades, its multiplication imposed many problems on the management of the city. In this sense, the Comissão de Desfavelamento, was created by law, during the administration of Celso Mello de Azevedo (1955-1959), see: Portaria no 557.

¹⁴ As well as occurred with deputy José Aparecido de Oliveira and Professors Marcos Rubinger and Moacyr Laterza. Correio da Manhã, Terror e violência em Minas, (Rio de Janeiro: June, 5 1964).

included theoretical fields, the cities didn't order its development. Even with numerous proposals referenced on theories and practices the difficulties remained. In the capital, Belo Horizonte, the unlimited spread of irregular neighborhoods amplifies the complexity of problems. Proportionally, inland state cities have reproduced this process. Overall, the urban problems remained and the thematic complexity reveals a socio environmental tragedy. As mentioned, housing, infrastructure, circulation and transport systems etc. are recurring. The loss of public spaces with quality and the sense of community increase the problems. The specialized knowledge and advanced techniques on urban planning have been applied in an incomplete, contradictory way.

It must have been a disappointment that professionals with several opportunities couldn't transfer and adapt the planning models. Everything could have been so different working into the agencies with governmental support but that doesn't seem to be the case. Ingenuity and lacking in vision on public policies may be considered. Management issues and participatory processes also intervened in the failure of planning. At the same time, on one hand, the criticism by technicians in the debates and forums related to thinking and practices on urbanism and urban planning was conflicting. After all, these professionals were directly interconnected with the activities in the governmental agencies. On the other hand, they were also in the private sector linked to engineering and architectural offices. The contradiction between thinking and practices became evident with the incomplete materialization revealed everywhere in the cities. In this regard, the absence of an integrated development strategy based on urbanism and urban planning and its consequences remains. In this regard, democracy is literally in vertigo and the cities remain unsustainable. Education is one of the keys with research that includes specific studies on urbanism and urban planning. Following this way with great energy to fight for democratic and social changes assuming our share by the cities... in Cities !!!

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Chapter 2

Public Space and Environmental Challenges

Toward a Climate Adaptive Street Framework: Investigating Landscape Performance

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ABSTRACT

Population growth and rapid migration to cities together with inadequate climate planning has become a catalyst for the loss of green spaces abundant in natural resources and biodiversity (Kambites & Owen, 2006; Thorn, Thornton, & Helfgott, 2015). These spaces play a vital role in our health and well-being and their absence leaves cities and their residents vulnerable to modern challenges such as climate change and natural hazards. Increasingly, urban residents are at risk to extreme weather events, including drought, heatwaves, and flooding with climate change impacts expected to continue to exacerbate these issues (Satterthwaite et al. 2007).

As urban development is a key factor in terms of how cities are affected by and affect climate change, urban planning and design policies are striving to integrate adaptation and mitigation strategies to meet climate objectives. While there has been a great effort to explore adaptation and mitigation options at regional scales, a lack of research on climate adaptive urban strategies at a local scale exists. In New Zealand, cities are vulnerable to the projected impacts of climate change such as extreme rainfall events and extreme storm events (NIWA 2017; NIWA 2019).

A climate adaptive street framework was developed and then tested through speculative street re-design proposals. This design-research investigation of climate adaptive streets demonstrated how reinvented streets may perform as more than thoroughfares for traditional transport, but as places for socialisation, recreation, cultural connection, and ecological health. These speculative climate adaptive streets demonstrate how urban streets in New Zealand and particularly Wellington might increase the climate adaptive capacity of cities.

Keywords: Climate Change, Climate Adaptive Streets, Street Design, Wellington, New Zealand

INTRODUCTION

There is a growing global concern about cities' ability to respond to extreme weather events raised from climate change (Dhar and Khirfan, 2017). According to the Intergovernmental Panel on Climate Change in 1996 climate change is "any change in climate over time whether due to natural variability or as a result of human activity" (IPCC-SAR, 1995). With cities accounting for more than half of the global greenhouse gas emissions and constituting over 80 percent of anthropogenic carbon dioxide emissions, cities become the main driver of climate change (UNEP and UN-Habitat, 2009; While and Whitehead, 2013). At the same, over half the world's population is living in cities and this number is projected to reach two-thirds by 2050 (Badaoui et al., 2020). This will mean that cities simultaneously drive climate change while remaining highly vulnerable to impacts such as global warming (While and Whitehead, 2013).

Given this situation, climate considerations have become a priority in every aspect of policies, strategic decisions, and the everyday life of cities (While and Whitehead, 2013). Urban development plays an important role in defining how climate disasters affect- adapt or exacerbate- our cities (Badaoui et al., 2020). There is extensive literature exploring the relationship between urbanism and climate change,

mainly focusing on environmental vulnerability assessment, socio-economic vulnerabilities, urban climate governance, mitigation, and adaptation strategies and policies (While and Whitehead, 2013). These studies cover various aspects of planning and design like transportation, infrastructure, and land use. However, less attention has been paid to the physical planning and the design of the built environment (Dhar and Khirfan, 2017). The relationship between urbanism and climate change has been explored at different scales including the scale of the individual building, a neighborhood, multiple neighborhoods to the city, and regional scale and beyond (Corburn, 2009; Dhar and Khirfan, 2017). Dhar & Khirfan (2017) study on adaptation studies has shown that most of the urban planning and design research addresses the larger scale of multiple neighbourhoods, city, region and beyond through land use modelling and spatial risk assessment and there is a dearth of empirical studies on neighbourhood scale. This also accentuates the lack of studies on the physical planning and design of built environment at the neighborhood scale and especially public spaces.

As an integral part of the social, physical, mental, and economic health of cities (PPS, 2018), streets hold an important position with regard to the capacity of cities to address climate change. Streets encompass approximately 20% of the urban environment and in some cases occupy over 50% of the urban land (Mehta, 2013) and hence are identified as critical public spaces for cities to build resilience (UN Habitat, 2013). UN Habitat (2020) recommends that 30-35% of urban space be allocated for sidewalks and streets for a functioning city.

To understand how a climate-adaptive framework informs a re-thinking about street design, students at Victoria University in Wellington, Aotearoa New Zealand reinvented streets as more than thoroughfares for traditional transport, but as places for socialization, recreation, cultural connection, and ecological health.

The Capacity of Cities to Adapt to Climate Change

There is emerging evidence that cities around the world and their physical, biological, social, and economic systems have already been affected by regional changes in climate like an increase in temperature (McCarthy et al., 2001). The most widespread and direct effects of climate change on human settlements are related to physical infrastructures, buildings, industries, population's health status, and economic sectors (McCarthy et al., 2001). Increasingly, urban residents are vulnerable to flooding, extreme weather events, including heat, and storms with climate change impacts expected to continue to exacerbate these issues (Satterthwaite et al. 2007).

These effects and changes necessitate possible adaptation options in the design and planning of urban settlements to reduce climate change and other environmental risks. According to Climate Change 2001: Impacts, adaptation, and vulnerability report, adaptive capacity is “the ability of a system to adjust to climate change, including climate variability and extremes, to moderate potential damages, to take advantage of opportunities or to cope with consequences” (McCarthy et al., 2001, p. 21).

Three reasons could be enumerated for the importance of urban adaptations. First, the majority of population growth is taking place in cities which means there would be intensified urbanizations. Secondly, the design of cities creates microclimates that could be affected by climate change. Formation of Urban Heat Island as a result of mass building, lack of vegetation and increase of impervious built surfaces, and the extreme amount of water runoff due to reduced infiltration surfaces are among some of the examples of changes in microclimate (Carter et al., 2015). Thirdly, due to critical infrastructures, different groups of vulnerable people, high population densities, inadequate urban design, and poor governance structures, cities hold a central position in adaptation schemes (Carter et al., 2015).

Two factors that are influencing the adaptive capacity of cities are socio-economic and biophysical factors (Carter et al., 2015). Governance supports, socio-economic status and peoples' awareness of climate change hazards are among some of the examples of socio-economic factors (Carter et al., 2015). Physical factors refer to the quality and location of physical infrastructures, transport networks, greener urban neighborhoods, and resilient and adapted housing (Carter et al., 2015). In urban areas, streets are an integral part of physical factors influencing the adaptive capacity of cities. As mentioned earlier, streets constitute an estimated more than 20% of land in cities (Mehta, 2013; Un Habitat, 2013). As a

result, it is vital to explore the potentials and challenges that streets can offer to address the effects of climate change.

Streets as Public Space and Other Functions

Urban streets are the key elements of cities that throughout history have accommodated a range of different functions including movement, commerce, social interactions, and political functions (Bertolini, 2020). Urban streets are ubiquitous and are easily accessible to all residents of cities (Mehta, 2019). People spend eight to ten times more in urban streets compared to parks (Cabanek, Zingoni de Baro, and Newman, 2020). As a result, they are an integral part of the health and well-being of cities and societies.

Since the advancement of the automobile industry and modernist tendency in the twentieth century, the dominant function of streets has turned into corridors for facilitating vehicular movement and transportation efficiency (Karndacharuk, Wilson and Dunn, 2014; von Schönfeld and Bertolini, 2017). The dominance of motorised traffic has resulted in traffic congestion, major road reconstruction projects, the demise of the social character of streets and safe spaces for pedestrians and cyclists and ultimately the formation of serious environmental issues (Karndacharuk, Wilson and Dunn, 2014). Some other derivative effects of vehicle dominance approach are air pollution, the increase of impervious materials such as concrete, asphalt, and darker surfaces, as well as a decrease in vegetation which all lead to higher temperature, low humidity, and microclimate discomfort (Gillner et al., 2015). However, in the past few decades, there is an increasing trend to reclaim streets from motorized traffic in favor of social life and pedestrian-oriented places (Mehta, 2019). Invaluable efforts have been made by groups like Project for public spaces (PPS) and seminal figures like Jane Jacobs and Jan Gehl to reclaim streets and public spaces as a shared ecosystem where social, civic, cultural, economic, and ecological systems intertwine. The evolution of Woonerf concept, shared street spaces, the concept of complete streets and lively streets are among some of the examples and efforts that remind us of the importance of streets as an integral part of public spaces and the public realm (Karndacharuk, Wilson, and Dunn, 2014; Norton, Zavestoski and Agyeman, 2015; Mehta and Bosson, 2021).

The main emphasis of these approaches is on transforming streets from movement corridors to places for people where the broader needs of residents are acknowledged. The design and management of streets contribute to the formation of equitable and social cities where incongruent groups of people can gather and participate in active and passive social activities such as dining, shopping, lingering, walking, talking and people watching (Mehta, 2019). Mehta and Bosson's study (2018) demonstrates how the liveliness of streets can be increased by the increase in community-gathering spaces, block variety, commercial seating, and independent businesses. The design of streets can also play an important role in terms of climatic parameters. Streets can provide a context for incorporating green and blue infrastructure like tree planting and stormwater management systems that can cool urban environments, especially at a local scale (Bowler et al., 2010; Gillner et al., 2015).

Re-thinking Streets to Increase How Cities May Adapt to Climate Change

Rapid urbanization and climate change have given cities a new impetus and sense of urgency to recalibrate community plans to incorporate more holistic and adaptive solutions into their urban fabric. Bulkeley and Tuts (2013) note that the capacity of cities to adapt to climate change varies according to the different physical and social contexts (Adger et al. 2005, cited in Bulkeley and Tuts 2013: 10; Eakin et al. 2010, cited in Bulkeley and Tuts 2013: 10).

One potential area of opportunity to improve the adaptive capacity in cities is a 're-think' of street design. Streets are a valuable part of the public realm. Retrofitting street networks with green infrastructure or blue-green interventions that reassign function can be a sustainable alternative to address contextual needs and climate vulnerability (Fallast, et al. 2021).

Establishing a network of blue-green infrastructure is a recognized approach to maximising ecosystem services and mitigating many of the urban effects of climate change such as improvements to air and water quality and biodiversity and reduction of flood risk and urban heat island effects (Lawson et al.,

2014). These networks can play a critical role in building resilience in cities when they are designed as multifunctional places that provide essential ecosystem services for our health and wellbeing.

Fostering ecosystem services in urban street corridors is an important challenge for urban planners and designers. In recognition that cities are social-ecological systems (Pickett et al., 2011), approaches must address the complexity of ecosystem processes and human interactions within what is often an already established network of physical space.

Blue-green street networks are not only systems that improve urban ecology, but can enhance the public realm through the creation of aesthetic amenity spaces that reveal and connect people to ecological processes and biodiversity of place. (Alves et al., 2018; Beatley, 2009). Several studies reveal that biodiversity is positively related to psychological restoration (Marselle et al., 2019; Wood et al., 2018) and people with daily connection to nature experience lower mortality and stress and increased cognitive performance and creativity (Aspinall, Mavros, Coyne, & Roe, 2015; Atchley, Strayer, & Atchley, 2012; DeVries, Glasper, & Detillion, 2003; Nielsen & Hansen, 2007).

Improvements in health, coping mechanisms, and cognitive function fostered through connections with nature can be valuable when dealing with today's urban challenges. Persistent engagement with nature can also provide people with greater awareness and understanding of ecological processes, particularly those distinct to place that are revealed through local ecology undergoing seasonal and temporal change. Through affiliation with nature, environmental literacy is transferred to society and an emotional attachment to spaces and places are engendered (Gobster, Nassauer, & Daniel, 2007; Lister, 2010). An understanding of the perceived value of ecological processes and emotional attachments to nature are likely to motivate peoples' care for spaces and improve their performance and productivity (Gobster et al., 2007; Kaplan & Kaplan, 1989).

Climate adaptation is not only about infrastructure and ecological solutions. Dimensions of social organisation such as cultural connection and social capital are acknowledged to be essential to a community's capacity to recover from disturbance (Olwig, 2012). Social capital networks provide access to various resources such as information, aid, financial resources, and emotional and psychological support in disaster situations (Aldrich & Meyer, 2014). Several studies reveal that communities with high social capital adapt, cope, and recover better following a disturbance (Adger, 2000; Chamlee-Wright & Storr, 2009; Hawkins & Maurer, 2011; Nakagawa & Shaw, 2004). Streets that incorporate inclusive, multifunctional open spaces that invite people to stay and interact help build social resilience (source). Meaningful human interactions contribute to social vitality and capital, while building trust and cultural competency (Beatley & Newman, 2013). This synergy of human interaction can enhance well-being and improve a community's ability to function positively during challenges and dynamic events (Chadsey, Grenfell, & Tung, 2018).

Climate Adaptive Street Framework

Bain et al. (2012) identify the valuable opportunities, approaches and benefits re-thinking street design in its many dimensions and functions as public space, including providing places that build more social capital and liveability, reducing hard surfaces and provide greener spaces while allowing adequate mobility. Urban green and blue space is often a crucial component of this. If cities are able to design green and blue spaces, Bain et al. (2012) infrastructure and possibly even buildings so that they start to produce ecosystem services, some pressure that the city exerts on urban and nearby ecosystem services will be lessened (Pedersen Zari, 2018).

This climate-adaptive street design framework through a review of scholarly literature of ecosystem services, biophilia and resilience and adaptation. The climate adaptive street design framework is expected to transform streets from simply serving as transportation corridors with high carbon generation into places with high carbon sequestration, places for socialisation, absorbing and treating stormwater and improving urban ecosystems and biodiversity.

Adaptive streets incorporate the three elements of wellbeing; material, (physical ecological services), relational (social interaction, collective action, sense of community, equity), and subjective (values, norms, culture, perception). To achieve this, streets shall address/include these elements. This project's

climate adaptive street framework was developed to include vegetation, transport, stormwater, social spaces, Te Aranga Māori Design Principles, education and engagement, and materials that promote climate adaptation, respond to neighbourhood needs, and support the three dimensions of wellbeing (material, relational, and subjective).

CONTEXT: CLIMATE CHANGE IN NEW ZEALAND AND WELLINGTON

Although it is expected that the impacts of climate change in New Zealand will be less than many other countries, there is a growing recognition of increasing flood risks, sea-level rise, and increase in temperature, matching the global trend (Manning et al., 2015). Over the past hundred years, New Zealand's average annual Air Temperature and Sea Surface Temperature have experienced almost 1°C and 0.12° C increase respectively (Christie et al., 2020). Ministry for the Environment has projected that by 2040 the mean temperature of New Zealand will increase up to 1°C and by 2090 up to 3°C (MFE, 2018). The effects of these changes in climate will be profound causing species and habitat loss, human health and well-being degradation, and changes in microclimate (Dadashpoor and Panahi, 2021).

In Wellington, projected climate change impacts include increased rainfall intensity, coastal flooding, coastal inundation and nuisance flooding (Cameron and Wood 2018; NIWA 2017; NIWA 2019; NIWA 2020). This subsequent increase in stormwater is anticipated to have continue to strain the city's existing infrastructure (NIWA 2019).

Climate Change Planning and Policy contexts

Given the importance and complexity of climate change and its possible effects in New Zealand, the central government has made a great effort to take into account the effects of climate change by providing legislative and policy frameworks at a national level (Archie, Chapman and Flood, 2018). Some of the policy and legislative frameworks that assist local governments to make climate-adaptive decisions are the Climate Change Response (Zero-Carbon) Amendment Act (2019), Resource Management Act (1991), and New Zealand Coastal Policy Statement (2010). Also, at a local level, there has been a growing interest in planning mitigation and adaptation responses (Archie, Chapman and Flood, 2018) such as Wellington's Low Carbon Capital (2016) action plan and Auckland's Energy Resilience and Low Carbon Action Plan (2014). However, as Archie, Chapman and Flood (2018: 21) demonstrate, effective planning at local scales in New Zealand is still at the beginning stages, highlighting the need to better understand the risks associated with potential impacts at the local scale.

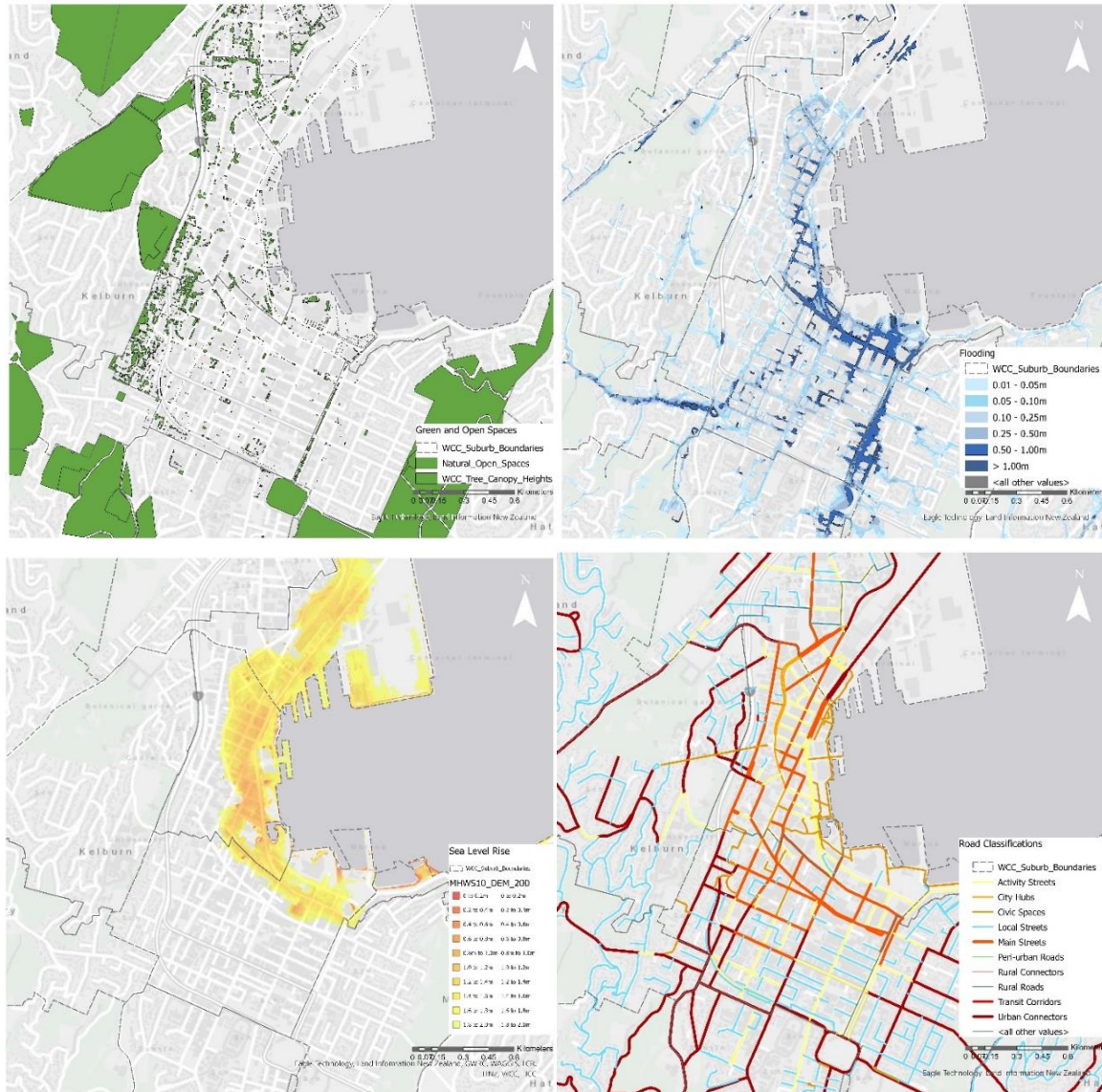
Wellington: Challenges and Opportunities for Climate Adaptation

Wellington's residential population will increase between 50,000-80,000 within the next 30 years (Wcc, 2021). To accommodate such a population, central Wellington is going under significant transformations particularly intense densifications which necessitate setting directions and targets about how Wellington's central city can simultaneously address climate emergency and rapid urbanisation.

One of the targets of Wellington City council is managing green and blue infrastructures which include protecting existing green elements, planting more trees, enhancing and greening existing public spaces, and developing sites into new parks (Wcc, 2021b). This is where the potential of central city streets come into play, where streets are more than thoroughfares for traditional transport, but as places for ecological health and multifunctional ecosystems, blending sustainable transport, green/blue infrastructure and public spaces that build social cohesion, immersing people with nature and each other. In the following, the existing vulnerability of wellington central city will be explored in four dimensions: flooding, green areas and open spaces, transportation, and sea-level rise.

As shown in Figure 1, Wellington central can be vulnerable to hazardous conditions given stormwater flooding and sea level rise. The flood hazard map shows the flood water depth. The areas with more than 0.30 can cause property flooding. In terms of sea-level rise, currently there is a 3mm increase in sea level every year. It is projected that by 2100, there would be 0.4m to 1.3m rise in sea levels. For a higher scenario, there is projection to see exceeding 2.4m sea level rise. Finally, streets in the central part of Wellington are mainly car-oriented and there are few areas like Cuba Street and waterfront that facilitate shared street and pedestrian quality areas.

The existing green and open spaces are few in numbers and tree canopy is 5.12% compared to 30.6% of tree canopy in the citywide (Wcc, 2021b). There is a great opportunity to use the existing public spaces including streets to increase tree canopy and green spaces in the central wellington. In particular, one goal for the city is to “[direct] new green spaces to provide for the projected residential population growth from 18,000 to 36,000 in 30 years” (WCC 2021: 9). A second goal is to “enhance and green existing public space” and “developing sites into new parks” (WCC 2021: 9).



RE-THINKING CLIMATE ADAPTIVE STREETS DESIGN RESEARCH

This research first developed a climate adaptive street framework and then tested this framework via speculative design approaches for streets in Te Aro within the central city of Wellington, New Zealand. Areas of opportunities and vulnerability were identified and analysed, and a set of climate adaptive urban strategic responses were applied at the street scale. Using a design-research approach, students applied a climate adaptive framework and then assessed the landscape performance of these re-designs in terms of social, ecological and environmental performance metrics. Performance metrics were used to evaluate the effectiveness of design solutions both to fulfill environmental and social goals. Both quantitative and qualitative performance indicators were described and quantified. Five street projects were compared and assessed in terms of metrics (Table 1).

Performance	Marion Street	Victoria Street	Victoria Street	Lower Tory <i>Note: performance was extrapolated based upon the design-are there others??</i>	Tory Street
Water Quality Improvement/ Purification	•	•	•	•	•
Beauty	•	•	•	•	•
Nutrient Cycling	•		•		
Recreation	•		•		•
Energy Provision	•	•			
Habitat Provision	•	•	•	•	•
Health and well-being	•	•	•	•	•
Food provision	•	•	•		
Knowledge	•	•	•		
Disturbance prevention & resilience	•	•	•		
Provision of fresh water	•	•	•		
Microclimate regulation	•	•	•	•	•
Culture	•		•		•

Table 1: Comparison of Landscape Performance by Street Re-designs

Marion Street as a Climate Adaptive Street

This selected re-envisioning of Marion Street student project was informed by developing a climate adaptive framework based upon socio-cultural and ecological landscape performance approaches responding to ecosystem services and Māori design principles (Figure 2 and Figure 3). This project was designed in response to the larger city context and how to improve how the street functions as a public space. The final design outcomes include creating a variety of multiple types of public spaces for recreational, educational and social activities. Ecological performance metrics include cleaning runoff and reducing the urban heat island effect (Figure 2).

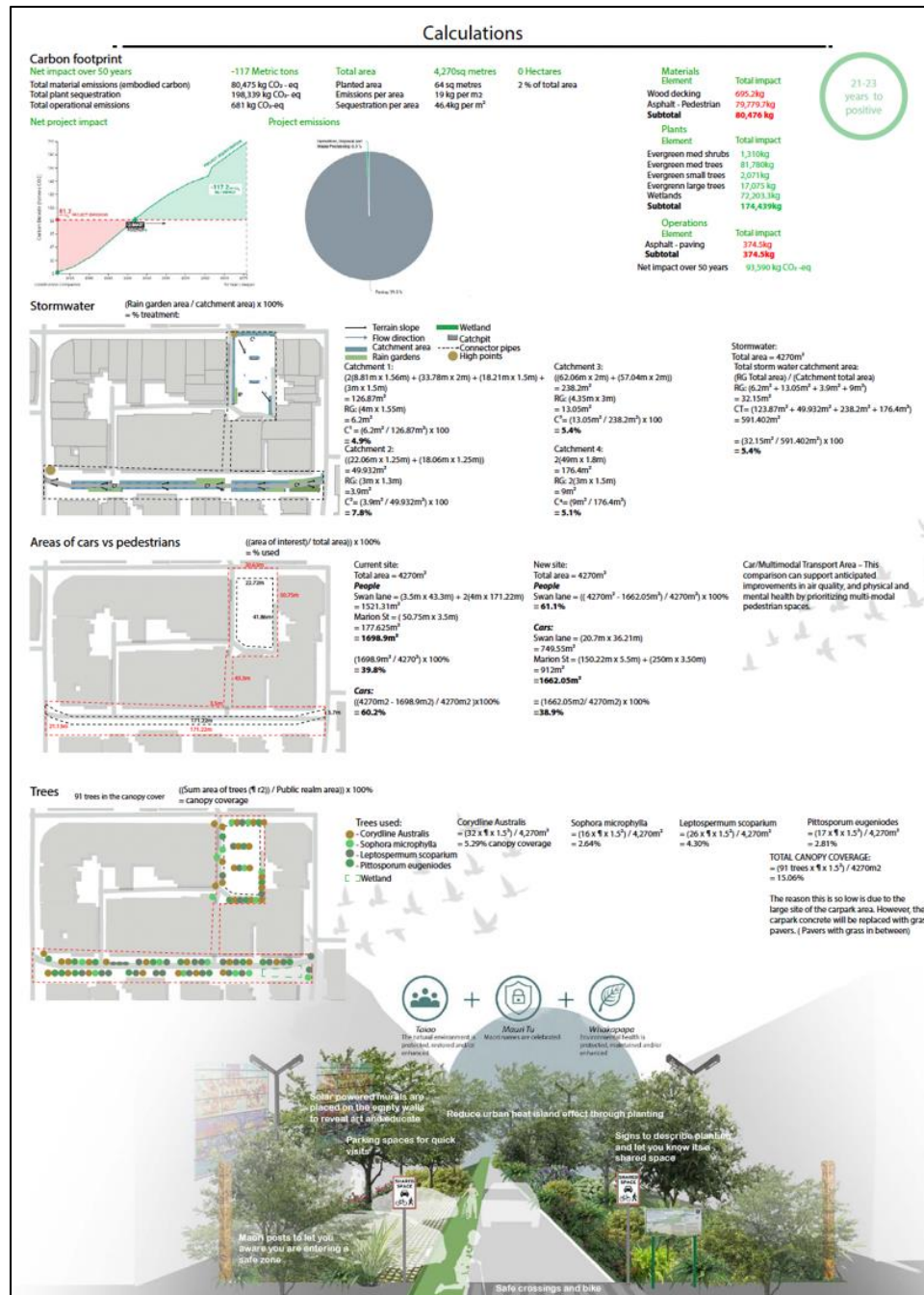


Fig. 2: Climate Adaptive Street Re-Design proposal performance metrics for Marion Street. Designed by Katie Jenkins.



Fig. 3: Climate Adaptive Street Re-Design proposal for Marion Street. Designed by Katie Jenkins.

CONCLUSION

Applying the climate adaptive street framework as based upon landscape performance led to the following: 1) Design outcomes that performed well in terms of social, cultural and environmental

performance metrics; 2) Design outcomes that developed a way of assessing a specific, context-specific approach that is unique to Aotearoa New Zealand; 3) Expanding upon design thinking in terms of the potential of streets in increasing adaptive capacity by maximising infiltration run-off water through permeable pavement and raingardens and bioretention swales; and 4) Applying a holistic approach to understanding the different functions of climate adaptive streets. For instance, the stormwater treatment elements can be integrated with visual, landscape and amenity aspects of development.

This design-research investigation of climate adaptive streets demonstrated how reinvented streets may perform as more than thoroughfares for traditional transport, but as places for socialisation, recreation, cultural connection, and ecological health. These speculative climate adaptive streets demonstrate how urban streets in New Zealand and particularly Wellington might increase the climate adaptive capacity of cities.

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Urban Open Space Adaptation in Case of Dust Storms: a CFD Simulation

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ABSTRACT

Sand and dust storm, as a climate-change-induced phenomenon, has been greatly endangering life around the world. Iranian cities similarly have been afflicted harshly by this hazard; and the city of Ahwaz is among the most polluted cities in terms of sand and dust storms globally. Besides all the environmental, socio-economic, and health issues, the impacts on urban open spaces are by no means negligible, and therefore, regarding the long-term role of urban design contributing climatology and providing comfort, we investigated ways in which adaptive design could alleviate this situation. This research evaluated how the physical form and structure of the built environment can affect the dispersion and concentration of dust particles at a local scale, emphasizing different forms of public space. For this purpose, the central district of Ahwaz was designated for the simulation.

The research was conducted on the basis of deductive strategy with a quantitative approach. The eight-hour simulation of eight urban blocks, including before the storm, during, and after, was run based on the computational fluid dynamics (CFD) method using ENVI-met software.

Based on the outputs and the analysis of six pertinent variables, the wide, open spaces with higher wind speed were more exposed to dust, whereas closed or limited urban areas with lower wind speed would act whether as a trap for the particles or a shelter, depending on the closure ratio, open sides, and shape. Moreover, the behavior of particles concerning wind speed is directly affected by their mass.

Finally, it is concluded that adaptation policies and design codes should be focused on post-storm hours by providing facilities to accelerate the process of particle settlement. In the end, the potential spaces which are less afflicted by dust storms for future public spaces are proposed.

INTRODUCTION

Climate change is well documented as the major challenge of the current century (Hamin and Gurran, 2009; While and Whitehead, 2013). Due to the increasing pace of urbanization, most of the world's population will experience climate change in cities, which are relatively vulnerable but crucial in adaptation and mitigation strategies (Rosenzweig et al., 2011; Worku, 2017). Meantime, Iranian cities are both the key drivers and the victims of climate change (Pahl-Weber et al., 2013). Sand and dust storm, as a climate-change-induced phenomenon, has put many parts of the world, the middle east, China, Australia, North Africa, and even North America, at-risk (Arabmohammadi, 2018). Climate change has had a considerable impact on the severity and the frequency of dust storms, which are influenced by climatological variables such as wind direction and speed, air temperature, precipitation and evaporation (Middleton et al., 2019). The country of Iran, due to its geographical location in an arid climate, is highly affected by dust storms and has 18 provinces dealing with this challenge, specifically in the southeast (Farjam and Zare, 2017; Hosseinzadeh and Taban, 2015; Pazhuhankia et al., 2016).

The impacts and damages of this phenomenon could be seen in direct and indirect, long-term and short-term, and also environmental, hygiene and health, and socio-economic dimensions (Abedini et al., 2016; Arabmohammadi, 2018; Crooks et al., 2016; Dehghanpour et al., 2017; ESCAP, 2018; Fouladian

and Amadeh Shahnabadi, 2015; Karimdoust and Ardebili, 2011; Mohammadi and Akhtarkavan, 2017; Salehi and Salehi, 2018; Shepherd et al., 2016). On the one hand, the citizen's experience in urban areas is extremely afflicted by this challenge as it significantly decreases the amenity, livability, satisfaction, and quality of urban life, which threatens the scenes of belonging to the city (Barihebari et al., 2018; Dehghanpour et al., 2017). On the other hand, these impacts have a direct contribution and an adverse effect on sustainable goals (11 out of 17 SDGs) (ESCAP, 2018).

To respond to climate-induced hazardous events and stress, policy-makers around the world have been increasingly developing action plans to curb climate change and its impacts in two categories of adaptation and mitigation (Sharifi, 2020). Adaptation measures seek to reduce vulnerability and enhance coping capacity and are defined by IPCC as "the process of adjustment to actual or expected climate and its effects" in human and/or natural systems (Pachauri et al., 2014). In contrast, mitigation actions focus on the drivers of climate change and are defined by the IPCC as "a human intervention to reduce the sources or enhance the sinks of greenhouse gases (GHGs)" (Pachauri et al., 2014). The policy framework in response to dust storms should also contain adaptation and mitigation strategies (ESCAP, 2018).

This research, with adaptive goals, explores the effects of the built environment on the dust storm and dust wind's patterns in order to firstly identify cleaner zones and secondly conduct a design framework for urban open spaces.

LITERATURE REVIEW

Sand and Dust Storms

By the official definition of WMO¹⁵, dust storms are a result of surface winds that lift large amounts of dust into the air and decline the distance of sight from 1.8 kilometers to less than 1000 meters (WMO). Dust storms generally happen in the vicinity of the land surface, but the lighter particles (less than 20 microns) could be lifted up to several kilometers in the atmosphere and be transferred to even thousands of kilometers away from their original source and traverse the geopolitical borders (ESCAP, 2018; Shepherd *et al.*, 2016). During the warm seasons of the year, summer and spring, they are more likely to happen due to the arid and hot weather (WANG, 2002). They could last from hours to days, and since the wind speed is next to zero at the ground surface, the density of the particles is much higher at the distance of 2-3 meters above the ground level, where exactly the urban life is going on, and therefore urban open spaces are highly subjected to this hazard (Fouladian and Amadeh Shahnabadi, 2015; Shepherd, 2017).

Wind erosion is the key driver of this phenomenon, and the activity of the source is highly dependent on the fragility of the surface against local winds, which is defined by the drought level of the soil due to the lack of vegetation (Shepherd *et al.*, 2016). Therefore, wind patterns and land cover are the main influential factors in this research.

Dust Storms and the Built Environment

Climatic conditions and environmental comfort have always been among the key factors in the process of urban planning and design. Among the climatological variables, the wind has a critical role in forming the built environment and the city. The wind pattern in the urban environment, which, as formerly mentioned, is a key factor in dust storms, is highly affected by the orientation of streets, the height and density of the buildings, distribution of high-rise buildings, and etc. (Kiani 2014). It is well documented that the urban environment could exacerbate the concentration of dust particles in comparison to rural areas and even act as a reinforced source of erodible particles or even a trap, which is caused by urban human activities and the behavior of urban winds and vertical currents (Erelltsoar,

¹⁵ World Meteorological Organization

1997). The main factors contributing to the intensity and the severity of local dust storms are land cover and wind speed, which are broadly related to the designing and planning of the built environment (Givoni, 1992; Givoni and Orlick, 1985). Effective urban environment protection against dust storms could be reached through comprehensive application of architecture, construction, design, planning and engineering tools according to particular local conditions (Abdegalieva and Zaykova, 2016).

What this research aims to explore is that how the distribution of dust particles is influenced by the built environment, while there is evidence suggesting that the flow field and the concentration of dust particles are not only affected by the horizontal layout of buildings but also their height (Luo *et al.*, 2016). In the process of designing cities facing dust-storm challenges, we should follow a compact and interconnected urban structure that reacts to the wind as an integrated element by reducing the length of pedestrian and vehicle routes, isolating buildings, and etc. (Abdegalieva and Zaykova, 2016). Neighbourhood's open spaces should be limited in size for better maintenance, and no uncovered lands should exist in the urban fabric (Givoni, 1992; Givoni and Orlick, 1985). High-quality vegetation covers should be contemplated for future developments, and in the case of desert areas, specific attention to the wind-exposed fronts are required, and the natural vegetation should be preserved as they can control dust storms to some extent (Givoni and Orlick, 1985).

Adaptive Urban Design in Case of Dust Storms

On the basis of the reviewed existing literature, various strategies in different scales and levels of interventions were gathered as follows.

At the level of city planning, (Golchin *et al.*, 2017) proposed a green belt around Zahedan to reduce the amount of dust particles by preventing their entrance to the city and have calculated the proper area as well. (Pazhuhankia *et al.*, 2016) developed a proposed framework for reforming the structure of the city through CFD simulations by Fluent and Gambit. Although their research defeated in many aspects as it has adopted a reductive perspective of the situation with extremely simplified models and simulations, they have discovered regular checkered structure is no good network in the face of dust storms, and the optimum structure is displaced checkerboard structure for developing districts and neighborhoods. Therefore, networks with short distances and winding streets are of good quality in such regions. (Luo *et al.*, 2016) also, through a CFD simulation of a residential neighborhood exposed to dust winds found that how particles are transported and distributed is highly dependant on the flow field, which is very complicated in a real residential neighborhood. When the axes of the streets are parallel to the wind direction, the current is very similar to that of a classic wind chime. Dust particles are usually more concentrated in places with lower wind speeds and more whirlwinds. This research also indicated that despite the adverse effects of acute variations in the facades at the level of pedestrians, these changes could be beneficial at higher altitudes like triangular roofs, which can detour the particles into the atmosphere.

At the regional and district scale, (Kiani 2014) had investigated urban design criteria (design of buildings, streets, landscapes, and public spaces) in 5 urban zones to compare them through a multi-criteria evaluation matrix which defects in method and results. To conduct a large-scale protective model of urban space against dust storms, (Abdegalieva and Zaykova, 2016) have proposed a structure in the field of landscape and large-scale architecture, with a combination of natural and artificial elements, which seems rather a reduced solution.

At the level of down-scale architectural interventions concerning individual buildings, (Hosseinzadeh and Taban, 2015) in desk research suggested utilizing state-of-the-art technologies such as intelligent facades which are capable of purifying the air. Another research, based on CFD simulation and advanced numerical models through the Fluent software by (Moayedi *et al.*, 2017), showed that the architectural design and orientation significantly impact the distribution of dust particles around the

building. Closer to the ground level, changes in the concentration of dust particles are more fluctuated with larger amplitude, and architectural variations have a greater impact on the concentration of fine dust at lower altitudes.

Conceptual Framework

Reviewing the existing literature indicates that not only the concentration, distribution, and size of fine particles in urban environments are different from the rural areas and natural environment; But also in the internal structure of the city and at the local scale. Therefore, it is crucial to investigate the behavior of dust winds and particles at this scale for conducting a proper adaptive urban design framework to improve the quality of life in cities facing this challenge.

Finally, based on the literature review, we can confirm the initial hypothesis of this research, stating the effectiveness of urban design strategies for influencing the distribution and concentration of dust winds. Measures at various scales from the micro-scale of architecture to the macro-scale of the urban structure are categorized in the following chart:

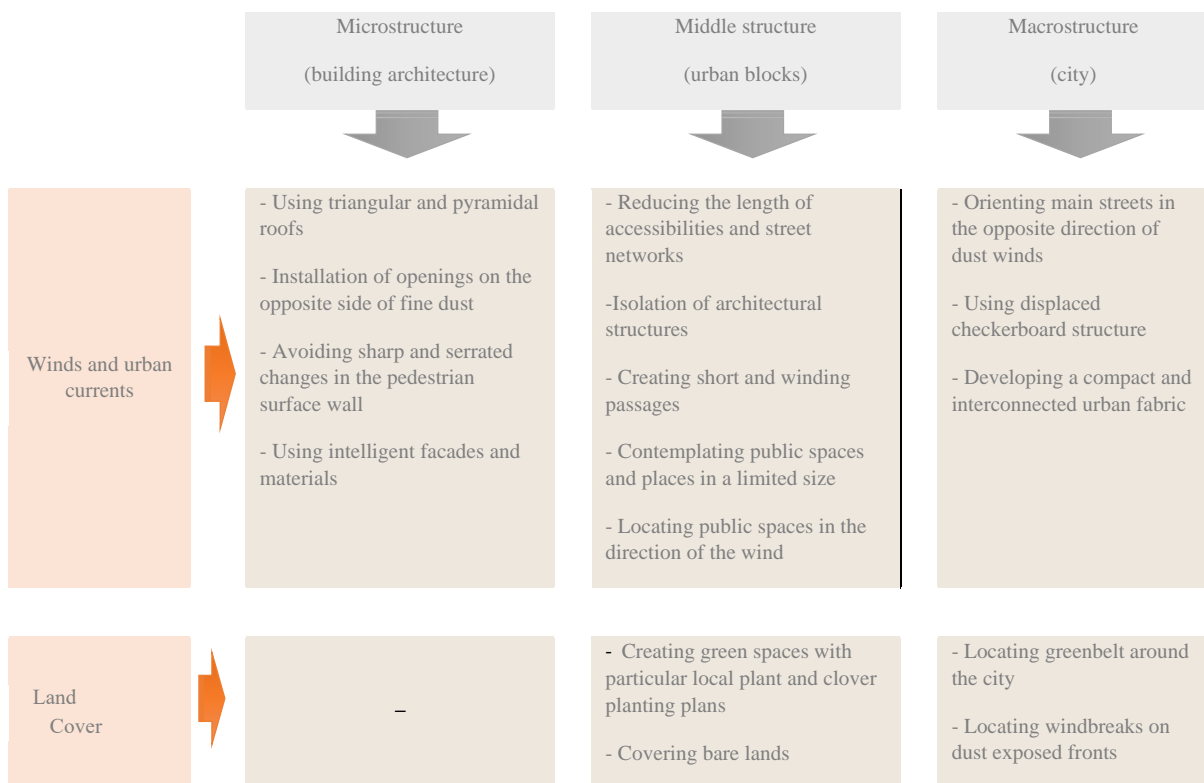


Table 1: Urban design adaptive policies to reduce dust concentration at different urban scales

METHODOLOGY

Case Study

The city of Ahwaz, the center of Khuzestan province in the southwest of Iran, has always been among the most polluted cities worldwide regarding sands and dust particles (Farhadi *et al.*, 2018). According to the strategic geopolitical location of this city and its multiple subcultures, such crises seem to have profound and irreparable damages and therefore is opted as the case study of this research. The city is exposed to dust winds mainly from the west, east, and southeast fronts. To clarify the study area, one of the most critical and vital urban spaces in the city of Ahwaz has been designated, which is located at

the heart of the city in the vicinity of Karoun river, encompassing a variety of urban open spaces and specifically the grand covered Bazar of Imam Khomeini.

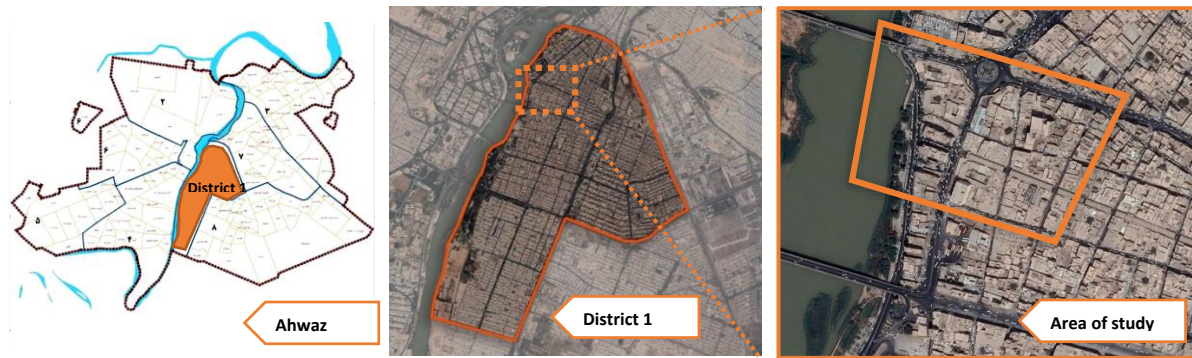


Figure 1: designating the research area

Methods and Techniques

Based on a deductive strategy, through a quantitative research method, this research aims to examine the hypothesis that claims the concentration and dispersion of dust particles in urban open spaces is affected to some extent by the physical structure and the built environment design. To investigate this relation, ENVI-met, a 3D software of computational fluid dynamics (CFD) based on the Navier-Stokes equations by Reynolds interpolation method was used. CFD simulation provides a reliable platform to simulate the fluid characteristics and pollution dispersion at the local urban scale for analyzing the influential factors on concentration and dispersion of dust particles and wind flow in complex spaces such as urban context (Dal Cin et al., 2021; Nikolova et al., 2011).

The selected area was modeled by Spaces appendix of ENVI-met in $x=2m$, $y=2$, and $z=3m$ cell sizes. As inferred from the literature in the conceptual framework, only the influential variables such as urban fabric, the direction of streets, land cover and vegetation, were taken into consideration, and other variables, namely the type of the building materials, were assumed constant. For conducting the simulation, one of the most severe dust storms on February 13th, 2017, was chosen for inserting the climatic variables. Through the appendix of Database Manager, a surface pollution source with details of the emission rate per unit area per hour and the characteristics of the polluting particles (PM_{2.5}, PM₁₀, PM₁₆) were defined. The simulation was conducted for 8 hours, starting from 2 pm to 10 pm. Finally, the outputs presented in the following were extracted and analyzed through the Leonardo appendix.

Data Source

The data used in this research comprises textual, numerical, and figurative documents, collected first handed or second-handedly. Data required for the modeling process, namely the density and heights of the buildings, trees, and types of vegetation, and land covers were collected from the official comprehensive plan of Ahwaz, and the climatological variables were collected from the "time and date"¹⁶ site. The presented chart illustrates the climatological situation (humidity and temperature) of February 13th, 2017, with a wind speed of 7.2 km/ph.

¹⁶ <https://www.timeanddate.com>

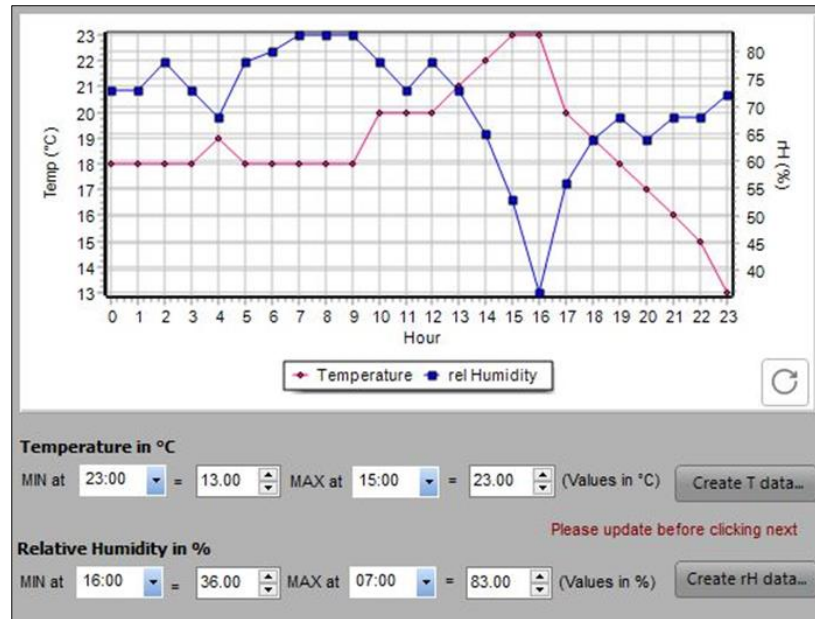


Figure 2: the rate of humidity and temperature on February 13th, 2017

RESULTS

To conduct precise analysis and gain a holistic understanding of the situation, outputs of wind direction and speed, dust dispersion and concentration, sedimented particles, humidity, and temperature were extracted from the simulation results per hour for a comprehensive comparison.

Wind Pattern

Streets and routes parallel to the wind direction had the highest wind speed, while the passages perpendicular to the wind direction had drastically reduced wind speeds. The effects of the street width were completely noticeable in figure 3, with higher wind speed in wider ones in comparison to the narrower. The wind speed pattern in urban open spaces showed that it is reduced significantly in enclosed and inter-block spaces up to a particular dimension.

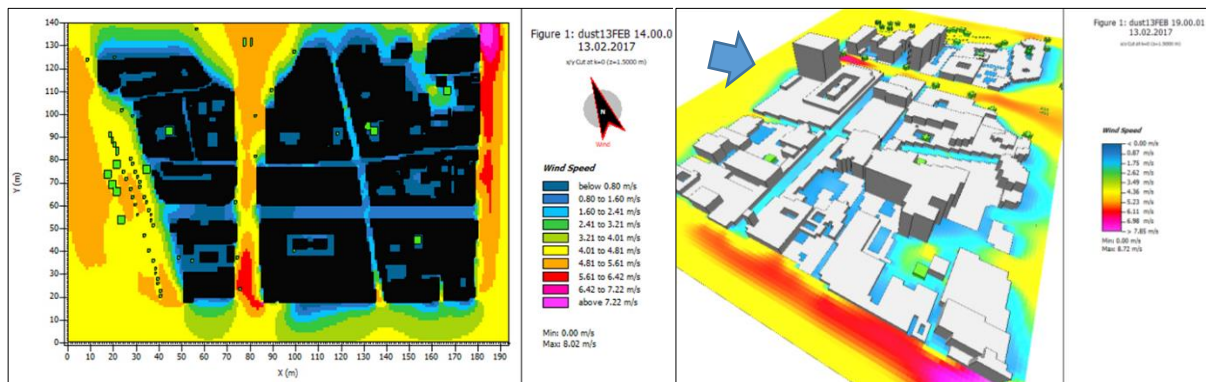


Figure 3: wind speed map, x,y=1.5m, 2-3pm

Figure 4: wind speed 3D map, x,y=1.5m, 2-3pm

The impacts of the built environment and the building on the wind speed are entirely noticeable. According to figure 4, the wind speed is reduced more in enclosed spaces with higher buildings than lower ones. The wind speed exacerbates countering high-rise buildings, while it is significantly reduced on the opposite side.

As it is shown in figure 5, fractions in the facades and the shape of the building lead to wind speed increase which the length of the arrows could understand. Moreover, the air suction power by the end of the main north-south street leading to the square is perfectly understandable.

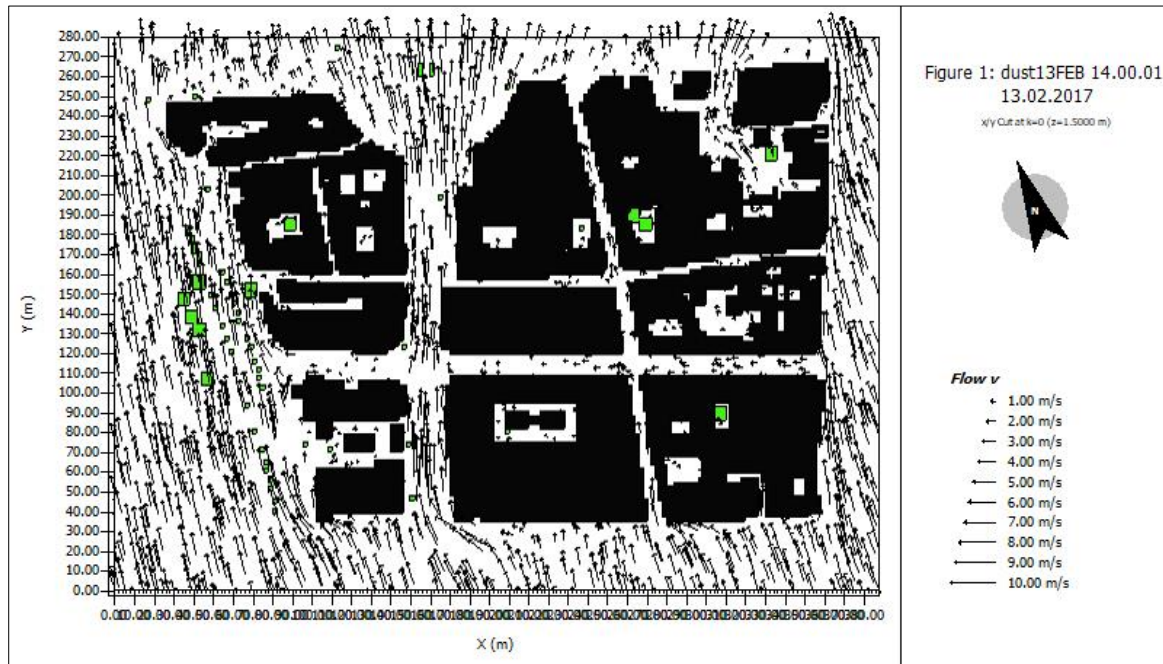


Figure 5: wind direction, x, y=1.5m, 2-3pm

Dust Particles' Dispersion and Concentration

As it could be seen from figure 6, the physical structures and buildings have a definite impact on dust particles' dispersion and concentration, whether in enclosed spaces or the streets and the open spaces. This impact is more sensible on the western sides, in the vicinity of the Karoun river and the surrounding open spaces. Additionally, angled passages have a significant influence on preventing dust storms entrance.

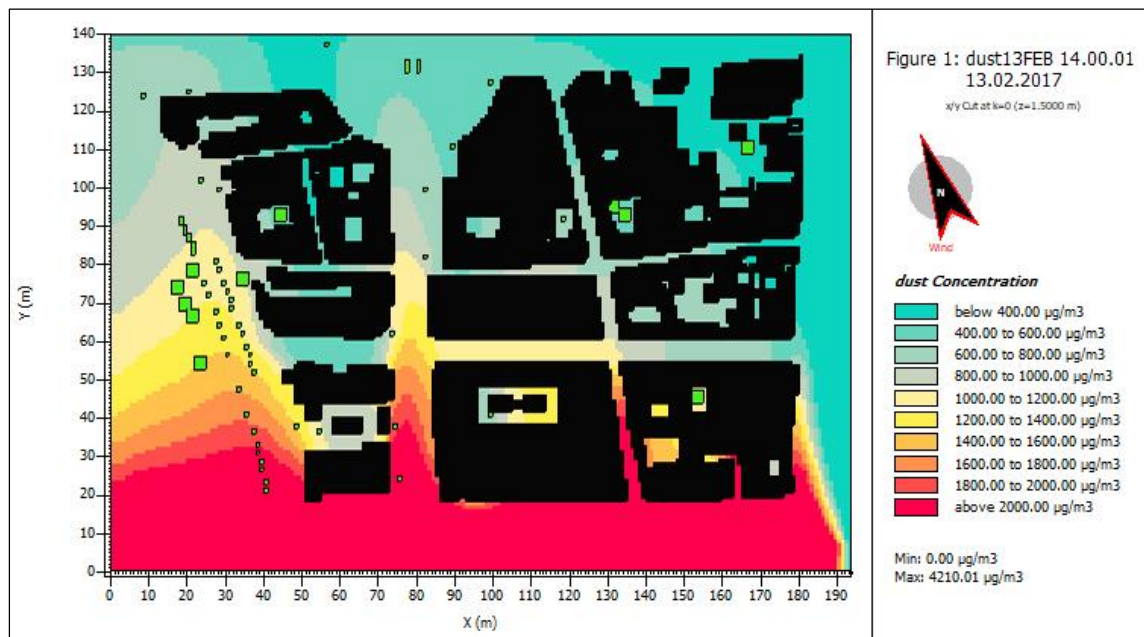


Figure 6: dust concentration, x, y=1.5m, 2-3pm

Investigating how dust particles disperse in open spaces, using figure 7, it could be understood that the concentration of particles is much higher in the covered grand Bazaar, which indicates the fact that when the wind speed is reduced, there would be no chance for natural evacuation of dust matters, and therefore such places could act as a trap. The inter-block open spaces, which are in the forms of central courtyards or plazas and can be seen in the northeast of the site, also showed a significant difference with other spaces in terms of dust concentration, which, of course, depends on their dimensions and size, as well as the direction of entrances and exits. Dust storm exposed fronts had a high aggregate of particles, while opposite fronts had less. Also, sharp and serrated corners in the facades could act as a place to accumulate more dust particles, such as the western sides of the site.

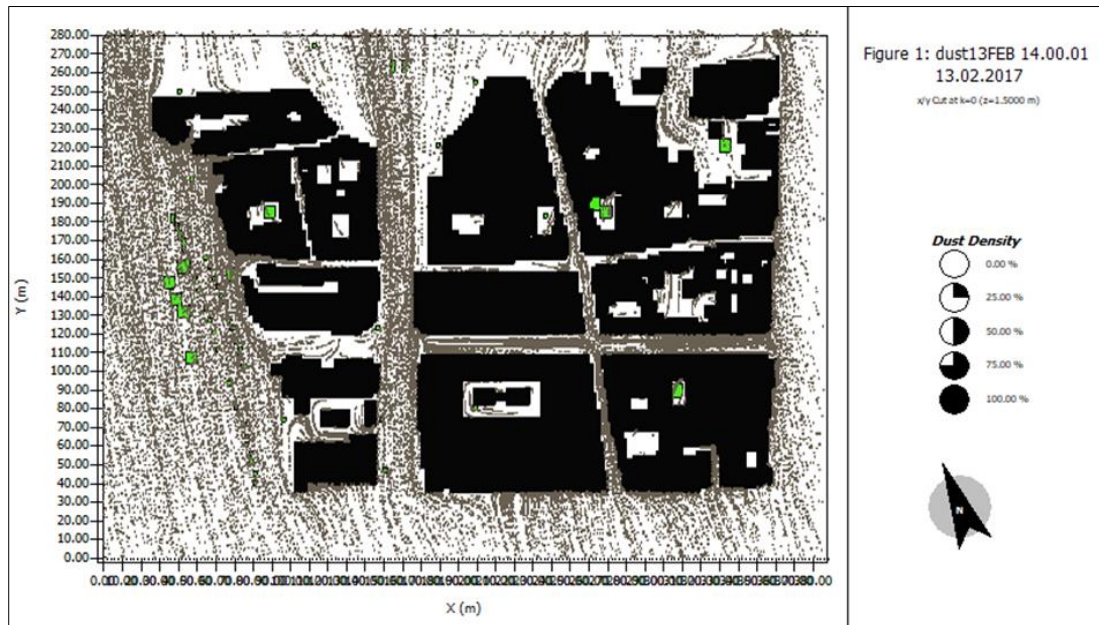


Figure 7: dust dispersion, x,y=1.5m, 2-3pm

Humidity and Temperature

Comparing figures 8 and 9, humidity and temperature variables with previous maps shed light on the spatial relationship between their variation and the mutual effect on the distribution of dust particles. A noteworthy point in the temperature and humidity maps is related to the Covered Bazaar of Imam, as in this axis, the humidity is the lowest, and the temperature is higher than other spaces, which can provide another explanation regarding the increased distribution of fine dust in the Bazaar. In the case of inter-block spaces, the same explanation is proper, as the temperature is lower (due to shading) and the humidity is higher, which prevents dust concentration. Comparative analysis of the spatial figure of these two variables also indicates the inverse relationship between them in terms of dust storms.

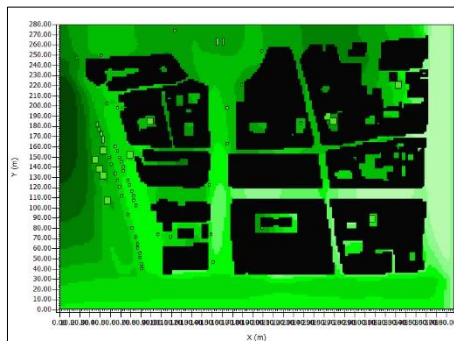


Figure 8: ambient humidity, x,y=1.5m, 2-3pm

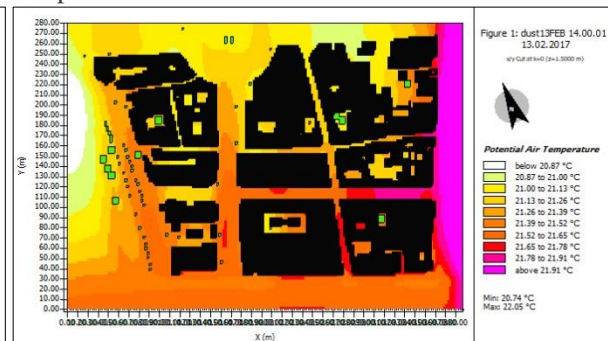


Figure 9: ambient temperature, x,y=1.5m, 2-3pm

Through the storm hours, the temperature and humidity had an inverse relation with lower degrees in humidity where the concentration of fine dust was higher, which has entirely changed from 6 pm onwards after the storm. Places that had high concentrations of fine dust before this hour recorded higher humidity and lower temperatures. It could be inferred that the accumulation of fine dust and other suspended particles can absorb the moisture of the space and lower the temperature. This feature could be used to settle particles by increasing the humidity of the environment so that by absorbing moisture, they get heavier, and in turn, the time of suspension in the air is reduced.

These data provide a clearer vision for adaptation policies to improve the quality of urban open spaces as it denotes that the primary focus should be investigated on the post-storm hours.

The Impacts of the Heights of Buildings

Results indicated that as the altitude increases, the concentration of dust particles decreases. Moreover, at higher altitudes, the physical structures and the buildings have a more severe influence on the distribution of the particles. The fact that the accumulation and concentration of fine dust are much higher at 1.5 meters above the ground level, which was mentioned in the literature, was confirmed in the simulation outputs.

Comparative comparison of key points

For comparing different types of spaces and gaining a better understanding of each dimension of urban design aspects in open spaces, seven focal points were selected for extracting in-detail data, including the covered Bazaar, a dead-end, an alley, the main street, the square, a courtyard, and open green space. By analyzing the outputs and figures, the following items were concluded:

- Spaces with broader physical formations, such as wide streets, squares, natural open spaces such as the waterfront and other urban forms, experience higher wind speeds than those with limited and closed spaces because of the enclosure ratio or the roofs, such as central courtyards, small local squares or covered Bazaar and porches.
- Wider open spaces with high wind speed and no obstacle in the direction of the wind flow consequently have a higher concentration of dust particles.
- Spaces in which the wind speed is reduced due to physical structure and physical barriers can be divided into two categories:
 - a) Closed spaces in which a facade or a side is open, such as the covered Bazaar with an open beginning and ending, or the dead-end alleys and unstraight alleys that reduce the wind speed: These spaces act as an open entry for dust particles, and besides the reduced wind speed they become so-called dust traps. The amount of dust accumulated in these spaces is no different from the wider open spaces mentioned previously.
 - b) Spaces with minimum open facades, such as the inter-block central courtyards: These spaces are the best place for establishing public spaces. More attention should be paid to these historic architectural heritages by injecting a variety of urban activities and land-uses to act as lively urban public spaces.
- The behavior of heavier particle matter (PM_{25} , PM_{16} , PM_{10}) and sand and dust particles has adverse relation with the wind speed, while on the other hand finer particles ($PM_{2.5}$) act adversely with direct relation with the wind speed, therefore have less concentration in low-wind-speed spaces in compare to wider open spaces with high wind speed.

CONCLUSION

Based on the results of the research and the literature review, investigating the impacts of the built environment and the physical forms, the following statements were concluded:

- Influential effects of the large scale city structures on the amount of entering dust, namely, the type of urban texture and compaction, street network patterns, distribution of urban density, type of land covers as well as greenbelt around the city
- Impacts of the built environment on the accumulation of particles and wind currents
- Direct effects of the type of enclosure, dimensions, and size, the height of surrounding buildings, and type of space in local urban spaces on the patterns of dust storm distribution
- A direct relation between the distribution and concentration of dust particles weigh between 16 and 25 Microns with heavier suspended particles such as PM10 and an inverse relation with lighter suspended particles such as PM2.5
- Focusing adaptive policies at the city and large scale on controlling the entrance of dust storms and exposed fronts, and at the lower scale on how to evacuate dust particles after the storm
- Co-relations between the concentration of dust particles and climatological variables such as humidity and ambient temperature
- Suggesting spaces with the least amount of dust concentration for the establishment of active and public land uses and urban public spaces
- Influential effects of micro-architectural structure on dust distribution, including the type of materials, the shape of the building, the shape of the roofs, as well as green roofs
- Installation of specific measures such as specific types of vegetation (there is a detailed discussion about dust-absorbing plants) and fountains or water sprays to increase the humidity of urban spaces in order to make suspended particles heavier and, therefore, accelerate the process of settling down in vital urban public spaces.

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(Re) planting our natural heritage in urban Aotearoa New Zealand*Maria Rodgers, Maibritt Pedersen Zari, Rebecca Kiddle*

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ABSTRACT

In Aotearoa New Zealand, Māori (the Indigenous people) see themselves reflected in the landscape; natural heritage is part of Māori identity. Natural heritage and therefore aspects of Māori identity have mostly been erased from urban areas through colonisation, despite it being a treasure for the first peoples of Aotearoa. Many plants growing in the urban public realm are representative of the colonial state rather than celebrating Indigenous natural heritage. In addition, many of the native plants are from other parts of Aotearoa and are not naturally occurring where they now grow.

This research examines the importance in landscape architecture and urban planting design of going beyond prioritising all of country native plants to focusing on those that were naturally occurring in the past in specific locations. It considers how this might better celebrate place specific natural heritage and so support decolonisation efforts and spatial justice.

Findings suggest that decolonisation of our landscapes offers benefits for mana whenua (people Indigenous to a specific place in Aotearoa) so they can better see their identity, knowledge and values reflected in urban landscapes. Celebrating place specific natural heritage can enable other peoples living in that place to grow deeper connections to the whenua (land), thereby creating a sense of place.

Keywords: “Landscape architecture”, “planting design”, “natural heritage”, “spatial justice”, “decolonisation”, “Aotearoa New Zealand”

INTRODUCTION

There have been urgent calls for environmental action and justice as a response to climate change, which will likely include increased vegetation in urban environments. The benefits of this planting could go beyond the ecological benefits, to build on the well documented links between the environment and human wellbeing (McDonald and Beatley, 2020), both for individuals and for communities, and to celebrate natural heritage.

In Aotearoa New Zealand, past and ongoing injustices have disconnected Māori (the Indigenous People) from their land. Māori see themselves reflected in the landscape; natural heritage is part of Māori identity and this is expressed in the recitation of pepeha (formal personal introductions)¹⁷, where landscape elements such as mountains, rivers, and oceans the individual connects to, and is literally related to, are named (Hikuroa, 2020; Kiddle, 2020). When Māori recite their pepeha, this connection is at the forefront; the name of the landform or water body a person belongs to is stated before their own name. That is, the natural heritage (understood to be ancestors) are more important as identity markers than personal names. Natural heritage and therefore aspects of Māori identity have largely been erased from urban areas through ongoing processes of colonisation (Kiddle, 2021). Honouring Te Tiriti o Waitangi, the Māori language version of the Treaty of Waitangi¹⁸, requires that taonga (treasures) are protected (Waitangi Tribunal, 2020). Natural heritage is a taonga which should be celebrated.

¹⁷ The meanings of Te Reo Māori words are given in brackets after the first occurrence of the word; these meanings are commonly known or, if in quotation marks, from Te Aka Online Māori Dictionary.

¹⁸ ‘The Treaty of Waitangi is New Zealand’s founding document. It takes its name from the place in the Bay of Islands where it was first signed, on 6 February 1840. This day is now a public holiday in New Zealand. The

Recently, there has been a shift from the European notion that natural and cultural heritage are separate and divided, towards Indigenous thinking, where natural and cultural heritage are entwined or are actually one and the same (Mallarach and Verschuuren, 2019). However, many plants growing in the urban public realm in Aotearoa are representative of the colonial state, rather than celebrating Indigenous natural heritage, because they are not native plants. In addition, many native urban plantings are native to other parts of the country and not Indigenous to the area in which they are planted, not naturally occurring in the past. An example of this in Te Whanganui-a-Tara, Wellington (the capital city of Aotearoa New Zealand), is the widespread planting of pōhutukawa (*Metrosideros excelsa*), a species not native to the place. Restoration planting often focuses on those plants that were naturally occurring, but in urban areas other factors, such as the colonial legacy and the desire for deciduous planting to allow light into buildings in winter, dominates. Plantings that celebrate natural heritage, ‘plants of place’, may enable mana whenua (people Indigenous to a specific place) to better see themselves and/or their knowledge and values reflected in urban landscapes.

The Impacts of Colonisation in Aotearoa New Zealand

It is currently understood that the people who came to the islands now known as Aotearoa New Zealand arrived from East Polynesia in the late 13th century (Wilson, 2020b). In 1642 the Dutch explorer Abel Tasman sailed up the west coast and Europeans became aware these islands existed (Wilson, 2020a). James Cook, a Briton, first made landfall in New Zealand in 1769, and circumnavigated and mapped the three main islands (Wilson, 2020a). As a result, New Zealand was colonised by Britain. The Indigenous people began calling themselves Māori (*māori*, ‘normal, usual, natural, common, ordinary’) to differentiate themselves from the newly arrived people they called Pākehā (‘New Zealander of European descent’), but it should be remembered that Māori were and are not one unified people and operated, and continue to operate, as separate tribal groups.

Māori became concerned about the threat the new arrivals could become, and met with the British Crown to seek agreement that the Crown would control unruly settler populations, allow Māori to continue to self-govern, and protect Māori interests over land and other resources. Thirty-four rangatira (chiefs) signed He Whakaputanga o te Rangatiratanga o Nu Tireni (known in English as the Declaration of Independence of the United Tribes of New Zealand) which ‘was formally acknowledged by the Crown in May 1836’ (Ministry for Culture and Heritage, 2020). He Whakaputanga was a declaration of the sovereignty of the rangatira stating they would never give up law-making powers; many hapū (sub-tribes), especially in the north, still consider it ‘to be the founding constitutional document of New Zealand’ (Mutu, 2019, p. 6).

By 1840, Māori decided that the British had to take responsibility for lawless immigrants and on the 6th of February, 40 rangatira signed Te Tiriti o Waitangi, which confirmed He Whakaputanga (Mutu, 2019, p. 6). By September, 500 more had signed copies sent around the country and almost all signed the Māori text (Ministry for Culture and Heritage, 2017).

There are marked differences in meaning between the English and the Māori versions. ‘In the English version, Māori cede the sovereignty of New Zealand to Britain’ (Ministry for Culture and Heritage, 2017). In Te Tiriti ‘the word ‘sovereignty’ was translated as ‘kawanatanga’ (governance) ... [and] the Māori version guaranteed ‘tino rangatiratanga’ (full authority) over ‘taonga’ (treasures, which may be intangible)’ (Ministry for Culture and Heritage, 2017). The document has long been and remains controversial (Ministry of Culture and Heritage, 2020). For many years, the understanding of the document by the New Zealand Government and Pākehā focussed on the English version. ‘Contemporary Pakeha¹⁹ debate and scholarship is now turning towards the signed treaty text in the

Treaty is an agreement, in Māori and English, that was made between the British Crown and about 540 Māori rangatira (chiefs)’ (Ministry for Culture and Heritage, 2020).

¹⁹ The use of macrons in Te Reo Māori in quoted text is determined by whether they are present in the original text.

Maori language ... in which ‘tino rangatiratanga’ (sovereignty) is retained by Maori, and ‘kawanatanga’ (a more limited power of governorship) is granted to the British’ (Huygens, 2011, p. 57).

The Ongoing Impacts of Colonisation on Māori

A multitude of laws passed by the New Zealand Government led to the continued loss of land by Māori and disconnection from their whenua (land). At the signing of Te Tiriti, Māori owned almost all the North Island, but by 1892 owned only about a third, with a quarter leased to Pākehā; a further 1.2 million hectares was sold, or confiscated, by 1900 (Ministry of Culture and Heritage, 2021).

Kake (2020, p. 125) has written:

The signing of te Tiriti o Waitangi in 1840, and the breaches that followed, led to the erosion of Māori lands and their resource base. It was this, rather than the introduction of new technology and trade, that led to the most significant changes in Māori economic and political structures.

Colonisation has had profound negative impacts on Māori in many aspects of their lives. ‘Indigenous cultures, economies, populations and rights have been diminished and degraded over more than seven generations’ (Moewaka Barnes and McCreanor, 2019, p. 19).

The Impacts of Colonisation on the Flora and Fauna of Aotearoa New Zealand

‘New Zealand’s plants and animals evolved for millions of years without human or mammal predators, so they were very vulnerable when people and other predators arrived’ (Wilmschurst, 2007a). A total of sixty-four endemic species of birds, lizards, frogs, and a bat have become extinct since the arrival of humans in Aotearoa New Zealand. When the ancestors of Māori arrived, they hunted the largest creatures first and most of the larger birds became extinct. When Europeans arrived in 1769, they brought animals for food or by accident, such as rats as well as plants, parasites, and diseases, and it was the beginning of a period of accelerating extinctions (Wilmschurst, 2007a; 2007c; 2007d).

More than 80% of pre-human Aotearoa New Zealand was cloaked in forest; this is now 24% (Dawson, 2007; Department of Conservation, n.d.). ‘When Māori arrived ... they burnt large tracts of forest’, probably to clear space for gardens, tracks and settlements (Wilmschurst, 2007a). Plants Māori brought with them were from warmer climates and so did not become naturalised or invasive, in contrast to those Europeans brought. ‘By the 2000s, more than 30,000 plant species had been introduced to New Zealand. At least 2,166 had become ‘naturalised’ and some early introductions by Pākehā rapidly became irrepressible weeds, such as gorse, *Ulex europaeus*. Other plants took over native habitat, such as marram grass (*Ammophila arenaria*) and tree lupin (*Lupinus arboreus*) in sand dunes (Wilmschurst, 2007b; 2007c).

The impact of Pākehā on the landscape was catastrophic. Huge areas of forest were rapidly cut for timber, or simply burnt and converted to exotic grass. Wetlands, waterways, and landscapes were devastated; bush, swamps, and creeks, seen as wild and waste lands ‘to be owned, fenced, cleared, tamed’, became pasture, orchards and plantations (Came et al., 2020, p. 105).

When Māori burnt the forest, native plants replaced it through natural succession. When Pākehā burnt the forest, the impacts were far greater: ‘they removed tree stumps and the protective cover of ferns and scrub – unlike the 13th-century deforestation, which left these in place’; this led to massive erosion and slips, and silting up of river mouths and estuarine systems (Wilmschurst, 2007c). Large areas of wetland and swamp were drained and by the early 2000s only 10% remained (Wilmschurst, 2007a).

WHY REVEAL NATURAL HERITAGE IN URBAN AOTEAROA?

This research seeks to understand the benefits for both Māori and Pākehā of revealing and reinstating our natural heritage in the urban realm, of prioritising plants that were naturally occurring in the past. We assert that prioritising these plants contributes in some way to honouring Te Tiriti and elevating Māori values in urban and landscape practice. A review of the literature identifies the following potential benefits of revealing our natural heritage in the urban realm as relates to Māori values and aspirations:

1. an opportunity to honour Te Tiriti o Waitangi
2. a contribution to decolonisation efforts and spatial justice
3. the protection of taonga tuku iho (the 'intergenerational protection of highly valued taonga, passed on from one generation to the next, in a caring and respectful manner' (Harmsworth and Awatere, 2013, p. 275))
4. an expression of a bio-cultural framing of heritage
5. support for place identity or a sense of place, for Indigenous and non-Indigenous Peoples
6. restoring wellbeing through restoring natural heritage; the restoration of physical, psychological, and cultural wellbeing through elevating the importance, significance and interconnectedness of the natural environment, social well-being, and health.

Honouring Te Tiriti o Waitangi

Jones (2008, p. 46) writes of the need to reassert the right of iwi (tribes) and hapū to tino rangatiratanga (self-determination) and considers this 'is likely to move much closer to achieving the true purpose of a city – by creating a sense of place, fostering diversity and complexity, promoting community life, building cultural landscapes, bringing power to the people and ensuring future development is sustainable'.

Honouring Te Tiriti requires that taonga (which include natural heritage) are protected (Waitangi Tribunal, 2020). However, in our urban realm natural heritage has been removed (Kiddle, 2021). Jackson (2020, p. 146) writes that in Aotearoa the coloniser kept identifying with and valuing the stories, plants, animals, and landscapes of their homeland, and disregarded those already here. Harmsworth (2004, p. 8) identified issues of concern for Māori in the urban realm are loss of and damage to habitats, loss of taonga species, and the impact of pest flora and fauna. He considers this requires 'new approaches to design and development that link the urban physical, social, and cultural environment intimately to human wellbeing, values, and human existence' (Harmsworth, 2004, p. 8). To enhance Māori values, Harmsworth (2004, p. 12) proposes celebrating natural heritage in urban areas through promotion of planting Indigenous flora, increasing habitats for native fauna and introducing native vegetation to culturally significant areas. Celebrating and telling stories of natural heritage, we argue, is an act of honouring Te Tiriti.

Contributing to decolonisation efforts and spatial justice

Colonisation in Aotearoa is 'a story about racism, discrimination and the systematic displacement of a people, their stories, place names, sites of importance, landscape features and even vegetation with a new colonial order creating new spaces for new immigrants to inhabit' (Matunga, 2000, p. 66).

The Oxford English Dictionary defines decolonisation as: 'The withdrawal from its former colonies of a colonial power; the acquisition of political or economic independence by such colonies'. This definition has not been updated since 1972 (Oxford English Dictionary, 1972). Fifty years have passed and the definition of decolonisation has broadened to include what political theorist Getachew calls cultural decolonisation (Getachew, 2020). Smith considers decolonisation is 'now recognized as a long-term process involving the bureaucratic, cultural, linguistic and psychological divesting of colonial power' (Smith, 2013, p. 175). Mercier (2020, p. 51) states:

In the Aotearoa context and in many other settler states – such as Hawai'i, the mainland United States, Canada and Australia – decolonising does not mean the removal or withdrawal of colonial occupiers so much as a fundamental shift in the ideas, knowledges and value sets that underpin the systems which shape our country.

Decolonisation requires 'that power imbalances are addressed, that negative effects of colonisation are peeled away and that pre-colonial ways are revived – often starting with language, education and social practices or tikanga' (Mercier, 2020, p. 53). Jackson (2020, p. 149) proposes going beyond the divesting of colonial power, to the restoration of iwi and hapū power and independence, and replacing the term decolonisation with 'the ethic of restoration'. Amundsen (2018, pp. 149, 151) sees decolonisation as

the wrong doer making steps towards reconciliation with the wronged, and that it ‘is not an “end”, rather a “new space” to be developed together’.

Elkington and Smeaton (2020, p. 18) acknowledge that colonisation and decolonisation ‘can seem politically loaded and fear inducing’. For some descendants of the colonisers of Aotearoa New Zealand the term decolonisation evokes fear of displacement from the place they and their ancestors have called home for generations. This fear appears to be fear of the unknown and of what non-Māori may be forced to give up, rather than the more positive view of how change could be beneficial to all and create a more just way to live in this place together.

In Aotearoa 84% of Māori live in urban areas (Meredith, 2005). ‘Despite large urban Indigenous populations, Aotearoa cities today continue to be conceptualised as non-Indigenous spaces’ (Kiddle, 2018, p. 55). Matunga (2000, p. 65) argues that cities in Aotearoa still reproduce urban design based on the British model (perhaps more recently, a globalised version); the stories of our cities and their identities reinforce their colonial past and negate their pre-colonial origins. The stories of tangata whenua (people of the land, Māori) have been removed and are largely ignored and invisible. Colonial norms privilege the built, subjugating the natural heritage and whenua that give Māori identity; natural heritage is often hidden beneath urban form and it is easier to celebrate the visible (Kiddle, 2021). Connections to Papatūānuku (Earth Mother) are thus harder to maintain in cities (Small, 2020). ‘For many Māori, urban environments symbolise pain: the pain of having lost whenua and having the city grow up around and take over traditional habitations. For others whose tūrangawaewae [place where one has rights of residence and belonging through kinship and whakapapa] is elsewhere, cities can be places of disconnection from tribal roots’ (Mercier, 2020, p. 65).

Injustice is physically manifested in our public realm due to the predominance in the telling of the colonial story and therefore ongoing colonisation. ‘A critical issue for tangata whenua during New Zealand's urban development over the last 150 years has been finding a space to belong, and a place to be at home, in a place that was originally your home, but which is now foreign territory’ (Matunga, 2000, p. 67). Our cities need to be re-imagined so as to relocate them in Aotearoa, away from the imperial centre (Matunga, 2000). The development by Ngāti Whātua o Ōrākei, a subtribe based in central Auckland, on ancestral land sees an innovative interweaving of traditional and contemporary urban design, a reclaiming of Māori spatial narratives and a re-establishing of Māori cultural presence in the city (Thompson-Fawcett and Riddle, 2017, pp. 661-664). Māra Kai (food gardens) are a part of this development (Figure 1a). Narratives may be subtle and not immediately obvious to all, however, ‘as an Indigenous group, being able to recognise your identity in the city is critical: that is, being able to be yourself and see yourself in the city’ (Thompson-Fawcett and Riddle, 2017, pp. 663-664). ‘Public spaces are important sites for decolonising acts’ (Mercier, 2020, p. 65-66).

Alongside a physical design presence, there is need for: more equitable representation of tangata whenua in democratic decision-making bodies such as local councils; comprehensive and collaborative planning; celebration of Māori histories through Māori place names and identification of significant people and landscapes; as well as ‘ecological surveys of the city and programmes to indigenise and reintroduce native trees, plants, bush, even forests back into the city’ (Matunga, 2000, p. 70). Mātauranga (Māori knowledge) about plants could be integrated into planting design and areas for harvesting of plant material for rongoā rākau (Māori medicine using plants) planted. Valuing of pre-colonial ecology can be expressed in planting design and can have cultural and social impacts. As colonisation has been cultural, social, and ecological, decolonisation requires a cultural, social, and ecological shift.

Kake (2020, p. 129) states that, ‘Indigenisation ... can be used to describe the ‘softer’ interventions or moves towards decolonisation’. Indigenisation may include: increased participation of mana whenua in design and development projects; referencing Indigenous history and culture; increased Māori participation in built-environment professions as students and practitioners; and the application of kaupapa-Māori urban design principles (Kake, 2020, p. 129). The latter include: ‘recognition of culturally significant landmarks, natural features, ecology, plant species, and narratives ... For these design principles and practices to have integrity, however, definition and control must be held by mana

whenua (Kake, 2020, p. 133). Kiddle (2020, p. 209) advocates that spatial designers in Aotearoa try to ‘understand the values of the mana whenua of the place in which they work, drawing off these to develop a sense of rooted identity in their designs and re-right historical injustices which have meant that Māori identities have been erased from the landscape’. Decolonisation requires change for the designer with ‘designed for’, becoming designing with, or designing by, and it is about listening to the land – what is best for the land here, for Papatūānuku, the earth.

The protection of taonga tuku iho

Taonga tuku iho refers to cultural treasures including tangible elements such as natural heritage and intangible elements such as Māori knowledge. In Te Ao Māori (the Māori world) ‘trees and other plants are descended from Tāne²⁰. Māori see all flora and fauna of the natural world as linked through genealogy’ (Royal, 2007). The removal of ngahere (forest) and the removal, by force or otherwise, of Māori from the land where they were mana whenua, has caused severe negative impacts and ongoing disconnection from the whenua, from Papatūānuku, and their identity (Moewaka Barnes and McCreanor 2019, p. 19; Kake, 2020, p. 125). In Te Reo Māori (the language of the Māori people), Māori are tangata whenua, people of the land. Ancestors are literally planted in the earth (Hikuroa, 2021). Durie (2005, p. 2) has written that, ‘A long-standing bond with the land and the natural environment is the fundamental feature of indigeneity’.

As stated in the introduction, that natural heritage is part of Māori identity is expressed in the recitation of pepeha (Hikuroa, 2021; Kiddle, 2020). The order of phrases in pepeha stress the primacy of connections with nature, referring first to landforms and water bodies, and assert that the land is what connects us (Hikuroa, 2021). The importance of the collective is then communicated through relating family connections. The introduction ends with the name of speaker. This is the opposite to the way a Pākehā typically introduces themselves, name first, as individual identity has precedence.

Matunga (2000, p. 67) has written that:

Except for rare urban remnants, and pockets of native bush the biota of the city is also radically different. Native plants, trees, and other vegetation valued by tangata whenua have been cleared and replaced by exotics, the ‘new’ colonial vegetation, colonial botanic gardens and imperial landscapes.

Kiddle (2021) states that Māori identity has been removed from our urban areas. She questions why Māori heritage is not as visible as colonial heritage and considers that:

one of the problems is that it’s much easier to celebrate things we can see. Because colonisation fundamentally erased Māori identities from our landscapes, we don’t currently see many symbols of this rich heritage. In parallel, colonial norms privilege buildings as symbols of human endeavour and identity, subjugating elements such as the whenua, mountains and water bodies which give Māori identity.

Kiddle (2020, p. 208) also writes that ‘an Indigenous ecological design approach would respond meaningfully to the context in which a project is located’. Therefore, there should be celebration of a place’s particular natural heritage and the plants of the place. For taonga tuku iho to occur, the taonga that is natural heritage must be protected and celebrated so that it can be inherited by future generations.

²⁰ Tāne is the offspring of Ranginui, the Sky Father, and Papatūānuku, the Earth Mother.



Fig. 1a: Māra Kai developed by Robert Small in collaboration with Ngāti Whātua Ōrākei, Pourewa, Auckland (Bierman J. 2021 – used with permission). Fig. 1b: Looking up Victoria Street, Wellington – none of the trees are native, in fact, all plants are exotic and deciduous except for a couple in the foreground bed. November 2021. Photo by M. Rodgers.

To express a bio-cultural framing of heritage

Extending the idea of heritage to include natural heritage began in the West in the middle of the 1900s (Batista et al., 2021, p. 1). However, natural and cultural heritage remained separate (Harrison, 2015, p. 27). Cultural heritage is human-made artefacts and other culturally related aspects, some intangible, and natural heritage elements are those not made by humans (Batista et al., 2021, p. 1). Natural heritage was seen in the past as ‘mainly valued for its contribution to ecological, biological and geological processes and the relative importance of natural habitats for the conservation of biodiversity’ with its value for people overlooked (Batista et al., 2021, p. 1). For Indigenous Peoples, natural and cultural heritage are woven together; Roberts et al. (1995, p. 10) write that in the Māori world view humans are a part of nature. Hikuroa (2021) has said humans exist in a kin-ship based relationship with Te Taiao, the environment, and that for Māori, cultural and natural heritage are inseparable.

The publication of *Cultural and Spiritual Values of Biodiversity* in 1999 marked a change in thinking, arguing that nature and culture are inextricably linked (Posey 1999; Mallarach and Verschuuren, 2019, pp. 141-142). There was a shift away from the Western understanding of heritage where natural and cultural heritage are divided, ‘singular and unanimous’, and natural heritage is set apart in the countryside (Harrison, 2015, p. 27). There was a move from ‘scientific expert valuation to valuation by Indigenous peoples’²¹ and from tangible to intangible heritage, towards ‘more holistic, natural-cultural approaches’, and it is now widely accepted that there are multiple heritages (Mallarach and Verschuuren, 2019, pp. 141, 143). The term bio-cultural heritage expresses closely linked cultural and natural heritage (Batista et al., 2021, pp. 2-3). ‘A biocultural vision implies equally that heritage conservation, whether natural or cultural, should consider the human context and local communities’ (Pungetti, 2013, p. 75). Harrison (2015, p. 27) sees this current way of understanding heritage as holistic, where ‘life and place combine to bind time and living beings into generations of continuities that work collaboratively to keep the past alive in the present and for the future’.

Despite the shift away from the Western understanding of heritage, natural heritage in Wellington is still recognised under the umbrella of natural and open space, rather than heritage, by Wellington City Council (WCC). Wellington’s heritage areas are defined by their buildings and are not natural, except for parts of the Botanic Gardens and Otari Botanic Garden which have forest remnants. Natural landscape or natural heritage areas are only recognised in ‘Māori Precincts’, for example, Te Ranga a Hiwi Precinct and Tapu Te Ranga - Haewai Precinct (Wellington City Wellington City Council, 2021, p. 27). Recently, as part of a full review of the current Wellington City District Plan, WCC asked for public feedback on the Heritage Places and Objects Heritage list, defining what will be included as

²¹ The use, or not, of capital letters in ‘Indigenous Peoples’ and ‘Indigenous’, when referring to people, in quoted text reflects the original text.

‘buildings, areas or objects that contribute to an understanding and appreciation of New Zealand’s history and culture’ (Wellington City Wellington City Council, n.d.-b). There is no mention specifically of natural heritage, although it is alluded to when tangata whenua values are defined: ‘these values relate to places that are sacred or important to Māori for spiritual, cultural or historical reasons’ (Wellington City Wellington City Council, n.d.-b). Natural heritage is also included in what WCC has called Backyard Tāonga: ‘Important natural landscapes, features, or areas of land with special wildlife, plants, or trees that are native and important to the biodiversity of our city’ (Wellington City Wellington City Council, n.d.-a). However, while important, these sites are remnants of what was there in the past; the stories of what is no longer present or visible are also important, especially as many of those are mana whenua stories.

Kermath draws on ‘E.O. Wilson’s idea that society must assign the same value to natural heritage as it does cultural heritage to successfully safeguard biodiversity for the long haul’ (Wilson, 1984 and Wilson, 1999, as cited in Kermath, 2007, p. 210). He suggests that if our natural heritage is not intricately woven into our cultural fabric, we are likely to fail in passing on this future legacy, and that: When natural heritage matters more deeply to us, our urban landscapes will have more complex assemblages of native plants that are more wildlife friendly and reliant on natural processes than the ecologically simple, capital intensive, and environmentally toxic industrial landscapes that dominate much of the settled world today. (Kermath, 2007, p. 212)

‘Wellington has relatively little of its original native forest left (estimated at less than 5 percent remaining broadleaf and 1 percent remaining coastal forest)’ (Beatley, 2016, p. 75). The treasured Town Belt embraces the city but is dominated by exotic species, and on the South Coast, karo, *Pittosporum crassifolium*, a native to Aotearoa but not to Te Whanganui-a-Tara, creates what WCC park ranger Tom Mayo describes as a monoculture (2021, pers. comm. 1 October). Expression of the importance of our relationship with local nature should be seen in our street trees, our pocket parks, our large civic spaces and throughout our urban areas, where most people live, not just on the fringes or in fenced sanctuaries that charge entry as they are expensive to run. The bed of hybrid tea roses laid out below New Zealand’s Parliamentary Library literally underlines the identity as a colonial power. The building already expresses this – why not show the admittedly beautiful building nestled in context, in its place, surrounded by plants of Te Whanganui-a-Tara? What is important to us, or considered important by local and national government, is expressed in our urban realm. Currently in Wellington the car and the road dominate and in winter most of the street trees in the CBD are leafless and grey, blending with the concrete and asphalt, as they are deciduous and exotic (Figure 1b).

Exotic plants and plants not native to place can have negative impacts on local biodiversity and lead to hybridization and disruption of ecosystem processes by altering soil chemistry and shading out natives. Another local example of this, in addition to that of karo stated above, is, *Pinus radiata* in Wellington Town Belt which produce a dense canopy and have shallow roots so that natives intolerant of shade cannot establish. Where the pines are less dense, or one has fallen creating an opening in the canopy, self-sown native plants establish.

Natural heritage should be revealed in a variety of ways designed to reach a variety of people; these can include naming, on site interpretation, and information accessible online. Celebrating hidden natural heritage in our urban areas could include recognition of Māori cultivation areas, waka (canoe-type vessel) landing sites, mahinga kai (food gathering areas) areas, enabling fish passage in urban streams and making people aware of areas of remnant vegetation. In Wellington there are some larger-than-life acknowledgments of vegetation past. The metal column homages to the nīkau that architect Ian Athfield arranged around his central library elevated the forgotten palm, *Rhopalostylis sapida*, long disappeared from the local landscape, to a symbol of Wellington (Davis, 2020). Recently, with a rebuild of the building mooted as it is now considered earthquake prone, there were calls for the much-loved metal nīkau to be preserved (Figure 2a). If only we could have campaigns to re-instate live versions in the city.

The recent interest in ‘ecological gardening’, or naturally inspired vegetation, has grown due to interest in more sustainable landscapes and was thought of in connection to a scientific approach; however,

greater emphasis is now on artistic outcomes (Dunnett and Hitchmough, 2008, pp. 53, 54). The desire for ecological planting could see expression in planting that expresses natural heritage. There is a need for a shift in emphasis to cultural/heritage outcomes, bio-cultural outcomes, outcomes that combine positive impacts on the environment and on people, in particular Indigenous Peoples for whom nature is integral to their identity.

One of the 2025 goals in Te Mana o te Taiao - Aotearoa New Zealand Biodiversity Strategy is that, 'Indigenous vegetation planting is standard practice in urban areas, riparian zones, agricultural buffers, transport corridors and other areas' (Department of Conservation, 2020, p. 54). In order to consider bio-heritage, and previously discussed benefits to both Indigenous and non-Indigenous Peoples, this Indigenous vegetation must also be naturally occurring in the past rather than all of country native.

Support for place identity or a sense of place for all

Park (1995, p. 320) states, 'A sense of place is a fundamental human need At its most meagre, a sense of place is the intuitive human skill we depend on to interpret the landscape and differentiate one place from another'. Seeing and understanding our natural heritage can enable deeper connection to place and the landscape and is valuable and beneficial to all. 'The urban plant community supports human wellbeing in part owing to its role in the construction of place identity. Some plant species become signatures of place such as palm trees in warm coastal areas or heather in the Scottish Highlands' (Hull, Lam and Vigo, 1994, cited in Hunter, 2011. P. 175). Kermath (2007, p. 213) predicts that the landscape aesthetic will shift so that it is not just about the visual but about the environmental, the ecological and natural heritage and that this will mean 'a truer sense-of-place'. This is seen in Aotearoa also. In 2011, for example, the Waitangi Tribunal²², as part of their response to the Wai 262 claim, stated: 'For many New Zealanders, indigenous flora and fauna are not merely a resource to be exploited. Indigenous plants and wildlife are symbols of nationhood, and possess intrinsic value that requires protection' (Waitangi Tribunal 2011, p. 197).

White 'is struck by how similar our urban green spaces are to those in England, where he grew up, and how many NZ cities lack native vegetation and are Victorian ideals of beauty and amenity' (Graves, 2021, p. 25). Park (1991, pp. 19-20) writing of New Zealand in 1991, wondered 'how a native, indigenous sense of place will ever be stimulated'. Artists and designers are beginning to express this, for example, in Waitangi Park in Wellington, where, with great attention to detail and collaboration with ecologists, local coastal species were gathered from different, local rocky coast habitats and planted in the Graving Dock. Other public art works acknowledge natural heritage in Wellington, such as, Athfield's nīkau and Michel Tuffery's *Nga Kina*, a sculpture of giant sea urchins (Figures 2a and 2b).



²² 'Set up by the Treaty of Waitangi Act 1975, the Waitangi Tribunal is a permanent commission of inquiry that makes recommendations on claims brought by Māori relating to Crown actions which breach the promises made in the Treaty of Waitangi' (Ministry of Justice, 2021).

Fig. 2a: Wellington Central Library by Athfield Architects - part of the nīkau colonnade. November 2021. Photo by M. Rodgers. Fig. 2b: Nga Kina, by Michel Tuffery, Kumutoto, Wellington Waterfront. November 2021. Photo by M. Rodgers.

The major Aotearoa earthquakes in Christchurch that started in 2010 had a devastating effect on the central city (Christchurch City Council Libraries, 2021). While tragic, room was created for re-imagining the colonial city, not as an outpost of England with a multitude of references to 'home', but as a city in Aotearoa. While not belittling the tragedy, the earthquakes 'made space' as buildings were demolished in the central city and mana whenua representation at most levels of the recovery governance system was greater than before the earthquakes (Thompson-Fawcett and Riddle, 2017, 659-660). 'In material terms, the result has been reconstruction that better interweaves traditional language, design, arts, natural heritage, recovery of natural resources, local narratives, important Māori values and aspirations' (Thompson-Fawcett and Riddle, 2017, p. 661). An example of this is Ngā Whāriki Manaaki, Woven Mats of Welcome, a series of 13 weaving patterns in paving in the Te Papa Ōtākaro/Avon River Precinct designed by expert weavers. However, the new planting alongside some designs could better support the meaning of the patterns by representing the natural heritage of the place visitors are being welcomed to.

The prioritising of native plants of place is not a new idea. 'For several decades, New Zealand has been developing its own 'Going Native' strategy with an emphasis on increasing the planting or revegetation of indigenous plants. Since the 1990s, 'plant signatures' have been very popular in New Zealand planting design' (Spellerberg and Given, 2004, cited in Ignatieva et al., 2008, p. 63). Robinson, who arrived in Aotearoa from England in the 1990s to become a lecturer in landscape architecture, wrote about plant signatures. He was struck by the wealth and diversity of plants and 'the distinctive visual and spatial qualities of the indigenous vegetation ... [which] stimulated thoughts and questions about how these might be used in landscape design' (Robinson, 1993, p. 26). He considers selected combinations can be plant signatures and represent the character, uniqueness and essence of a particular place, and so contribute to place identity (Robinson, 1993, pp. 26, 27).

Norton et al (2016, p. 172) envision that by 2050 'restoration and biodiversity conservation will underpin our identity ... the ihi (vitality or essential force) of the environment reflected in the relationship of people with the land ... [and that] Te Ao Māori (Māori worldview) principles, values and customary approaches will be central to restoration practice'.

Imminent climate change is a threat that should be considered in every aspect of our lives. Hikuroa stated, 'Rekindling the relationship with whenua is the first step in achieving better health and wellbeing, improved ecological and environmental outcomes and contributing to climate change mitigation' (Hikuroa, 2021). In Aotearoa there is an added layer to the need to address climate change and the need for environmental justice, and that is the need for spatial justice, to decolonise or re-Indigenise our urban spaces. By celebrating natural heritage through planting design these two needs may be met, although care is needed. Hunter proposes identifying signature species and then identifying an alternative with similar aesthetic presence but broader ecological tolerance as an adaption to climate change measure (Hunter, 2011, p. 175). This proposal would probably not address spatial injustice or have a positive impact on mana whenua or Indigenous Peoples as natural heritage would be lost. Rather than matching 'specific plant species to specific predictions of climate change', a better fit with natural heritage goals is Hunter's proposal of adding resilience to plantings by assessing plant potential for plasticity and adaptation to change (Hunter, 2011, p. 173). 'Plasticity describes how well species perform across a range of environmental conditions' (Hunter 2011, 174). An example could be a plant with a long flowering or pollination period being less impacted by climate changes. Another issue is that 'the extensive use of highly plastic species can inadvertently result in lower biodiversity' as the list of potential species is reduced (Hunter, 2011, p. 181). This could lead to a loss of taonga species. Hunter states it is important to consider aesthetic goals if ecological planting design is to be accepted. It is vital that cultural and spatial justice goals be a priority.

Restoring wellbeing through restoring natural heritage

‘There is growing recognition that access to nature is vital for our mental and social wellbeing. Spending time in nature can provide physical activity, create social bonds with others who share the same space and improve our mental health through relaxation and restoration’ (Department of Conservation, 2020, p. 24). This nature can also have a multitude of other benefits if it is a celebration of the natural heritage of place. ‘In settler countries, attention is now extending to the wellbeing benefits of recognising and promoting the Indigenous cultural identity of neighbourhoods as a contributing factor to more equitable and healthier communities’ (Raerino et al., 2021, p. 1). Hikuroa has stated that if Māori rekindle a relationship with whenua, they will achieve better health and wellbeing (Hikuroa, 2021). Norton et al. ‘argue that [ecological] restoration must be as much about people as about the natural environment: *He tangata, he tangata, he tangata* (it is people, it is people, it is people), about supporting *kaitiakitanga* (environmental guardianship) and building on concepts of social–ecological resilience’ (Ruiz-Mallen & Corbera, 2013, cited in Norton et al., 2016, p. 171).

The concept of biophilia was popularized by E. O. Wilson (Harvard myrmecologist and sociobiologist). ‘Wilson argues that humans have co-evolved with nature and that we carry with us our ancient brains and our need to connect with and affiliate with nature, to be happy and healthy’ (Beatley and Newman, 2013, p. 3329). Recently, there has emerged a large amount of evidence ‘showing the many positive benefits of contact with nature ... it is increasingly clear that the ecosystem services supplied by natural features like trees make us calmer, less stressed, happier and more focused’ (McDonald and Beatley, 2020, p. 64). The Biophilic Cities Network was founded in 2013 and is made up of cities which seek to prioritise nature, and includes Wellington. Biophilic cities: ‘represent a new vision of global urbanization that puts nature at the center of design and planning’ (McDonald and Beatley, 2020, p. 63); ‘provide close and daily contact with nature’ (Beatley and Newman, 2013, p. 3328); prioritise human-nature relationships; and integrate nature into design for human wellbeing (Beatley, 2011). Biophilic urban environments, can also strengthen place connection as ‘green elements are an important aspect of place. They ... can strengthen distinctive place qualities, nurturing a special sense of place and, in turn, commitments to place’ (Beatley and Newman, 2013, p. 3335). The natural environment is critical to places that are unique; a distinctive natural environment and distinctive plants contribute to a place’s identity (Beatley and Newman, 2013, p. 3335).

An increase in native plants will increase native birds; Maire Kipa (2020) stated that ‘bird song contributes to identity’ (Kipa, 2020). Native birdlife has other positives for humans. ‘We know that hearing birdsong is beautiful and therapeutic’ (Beatley, 2016, 80). White (2021) has stated that, as birdsong was at the top of the list when people were asked what they most valued in the city, he is seeking the answer to how to create a city where people have access to birdsong (White, 2021).

CONCLUSION

Landscape architecture and urban planting design should go beyond prioritising ‘all of country’ native plants to focusing on those that were naturally occurring in the past in specific locations, that is, ‘plants of place’ that celebrate a place’s specific natural heritage. The planting in shared spaces of plants that were naturally occurring in the past may enable mana whenua to better see themselves and/or their knowledge and values reflected in the urban landscape and so better connect to Papatūānuku. Further research is proposed to examine this more closely. For all people in Aotearoa New Zealand, plants growing in public spaces that would naturally have occurred there in the past will contribute to place identity, sense of place, and grow deeper connections to the land on which they stand.

To conclude, this research suggests 6 potential cultural benefits of revealing our natural heritage in the urban realm. These are: honouring Te Tiriti; contributing to decolonisation efforts and spatial justice; protection of taonga tuku iho; expression of bio-cultural heritage; support for place identity or sense of place; and, restoration of wellbeing through restoring the environment. Spatial justice demands that urban spaces, where Māori identity is reasserted and valued, and where Māori stories are told by the deliberate and careful inclusion of natural heritage, be visible, and freely and easily accessible to all.

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Urban Blue-Green Infrastructure (BGI) as an Integrated Approach to Sustainable Development (Case Study: Ningbo Eco-corridor, China)

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ABSTRACT

Today, accelerating urbanization and Expansion of cities has caused various environmental challenges, including heat Island, decreasing green spaces and natural species, water pollution and scarcity that seriously threaten human lives and the whole ecosystem. Adaptation of urban spaces to their Ecological capacities is one of the key principles of sustainable urban planning and design. BGI as an integrated approach of blue and green infrastructure interconnected network of landscape components, both natural and designed, that includes open, green spaces and water bodies which provide multiple functions. Blue-Green Infrastructure is increasingly recognised and valued as a strategy to address the urban water challenges posed by present-day climate variability and ur-banisation, and to increase the resilience of cities to future change. At the same time, BGI can enrich society and the environment through the provision of multiple co-benefits.

In this research, Ningbo Ecological Corridor is considered as an impressive case study in the subject of blue-green infrastructure .This project is an excellent example of creating a sustainable urban design.This Ecological Corridor creatively integrates the characteristics of local topography, hydrology and vegetation, turning uninhabitable brownfields into living filters. Implementing blue-green infrastructure integrates the diversity of the ecological environment and human activities. Through this innovative synthesis, the project designed to restore a rich and diverse ecosystem and has become a model of sustainable urban expansion and development .The purpose of this study is to investigate the aspects of blue-green infrastructure and ecological planning towards sustainable urban development. The results show that the Ningbo Ecological Corridor is an innovative combination of nature-based solutions that enrich ecosystems by biodiversity and create dynamic public spaces for local and neighboring communities and serve as a valuable educational model for sustainable urban development.

Keywords: blue-green infrastructure, Ningbo Eco-Corridor, sustainable development, ecological planning

INTRODUCTION

Currently, there is a tendency to apply nature-based landscape components as an important element in decentralised stormwater management, an essential part of sustainable urban development. The term blue-green infrastructure (BGI) is now used for many planning solutions of sustainable cities (Kopp et al., 2021). Green Infrastructure (GI) is a generic term encompassing the protection, management and enhancement of urban, peri-urban and rural environmental resources (natural and managed), through the identification and provision of multifunctional and interconnected green spaces and provides an opportunity to reassess the manner in which we manage and use green spaces (RPGGDA, 2010). Spatially planned networks of natural and semi natural green (land) and blue (water) infrastructure becoming increasingly recognised as providing many environmental, economic and social benefits to society and we need to plan for their creation and protection lands. Successful green and blue infrastructure planning is also recognised as a natural solution to urban development in different aspects of sustainable development that is environmentally friendly and less expensive. Sustainable water

management and the protection natural environment and built heritage assets of the lands, in order to provide planned networks of green and blue infrastructure.

OVERVIEW

Blue-Green infrastructure (BGI) offers a feasible and valuable solution for urban areas facing the challenges of climate change. It complements and in some cases replaces the need for grey infrastructure. BGI connects urban hydrological functions (blue infrastructure) with vegetation systems (green infrastructure) in urban landscape design. It provides overall socioeconomic benefits that are greater than the sum of its individual components.

Blue-green infrastructure (BGI)

BGI integrates hydrological and biological water treatment trains into systems where green features are seamlessly overlapping with blue features. Together blue and green infrastructures strengthen urban ecosystems by evoking natural processes in man-made environments and combine the demands of sustainable water and storm water management with the demands of urban planning and urban life. Such systems have positive impacts on the urban metabolism of natural resources (added green values) and on the experience and behaviour of people using these infrastructures (added social values).

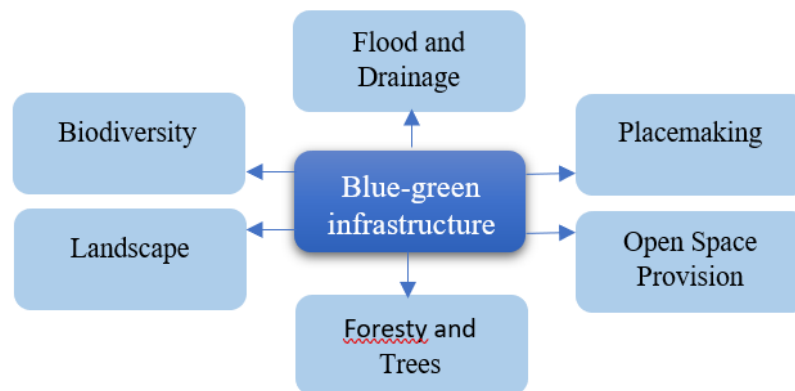


Fig. 1: Aspects of blue blue-green infrastructure

Blue infrastructure

Blue infrastructure is also referred to as smart infrastructure because, by installing flow and level sensors at strategic locations within the sewer system, it can make existing sewer pipes smart. The objective of blue infrastructure is to maximize the use of existing gray infrastructure for storing wet weather flow. It is, therefore, also referred to as wet weather optimization. Blue infrastructure is based on the application of real time control (RTC) using a supervisory control and data acquisition (SCADA) system to optimize system storage by better managing the capacity of the system for conveyance and treatment. Blue infrastructure examples include inflatable dams and sluice gates installed at strategic locations in the collection and interceptor systems. This approach does not work everywhere so extensive RTC modeling is required to assess the feasibility and effectiveness. Sewer systems with large flat sewers are good candidates; systems with small steep sewers are not (Shamsi, 2018).

Green infrastructure

When green infrastructure is used for stormwater management, it is referred to as green stormwater infrastructure (GSI). GSI is defined as runoff source controls that use natural processes to reduce the volume of stormwater entering the sewer system. Variously referred to as sustainable infrastructure, low impact development (LID), or best management practices (BMP), GSI includes technologies designed to capture surface runoff using some combination of detention, infiltration and evapotranspiration (Shamsi et al. 2013). GSI is designed to capture surface runoff, close to its source,

at distributed (decentralized) locations (Shamsi 2011). Rain gardens or bioretention cells, subsurface infiltration, green roofs, porous pavement and street planter boxes are common GSI examples.

BGI	
Blue infrastructure	Green infrastructure
Sustainable water use plan	Environmental strategy
Integrated water management strategy	Vegetated open areas
(water collection, rain water harvesting,	Tree planting
sewer connection, rain gardens)	Urban forest strategy and urban Agriculture,
Flood resilience	Green roof
Stormwater management	Biodiversity
Underground detention/infiltration	Wetlands plants
Constructed wetlands (wastewater)	Vegetated filter strip
	Infiltration basin

Table 1: blue-green infrastructure approaches

MATERIALS AND METHODS

Urban landscape and sustainable development

Recent political commitment to sustainable development on a European level further strengthens the idea of an inclusive approach for protected urban landscapes (Council for the EU 2006). The concept of sustainable development encourages policy officials to address the environmental and social as well as economic dimensions of rural areas. Because of the particular origin and nature landscapes, principally the close relationship between landscape and the people connected with it, protected areas could very well ‘become pioneers in society’s search for more sustainable futures’ (Phillips 2002, 2003). The following objectives have accordingly been articulated: regional policy – balanced opportunities for economic development and the provision of services; agricultural policy – compliance with environmental standards, cultural landscape preservation and multifunctionality; transportation policy – assignment of a high priority to railways and public transport; spatial development – rational use of space and the preservation of natural resources; environment and nature conservation – improved quality of the human environment, and the conservation of biodiversity and landscape diversity. (Council of Europe 2000: 4). By taking into account landscape, culture and nature, the Council of Europe seeks to protect the quality of life and well-being of Europeans from a sustainable development perspective (Council of Europe 2006).

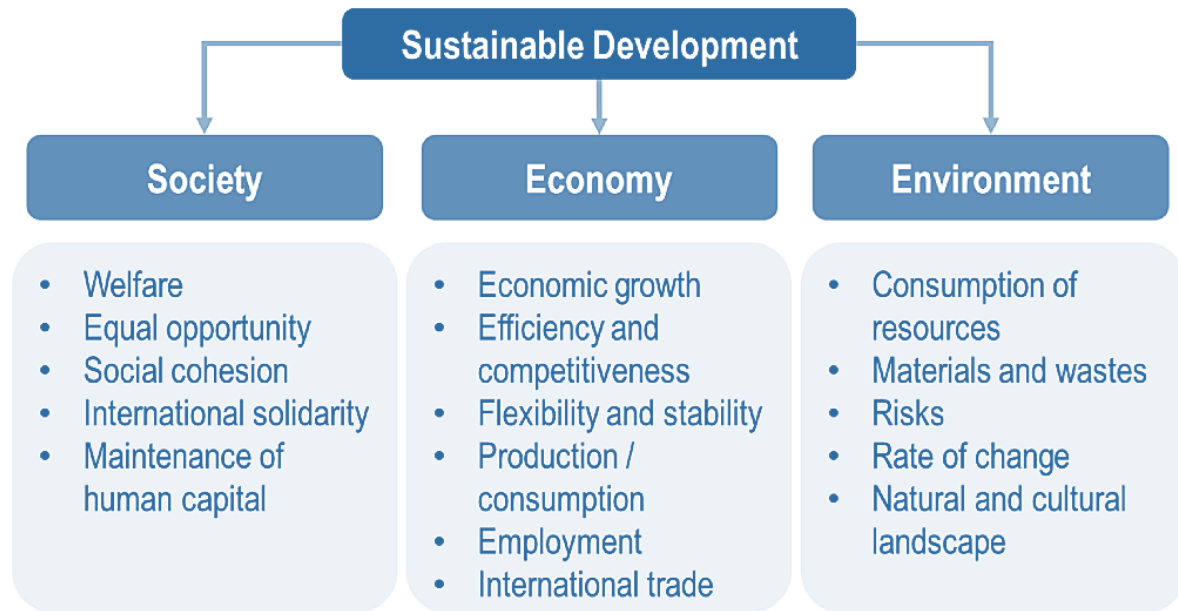


Fig. 2: sustainable development aspects

CASE STUDY: NINGBO ECO-CORRIDOR

Ningbo eco-corridor creatively integrates the characteristics of local topography, hydrology and vegetation, turning uninhabitable brownfields into 3.3-kilometer-long “living filters”. Implementing blue-green infrastructure integrates the diversity of the ecological environment and human activities. Through this innovative synthesis, the project designed to restore a rich and diverse ecosystem and has become a model of sustainable urban expansion and development.

Study area

Ningbo is located on the east coast of China and the center of the Yangtze River Delta with an urban population of 3.49 million (2010 Census). This city is in the southern part of the evergreen forest ecological zone of the Yangtze River Plain. The lake basin formed by intermittent rivers in the ecological zone is surrounded by large evergreen oak forests and reed swamps.

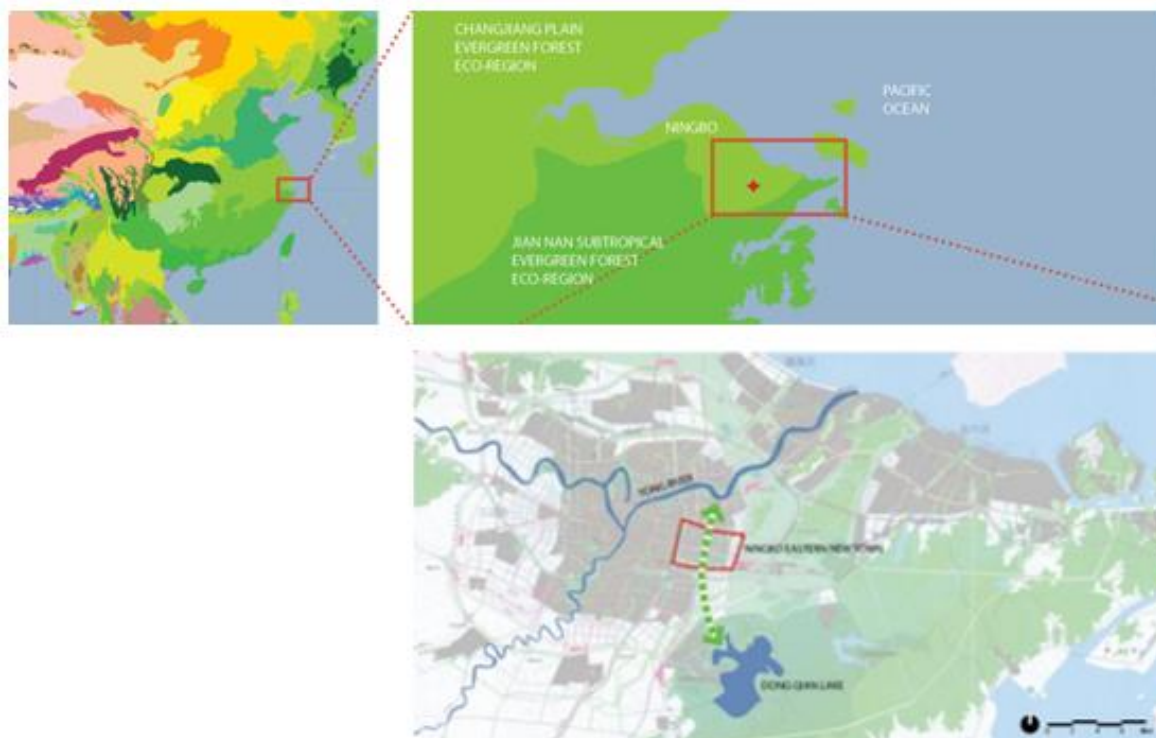


Fig. 2: Ningbo eco-corridor location

Site history

Ningbo is one of the oldest and most famous cities in China, as well as a major port for foreign trade and an important economic center. Like other cities across the China, Ningbo has also faced pressure on infrastructure due to its rapid population growth in recent years. This has also set a huge challenge for the local government: to adjust the density of the city without negatively affecting the environment.



Fig. 3: The Ningbo was an industrial site

In 2002, with the intention of alleviating pressure on the Old City while setting a precedent for a balanced, ecological approach to urban expansion, the Ningbo Planning department called for a master plan for the creation of the “Ningbo Eastern New City.” The plan would include 6 square miles of mixed-use urban development organized around a signature “Eco-Corridor,” forming an ecological network to Interacting humans, wildlife and plants to live in harmony and thrive the design structure based on blue-green infrastructure to restorative the regional ecosystem and urban sustainable development.

Eco-Regional Context

Due to long-term agricultural operations and urban development, wetlands and aquatic habitats have been greatly reduced. Existing wetlands are still important habitats for migratory birds and aquatic organisms, such as oriental white stork, swans, white-naped cranes, and aquatic organisms such as white fin dolphin, Chinese alligator, roe deer and otter. The design team knows that wetlands and aquatic habitats are of great significance to this ecological area, so they do their best to restore wetlands and intervene in accordance with regional characteristics in line with the ecological consciousness of the new era and have historical and cultural significance.

Site challenges

The Ningbo region is characterized by a canal system that historically performed a set of functions including flood control, irrigation and transportation. Within the Eco-Corridor site, the canals had become severely degraded with the introduction of industrial uses in the absence of effective zoning and pollution controls. As successive generations of factories were built, contaminated soil from construction excavation was dumped illegally and randomly through out the area, with factory sewage and stormwater runoff allowed to flow untreated into the guide. [3]. Canals rendered stagnant by ad-hoc infill.

Knowing that an effective and meaningful intervention would require sufficient data about the underlying conditions of the site, a thorough analysis was conducted by the leading landscape architects and affiliated consultants--including water-quality scientists, wetland experts, and hydrologic engineers--in order to fully understand the existing conditions, map the local hydrological cycle and natural flow of water across the site, and identify potential synergies.

Implementation Blue-Green Infrastructure

Through analysis, the designer and related experts, put forward the idea of building a miniature Yangtze River ecological zone. A combination of blue and green infrastructure was considered to construct waterways between relatively low-lying hillsides to improve the water quality of the canal, build rainwater runoff into new development areas, and providing biodiversity to revive ecological habitats.

- Topography for water conduction

Through the excavation and landfill of the surrounding development areas, the entire ecological corridor has become undulating hills and valleys. These hills and valleys are carefully arranged. The waterways formed along the valleys can not only remove pollutants through sedimentation, aeration and biological processes, but also provide a guarantee for the replenishment of the aquifer. During its flow, it also forms many different water forms.

- Water management and quality improvement

At present, no-outlet canals that lack systematic planning will no longer exist. Instead, many free-flowing rivers, creeks, ponds and swamps will be replaced. Their water flow is winding and slow, almost restoring the original state of the lowland river floodplain to help rebuild the original ecological environment. Through innovative bioremediation technology to simulate the local ecological process, the newly built waterway can improve the water quality of the canal. At present, the water in the canal belongs to the worst category V water, which is only suitable for industrial water and farmland irrigation. After purification, it can achieve suitable ecological restoration. And Class III water used by people for leisure and entertainment.

- Vegetation: local plants and water purification

In undulating landscape areas, the strategic layout of deciduous and evergreen species reflects the designer's comprehensive consideration of aesthetics, planning, ecology and climate. Vigorously planting local vegetation will help the corridor rebuild diverse vegetation communities and attract wild animals to inhabit here. The vegetation, bio-swales and rain gardens along the river bank can purify rainwater from hard landscapes such as nearby development areas and other construction areas. Plant

selection creates a unique sense of place: as the terrain changes, the types of vegetation show group differences, showing a unique spatial pattern according to different heights, shapes and colors of plants.

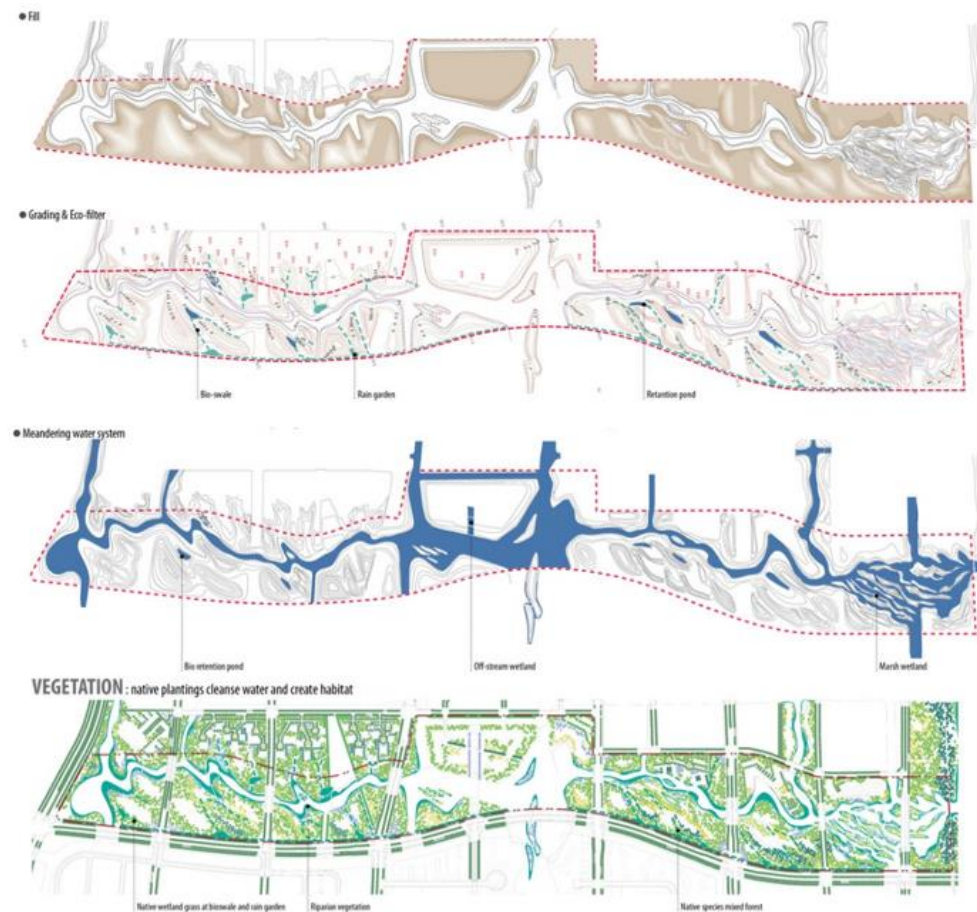


Fig. 3: Analysis topography, blue and green layers

Blue infrastructure strategies

The Eco-Corridor zone is carefully graded into contours creating a terrain of hills and valleys. Valley waterways serve to remove pollutants through settlement, aeration and bio-processing, while the hills provide vista points for visitors and increase habitat diversity. After careful classification, the topography of hills and valleys is formed. The waterways formed by the valleys remove pollutants through sedimentation, aeration and biological action. The hills provide visitors with viewing sites and also increase the diversity of the living environment. The blue infrastructure strategies in this project contain:

- Increase waterflow → active water treatment
- Remove targeted pollutants → wetland
- Harvest clean water → storm water management

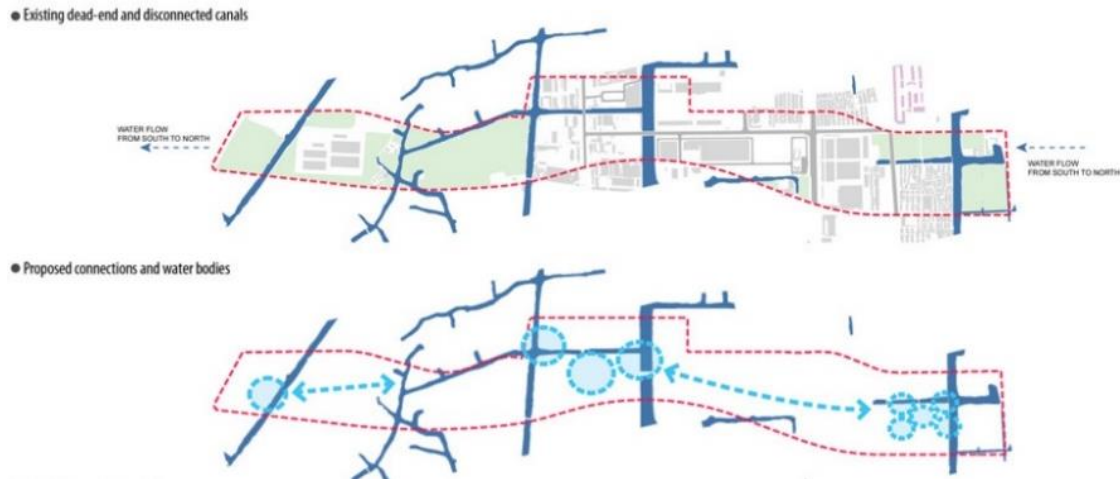


Fig. 3: Blue infrastructure strategies

Water sampling and mapping of the local hydrological cycle and natural flow of water across the site inform strategies for water quality improvement from Class V, restricted use to Class III, suitable for recreational activities. The natural water flow distribution map, and the development of water quality improvement strategies, from the only category V water used in industry and agriculture to the category III water suitable for recreational activities.

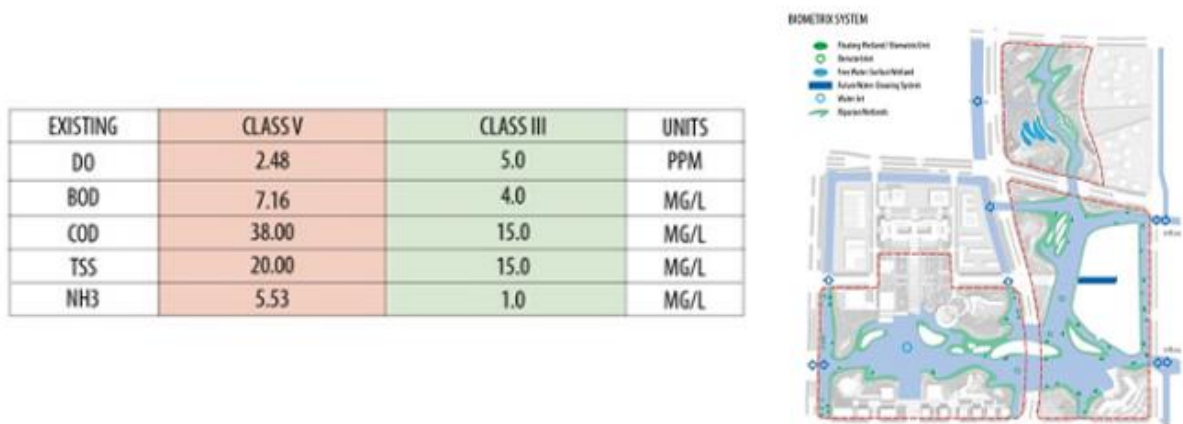


Fig. 3: Analysis water quality

In collaboration with water-quality scientists, a system is designed using passive and active methods to aerate and encourage water movement over plant roots to remove contaminants. Flow through the roots of plants to remove contaminants.

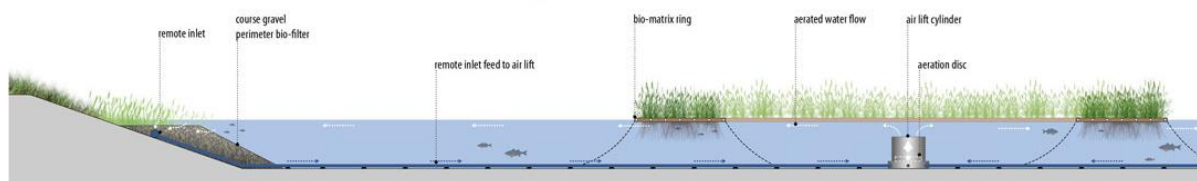


Fig. 3: Water improvement system

By interacting with wetland experts a site-specific system of free water surface, floating and riparian wetland is designed to remove targeted pollutants.

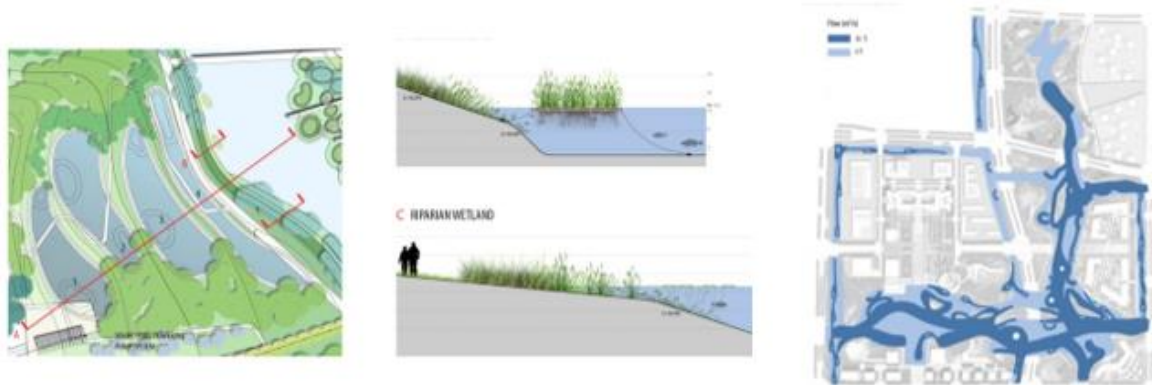


Fig. 3: wetland is designed to remove targeted pollutants: On the isles, densely planted groves form a green volum and divide space in the middle of the ecological corridor. The roots of the tree penetrate into water body to absorb nutrients and purify the water.

Stormwater run-off is collected and treated before entering the major waterway. The entire process has been verified and incorporated into the park plan. It can also be used for future education and teaching.

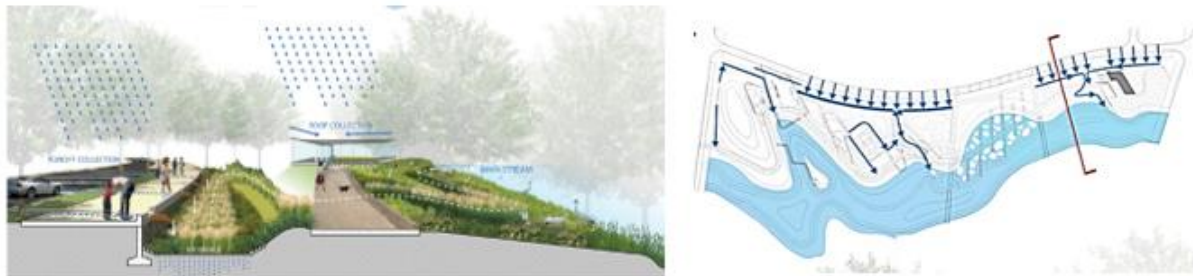


Fig. 3: collecting and treating Stormwater run-off

Green infrastructure strategies

The green infrastructure provides habitats for native animals and plants by restoring the ecological network of the area, improves the public environment, and creates a fun public space for local and nearby residents, indicating that sustainable development has reached a new level. Vegetation design is divided into three types:

- wetland vegetation
- annual crops and meadows
- woods

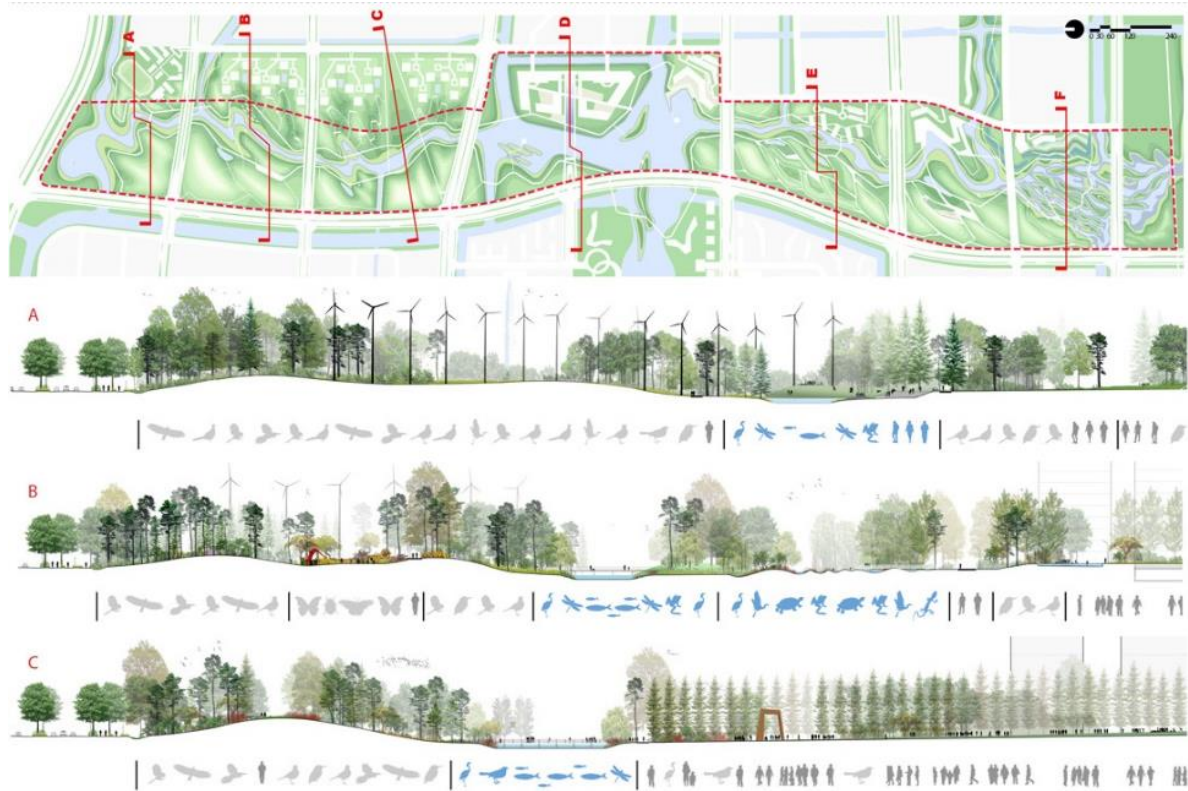


Fig. 3: Native animals and plants by restoring the ecological network

Low-maintenance aquatic plants and wetland plants are widely used on both sides of the riverbank and in the water. On the side close to the city, arbor belts dominated by broadleaf trees such as *Cinnamomum camphora*, *Ginkgo biloba*, and *Elaeocarpus decipiens* form a green border between the city and the park meanwhile create a penetrable visual connection in between.

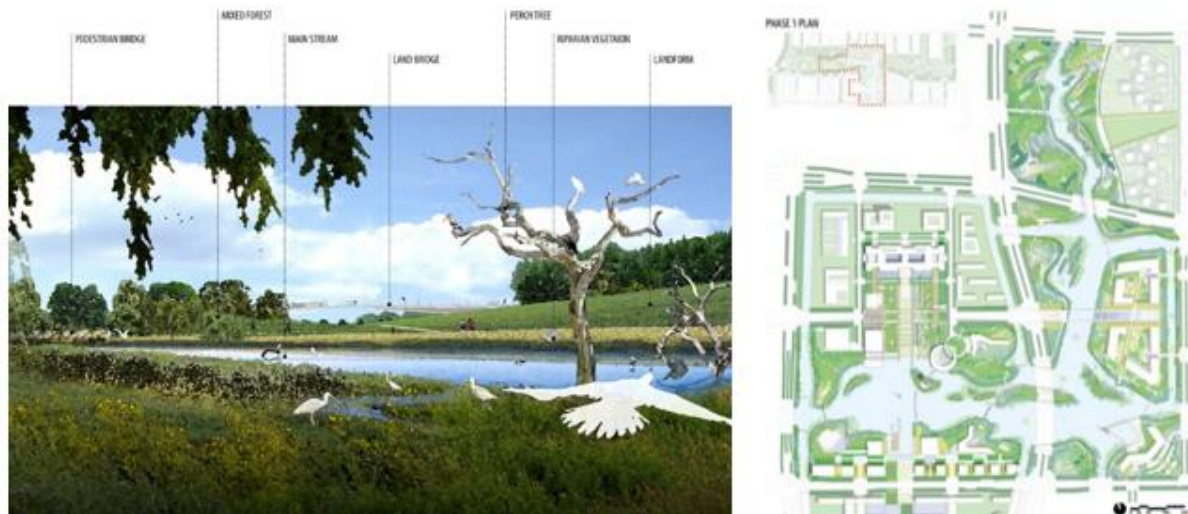


Fig. 3: Native animals and plants by restoring the ecological network

The design team identified emergent sustainable opportunities like waste concrete and excessive soil from surrounding urban development to create landscape topography to direct water, buffer the urban environment, provide vista points, and increase habitat diversity. The design team also adopted

sustainable construction. For example, the use of waste concrete and the excess soil produced by the surrounding urban development to build undulating landscape terrain to guide water flow, alleviate the urban environment, provide viewing points and increase the diversity of the living environment

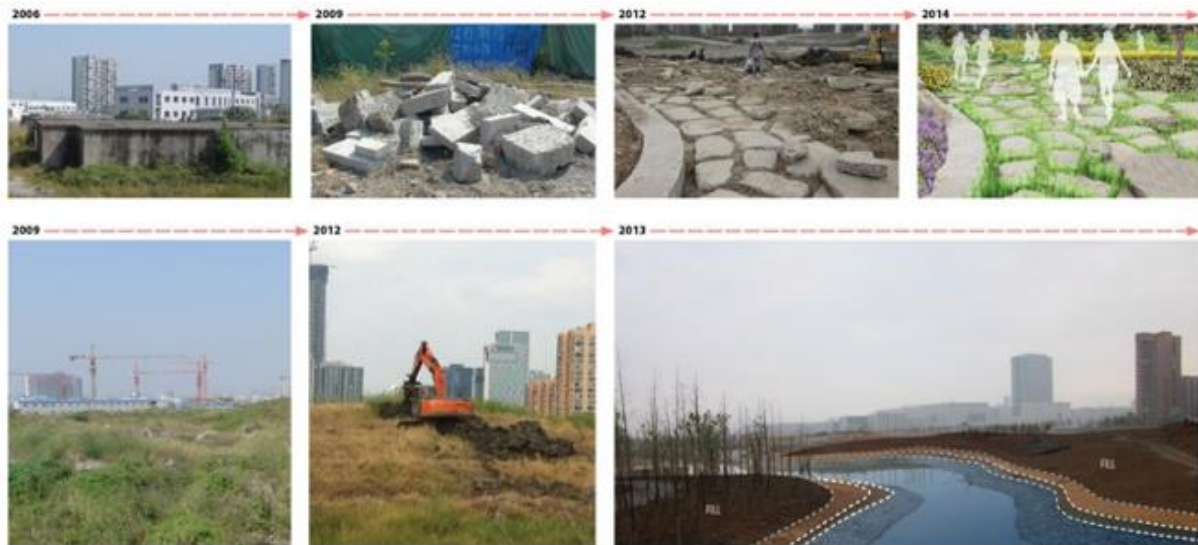


Fig. 3: Using of waste material to development and create new landscape

DISCUSSION

The blue-green infrastructure as the base of Ningbo eco-corridor, supports the open space system of the new city, dividing the land into multiple uses and connecting them together. The ecological corridor which is in perfect harmony with the surrounding urban structure and natural system.

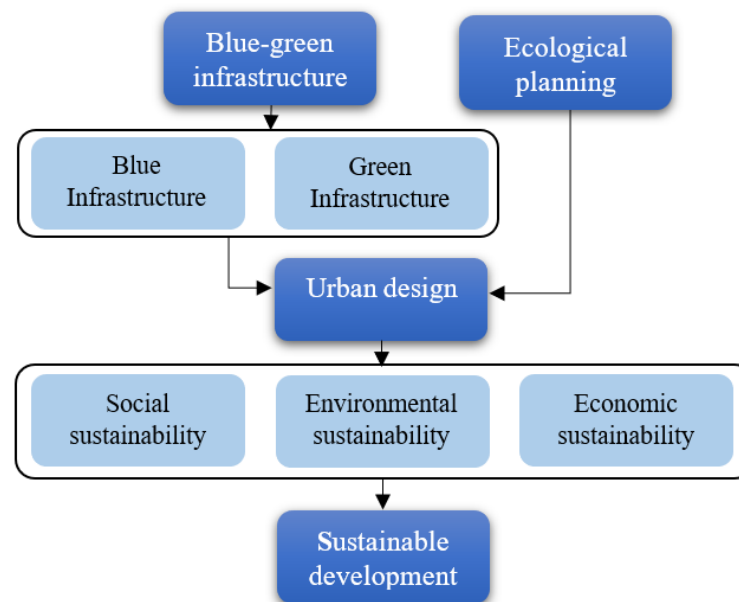


Fig. 3: Using of waste material to development and create new landscape

The design utilizes ecological strategies of hydrology, vegetation and topography, providing recreational, educational and cultural facilities for the Ningbo Eastern New City. Each area of development exemplifies a sustainable ecological approach by treating and recycling surface run-off

water, harvesting solar energy, and reducing the urban heat-island effect. SWA additionally implemented a sustainable hydrological design that allows water to be filtered and aerated effectively and retained for aquifer recharge. The design seeks to offer a link between humans and their environment, fostering a community relationship to water and opportunities for environmental and ecological education. By linking together the ecological network in this region, the Ningbo Eco-Corridor enhances public health, quality of life, and property values of local and neighboring communities.

- **The Environmental sustainability**

The eco-corridor design provides a clear example of natural processes in an urban setting. Bio-swales, rain gardens, an aquatic garden, and restored habitat were all carefully sited for maximum function, but can be easily assessed or observed by elevated boardwalks, stepping stones, bridges, and bird blinds. Replaces existing impervious, vertical canal banks with soft, sloping vegetated banks. The riparian planting edge provides a green buffer and aquatic habitat, and aids the removal of contaminants from canal water and storm water runoff. Wildlife habitat structures like logs and perch trees are placed along the riparian edge to jumpstart habitat complexity and species richness functions.



Fig. 3: Using of waste material to development and create new landscape

The Riparian Buffer zone replaces existing impervious, vertical canal banks with soft, sloping vegetated banks. The riparian planting edge provides a green buffer and aquatic habitat, and aids the removal of contaminants from canal water and stormwater runoff. Wildlife Habitat structures like habitat logs and perch trees are planned along the riparian edge to jump start habitat complexity and species richness function.

- **Social sustainability**

Ningbo Eco-Corridor creates a vital habitat for native flora and fauna, creates fun and enjoyable public spaces for local and neighboring communities, enhances public health, but also provides a fun public space for local and nearby residents, and raises the bar for sustainable development.

On the terraces between the wetlands and arbor belts, annual crops and flowers are planted in rotation around the season, such as canola flower in spring, sunflower in summer, and chrysanthemums in autumn. The seasonal rhythm and sense of change are brought about to the city by the changing plants, providing the new generation of urban residents with nostalgia after long time away from farming. Standing out from other stereotyped cities, the urban area has been refreshed by pleasant vitality. There are so many opportunities to enter and enjoy it. They succeed admirably in making this site feel natural.



Fig. 3: Using of waste material to development and create new landscape

People can easily access different parts of the park and have a variety of views of the site through different walkways, stairs, bridges and terraces and understand the coexistence with nature and the city. The living spaces of the park provide an opportunity for people to experience a sense of belonging to the environment and an opportunity for social interaction for different age groups.

- **Economic sustainability**

The materials used for the bridges and walks speak to the industrial past and are adroitly integrated into the park.”



Fig. 3: Using of waste material to development and create new landscape

The proposed table (Table 6) is the result of a summary done on the basis of the study, and the comparison and analysis of existing documentation of the project. In fact, we summarized three essential aspect of sustainable development related to this project. That indicate the criteria and indicators which planner considered from the perspective of sustainable renewal.

Table 1: for table captions and places them below the table. Please do not use automatic numbering of figures and tables

Sustainable development Aspects	Blue-green infrastructure Aspects	Design Approaches
Environmental	Reduce runoff	Rise of groundwater table from infiltration can impact foundations and basements
	Improve air quality	Seepage to and contamination of aquifers
	Reduce summer temperatures	Release of fertilizers (nitrogen and phosphorus) to downstream waters
	Reduce energy usage	Water overshooting the GSI inlet (curbcut) on steep slopes
	Offset climate change	Underdrains (none, undersized or clogged)
	Improve habitat	

Social	Enhance neighborhood aesthetics	Additional cost for gray amenities (benches, swings, play areas, etc.)
	Improve livability through green space	Potential for mosquito habitat.
	Cause less disruption during construction	
Economic	Create green jobs	Equivalent job loss in gray infrastructure (flow monitoring, TV inspection, sewer cleaning, etc.)
	Enhance property values	Facility ownership (who will own?)
	Spur economic development	Maintenance responsibility (who will maintain?)

CONCLUSION

Urban lifestyle has created various environmental challenges, the consequences of which seriously threaten the future of the environment and human society. Urban landscapes are changing from pristine and valuable ecological areas to fragmented and inefficient areas. So that every day the traces of nature become less and less. Adaptation to environmental characteristics and compliance of urban spaces with natural conditions have been among the principles of urban planning and design. Ecological corridors in cities are an opportunity for sustainable development. Reconstruction of ecological corridors not only helps to improve the environmental conditions and living elements of the city but also promotes economic and social aspects as sustainable goals. The connection of urban life with nature through ecological corridors can be a vital element in improving the climate, improving the quality of the environment and creating dynamic and social environments, and promoting health, identity, and a sense of place. In this paper, the Ningbo Ecological Corridor is considered as a significant case study: This project is an excellent example of creating a sustainable urban space. The purpose of this study is to evaluate the compatibility of ecological corridors with sustainable development indicators. Evaluation results show that Ningbo Ecological Corridor through an innovative combination of topography, hydrology, and vegetation, Ningbo Ecology Corridor project becomes a "living filter" to synergize the rich and diverse ecosystem, creating synergies between human activities and vital habitat Creates for native plants and animals, enhances public health, creates fun and enjoyable public spaces for local and neighboring communities, and serves as a valuable educational model for sustainable urban development.

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Promoting the Sustainability of Urban Spaces through a Networking Approach (Case Study: Sahand New Town, Iran)

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ABSTRACT

Urban sustainability as a dominant paradigm in contemporary city development has been proposed in four dimensions (economic, social, environmental, and governance) at different scales. What has been less addressed in this field is the potential of public spaces design and its impact on achieving sustainability. This research is supposed to explain the role of urban design in sustainable development. To achieve a sustainable public space design, we have explored network and integrated design solutions as one of the factors of sustainability of urban fabric. In this research, the content of theories presented in the literature of sustainable urban development and network approach was studied using thematic analysis. An attempt was made to investigate the relationship between these two approaches. According to the findings using the network approach can provide an opportunity in the design process to guarantee the sustainability of public spaces as the main structure of the urban fabric. Finally, the interaction results of these two approaches presented through factors were used to assess the sustainability of urban spaces in Sahand New Town, Iran.

KEYWORDS: Public spaces network, sustainable urban spaces, sustainable urban development

INTRODUCTION

In this day and age, cities are struggling with the consequences of urban sprawl and unsustainable urban planning and design. In this process, cities suffer from fragmentation and do not have any clear future that can guarantee a suitable living area for citizens. The process of programming, planning, and designing public spaces of a city, as integrating elements of the urban network, has several added values associated, which strongly contribute to urban sustainability (in its four-vectors) (Ana Julia et al., 2010: 3). Future cities can not follow a sprawl pattern in which public spaces are separated, and there is no connection between different parts. By contrast, they have to be connected to have a chance to remain and sustain during future changes.

One of the key elements of urban sustainability was connection or precise cohesion in the past. By having this feature, all parts of the city were well-connected and an excellent accessibility, and there was no need for new extra developments. These connected public spaces gave neighborhoods a sense of community while providing good access for inhabitants to reach any destination. Public spaces included streets, squares, parks, open spaces around public buildings, churches or mosques, bridges, gardens, and greenways. Compared to the past, open spaces such as streets are no longer considered as public spaces which are connecting other public spaces; they seem to be borders between urban areas and public spaces. They encourage inhabitants to use private cars, so the more people use private cars, the more polluted cities will become and the less they will be clean and quiet. Therefore, there is an urgent

need for cohesion and cohesive urban network which can guarantee the sustainability of cities all around the world.

LITERATURE REVIEW

Sustainable Urban Design

Predictions vary, but it seems likely that over two-thirds of the world's population will be living in urban areas towards the middle parts of this century (Thomas, 2003: 3). Sustainable urbanism is really a call for integration of all of the human and natural systems that make up a neighborhood or corridor (Farr, 2008: 51). By definition, sustainability identifies strategies that look at a community's on-site natural resources as integral aspects of the design. It integrates natural systems with human patterns and celebrates continuity, uniqueness, and placemaking. Sustainable design celebrates and creates the ability of communities and wider urban systems to minimize their impact on the environment, in an effort to create places that endure (Kazimee, 2000: 31-32).

Since the emergence of the term Sustainable Development, the appearance of tools and assessments that attempt to measure the level of sustainability of an urban system through indicators has been quite fruitful (Organization for Economic Cooperation and Development, 2014) and to date, there is a heterogeneous amount of options to assess sustainability in an urban context, taking into account different aspects: the geographical scope of the selected area of study, the main interest of study and so forth. However, not all the sustainability criteria are always contemplated by each assessment or even those included in each one have not been thoroughly analyzed. There are also tools that include an overwhelming number of indicators, which are not easy to measure or obtain and are not necessarily relevant in every case. According to Kennedy et al., a sustainable city can only be one for which the inflow of material and energy resources and the disposal of wastes, do not exceed the capacity of the city's surrounding environment. As stated before, research shows that sustainability depends on social, economic, environmental and governance factors, which can only be achieved through great effort from a holistic point of view. With respect to cities, indicators are understood to provide a barometer of how various aspects and parts of a city are unfolding and performing (Cao et al., 2020: 3).

Concerning the aspects of sustainability, the three-pillar conception of sustainability (social, economic and environmental) has become widely represented. The inclusion of the three initial pillars did not occur at the same time but as a result of needs that appeared as the notion of sustainability matured. However, we find it necessary to include a fourth aspect, governance, as it is key in the implementation, management and reporting processes of overall sustainability (Cao et al., 2020: 4)

Sustainable cities will have a rich set of interconnections or they will not be sustainable. For example, a city for walkers and cyclists needs more visual variety, or diversity, more "accidentals" (in the usual sense) in its streets patterns and its buildings because the pace is slower and the mind both desires more and can take in more (Thomas, 2003: 4).

Table 1: sustainability indicators (Cao et al., 2020: 3)

ESGE	Area	Category	Subcategory	Indicator
Environmental	Resources	Energy	Indoor environment quality	Proportion of buildings certified by an environmental quality sign
			Consumption	Total energy consumption
			Efficiency	Proportion of energy self-sufficiency based on renewable energies use
			Infrastructure and Buildings Energy Efficiency	
			Housing density	
			Building age index	
			Investment in restoration and conservation projects	
		Waste	Emissions	Greenhouse gases emissions
			Waste water treatment	Use of systems to reuse/treat wastewater

Social	territory management		Recycled/treated solid waste	Percentage of municipal solid waste recycled.
			Waste management	Generation and waste management
		Water	Access	Percentage of population with sustainable access to an improved water source
			Efficiency	Efficiency of water usage
			Consumption	Water consumption
		Pollution	Light pollution	Reduce light pollution
			Noise pollution	Reduce noise pollution
			Gas pollution	Reduce gas pollution
			Air quality	Improve air quality
		Mobility transport & Public transport	Proximity to services	Distance to basic services
			Traffic	Surface of public road for automobile traffic and public transport.
			Accessibility	Accessibility to key services
				Access to public transport network
				Quality of public transport network
				Smart public transport network
			Pedestrian-oriented urban structures	Pedestrianized streets
		Plan & design	Enlarged pedestrian and pedestrian-priority areas	
			Cycling network availability	Quality cycling network
		Site and land	Open/green areas	Percentage of open/green public areas
			Roads	Number of trees / Kilometer urban road
			Urban structure	Length and surface of urban roads
Governance	Social	Social aspects		Pedestrian-oriented urban structures with short distances
			Land use	Up-to-date sustainable land use
			Conservation	Maintain or re-cultivate/restore green and water elements
			Reuse	Prioritize the use of existing sites
		Health and wellbeing	Housing	Proportion of social housing in the neighborhood
			Public spaces quality	Integrate public spaces and streetscapes of high spatial quality
				Access to basic services
		Management		Encouraging a healthy lifestyle
				Ensuring healthy outdoor spaces and healthy atmosphere in indoor spaces
Economy	Governance	City planning and innovation	Monitoring and reporting	Implementation of monitoring and reporting systems
			Integrating agenda 21	Integration of Agenda 21 into urban planning
				Transition towards smart city (implementation of sensors, open data, . . .)
		Transparency	Smart city development	Citizens access to ICT information
			Transparency	Transparency and open Government
		Local aspect	Local resources	Encourage use of local resources
			Labor and skills	Strengths and local specifics of the labor force including the availability of workers with different qualifications
Economy	Economy	Labor	Employment	Employment rate
		Finances	Household income	Average household income

Sustainable urban design principles

Whilst space does not permit a debate about what sustainable development is, or is not, a number of commonly agreed tenets can be identified in the literature that underpin notions of sustainable development. These include:

- Futurity – because we owe future generations an environment at least as rich and opportunities at least as good as those available today;
- Environmental diversity – because maintenance and enhancement of various forms of natural capital underpin notions of sustainability;
- Carrying capacity – because by remaining within the carrying capacity of environments, activities can be accommodated in perpetuity;
- The precautionary principle – because environmental impacts are by their nature uncertain and because prevention is better than cure;

- Equity/quality of life – because sustainability extends to the needs of people in that environments which fail to meet human needs and in which resources are poorly shared are unlikely ever to be sustainable;
- Local empowerment – because sustainability is a process as much as an objective, requiring the acquiescence and preferably the active involvement of communities;
- The polluter pays – because those responsible should pay for the consequences of their actions.

But how do such general principles relate to urban design? Lang (1994) has argued that sustainable approaches to urban design should first avoid the misconception that dealing with the environment is merely ‘an engineering problem’ to be overcome by technology; and second, that designing to meet people’s social needs is appropriate at the expense of the natural environment (Carmona, 2009: 52-53).

At the larger spatial scale Richard Rogers (1997) in his 1995 Reith Lectures outlined his vision for the sustainable city; analysis which culminated in a series of sustainable city principles, whilst in one of the few empirically based studies of sustainable urban form across macro and micro scales, Frey (1999:32–33) has broken desirable sustainable characteristics into their constituent parts:

- Physical properties of the city: containment, densities to support services, mixed use, adaptability;
- Provisions of the city: readily available public transport, reduced and dispersed traffic volumes, a hierarchy of services and facilities, access to green space;
- Environmental and ecological conditions: low pollution, noise, congestion, accidents and crime, available private outdoor space, symbiotic town and country;
- Socio-economic conditions: social mix to reduce stratification, a degree of local autonomy, a degree of self sufficiency;
- Visual-formal quality: imageability of the city and its constituent parts, a sense of centrality and a sense of place (Carmona, 2009: 55).

Table2: Sustainable design principles (Carmona, 2009; 56-57), (Larco, 2015; 5-6)

1	Theorist Hough (1984)	Principles Enhancement through change; Economy of means; Diversity; Process and change, Environmental literacy	8	Theorist Barton (1996)	Principles Energy efficient movement, energy strategy, Human space networks, self-sufficiency	15	Theorist CEC (1990)	principles Integrated planning; Reducing travel/energy reduction; recycling; Mixed development; Amelioration pollution through planning; Compact development; Regional identity; Open space
2	Beatty (1990)	Energy efficiency; Variety; Permeability; Legibility; Resilience; Cleanliness; vitality	9	URBED (1997)	A feeling of stewardship; Minimal environmental harm; Integration & permeability, a rich mix of uses; quality space, a framework of safe/legible space; Ability to adapt and change; A critical mass of sense of place	16	Rogers (1997)	A creative city; An ecological city; A city of easy contact, a diverse city; A just city, a beautiful city; A compact and polycentric city
3	Wheeler (2000)	Compact urban form; Preservation of open space and sensitive ecosystems; Reduced automobile use; Reduced waste and pollution; Reuse and recycling of materials; Liveable/ community-oriented human environments; Decent, affordable and appropriately located housing; Improved social equity; Development of a restorative local economy	10	Clarke (2003)	Urban management focused on sustainability; Orientation for solar energy, public transport; Mixed use high streets, housing mix, permeable block structure, social streets; Local community facilities, surveillance, privacy, mixed and inclusive communities; Long-term maintenance; Polycentric urban structure, density gradients, reduce parking; Walkable, community, shared surfaces, participation	17	EU (2004)	Land reuse, resource; Vibrant, mixed use, connected streets; Secure healthy, equitable, cohesive, with privacy, supports social capital, human scale, balanced economy; Adaptable built form; Pollution avoidance, support microclimate; Pollution density to support public transport; Compactness, density to support public transport; Beautiful, distinctive identity, sense of pride, respects heritage; Integrate landscape, biodiversity, green structure; Integrated networks and systems, pedestrian and cycle networks
4	Breheny (1992)	Town centre rejuvenation; Public transport, mixed use CHP systems; Mixed use; Containment/ intensification; Urban greening	11	Frey (1999)	Public transport, reduce traffic volumes; Mixed use, hierarchy of services and facilities; Low crime, social mix, imageability; Adaptability; Low pollution and noise; Containment, densities to support services; Sense of centrality, sense of place; Green space, public/private symbiotic; Some local autonomy, some self-sufficiency	18	Wheeler and Beatley (2004)	Land use and urban design; Transportation; Urban ecology and restoration; Energy and material use; Environmental justice and social equity; Economic development; Green architecture and building
5	Calthorpe (1993)	Ecology and habitat; Commercial and residential areas; Parks, plazas and civic buildings; Street and circulation system; Pedestrian and bicycle system; Transit system; Parking requirements and configuration	12	Edwards (2000)	Integrated land use and transport planning; Public transport, renewable energy, rainfall capture, low energy/water use; Mixed use, diversified tenure; Shelter and safety, open space for social interaction, healthy, secure, comfortable; Adaptable and extendable; Pollution and waste strategy; High density; Ecological well-being, natural habitat integration	19	Jabareen (2006)	Sustainable transport, passive solar design; Mixed uses, diversity in housing types and prices; Green urban drainage; Compactness density to support transit; Diverse architecture; Greening, biodiversity; Walking and cycling
6	Blowers (1993)	Land/ mineral/ energy resources, infrastructure and buildings; Aesthetics, human needs, Climate/ water/ air quality; Heritage; Open space, biodiversity; self-sufficiency	13	Houghton & Hunter (1994)	Economy of means; Variety, permeability; Security, appropriate scale; Flexibility; Concentration; Creative relationship, organic design; Democracy, consultation, participation	20	Kenworthy (2006)	Compact, mixed use urban form; Well-defined higher-density development; Human-oriented centres; Superior non-auto transport systems; Minimal road capacity increases; Protection of natural areas and food prod. capacity
7	Farr (2008)	Define centre and edge; Compactness; Integrated land use and transportation; Land use, building and housing variety; Sustainable neighbourhoods and corridors; Biophilia- connecting humans and nature; High performance buildings; High performance infrastructure; Integrated design	14	Ritchie and Thomas (2009)	Urban planning and design (compact, walkable, mixed use and integrated communities); Sustainable transportation; Landscape and nature in the city; Environmental building design; Sustainable energy resources; Material and their environmental impact; Water sources and use; Waste, resources, and recycling	21	Condon (2010)	Restore the streetcar city; Design an interconnected street system; 5-minute walk to commercial areas, transit, and schools; Locate good jobs close to affordable housing; Provide a diversity of housing types; Create a linked system of natural areas and parks; Invest in lighter/greener/cheaper infrastructure (stormwater syst)

Public space network

Public space is considered as a complex set of elements, linked and related in a dynamic way. Therefore, it is this complexity of spaces, connections, dynamics, relationships and complementarities that makes

up a network of public spaces and constitutes the key to the advancement of urban cohesion. The linkage theory is derived from 'lines' connecting one element to another. These lines are formed by streets, pedestrian ways, linear open spaces or other linking elements that physically connect the parts of a city. Individual components are integrated into a larger framework in a hierarchical, open-ended and interconnected system (Trancik, 1986). New patterns of open space networks are conceptualized to reflect new scientific and cultural understandings (Thompson, 2002). Therefore, the public space plays a key role in the urban structure and city life, becoming a privileged element in order to promote territorial cohesion. It thus becomes possible to think of public space as an element able to promote continuity and order the territory, but also with a natural ability to create and maintain strong local centrality, environmental quality, economic competitiveness and sense of citizenship (Ana Julia et al., 2010: 1).

The concept of network is not new, and several authors have applied and adapted it to different scientific fields. It is believed that the genesis of this concept relates to a continuous pattern in which strings and knots are attached (Fonseca, 2001). In the urban context, generally speaking, the "knots" are often associated to urban elements (facilities, services, buildings, etc.) and the "strings" to the road network, through which flows circulate (being roads, railroads, pedestrian, etc.). (Ana Julia et al., 2010: 2)

However, if we take a closer look at it, we can consider that the urban network can be understood in of two dimensions: (1) a physical-formal, which consider the various urban elements, as well as the links and relations between them, and (2) a formal-functional, representing the population, as the user of urban functions, and the relations / interactions established (Hillier, 1984). These two dimensions cannot be taken separately, as they establish strong complementarities between them, and also important relations with the social-cultural network of the city (Mandanipour, 1998). (Ana Julia et al., 2010: 2) These concepts are linked to:

- (1) Environmental factors, involving the management of natural resources, reduction of carbon emissions and renewable energy;
- (2) Economic factors related to the city's economical and functional dynamization;
- (3) Social factors, seeking to promote social inclusion and to generate integrative dynamics;
- (4) Physical / functional factors, i.e., related to urban form, such as the continuity of space, seeking that all spaces are easily accessible; or permeability, promoting a better understanding of the area, and its functions, facilitating people's circulation and allowing to establish the necessary links to the proper functioning of the urban network. (Ana Julia et al., 2010: 2-3)

Lastly, it is important to point some principles that can guide the integrated planning of the city's network of public spaces, having, as primary goal, the construction of a cohesive and coherent territory:

- (1) Promote the formal continuity of the flows circulation (road network, pedestrian network, railroad network, cycling, etc.);
- (2) Promote the continuity of important natural structures and ecologic corridors (waterlines, large green areas, etc.);
- (3) Create relations of functional complementarity through the existing land uses / activities;
- (4) Generate social dynamics that minimize phenomena of social exclusion and marginalization;
- (5) Generate socio economical dynamics capable of regenerating a degraded area of the city. (Ana Julia et al., 2010: 9)

It is important to stand out that planning and designing public spaces as part of an urban network brings out the possibility not only to restructure the existing spaces but also to develop new public spaces in the expansion urban areas (especially relevant in new developing areas) so that they can create cohesive cities, promoting urban sustainability. (Ana Julia et al., 2010: 2)

This way, the process of programming, planning and designing a public spaces network can represent a valuable instrument for the construction of cohesive and coherent urban spaces, presenting itself as an important tool for urban planning on a municipal level, once:

- (1) Contributes to the connectivity between different areas of the city, establishing important links regarding the population movements and displacements, but also the urban functions and land uses.
- (2) Allows the minimization of physical barriers that degrade the existing natural and ecological structures of the city.
- (3) Enables the generation of socio-economical dynamics that, together with other measures, are able to contribute to the regeneration and rehabilitation of an area. These socio-economic dynamics may also help to minimize the phenomena of social exclusion and marginalization. (Ana Julia et al., 2010: 9-10)

Public spaces considered from a network-based approach will allow observing the structuring and articulation of the urban territory at different levels – formal, economic, social, and cultural – (Carmona et al., 2003). The emergence of the concept of network generates a stable pattern in which lines and nodes are connected to each other in the urban fabric. The network of public spaces is composed of separate spaces that complementary relationships and intermediate spaces are between them. These complementary relationships and conjunctions affect people's experience of space and their movement in the city (Pinto et al., 2015). Using network system to organize public spaces forms a coherent structure of the city fabric, in which not only physical conjunction spaces are shaped correctly; but also activities find a good relationship with each other which leads to readability, creation of a sense of direction, and integration of the city structure and the elements that develop the urban structure (urban spaces and connection joints) play a vital role as important places for activity and living of residents (Tavasoli, 2003).

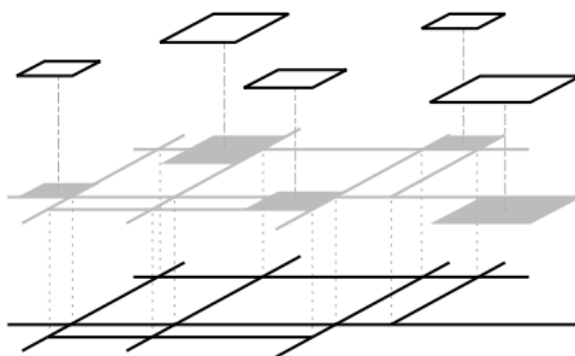


Figure 4: Schematic representation of the public realm: This figure shows a schematic representation of the public realm. According to Carmona, Tiesdell, Heath and Oc, the public realm consists of elements which can be categorized into two main themes: squares and streets.

Rogers believes that in order to achieve a coherent city the issue of the theory of urban public spaces network shall be considered as a vital part of the urban landscape. The network that Rogers refers to is based on a mixture of urban nodes and connecting spaces that connect them to each other. During their movement, Components of this network have different hierarchies according to their performance scale

(Esmaeeliyan & Pourjafar, 2012). Features of public spaces network lead us to the key principles of network public spaces planning and design, these principles are as follows:

1. Promote the formal continuity of the circulation of the flow (road network, pedestrian network, railroad network, cycling, etc.);
2. Promote the continuity of important natural structures and ecologic corridors (waterlines, large green areas, etc.);
3. Create relations of functional complementarity through the existing land uses/activities;
4. Generate social dynamics that minimize phenomena of social exclusion and marginalization;
5. Generate socio-economical dynamics capable of regenerating a degraded area of the city.
6. Determining of the structure of the main public spaces network done based on four main criteria:
7. The location and morphology;
8. Different land use;
9. Connect nodes;
10. Gravitational potential (Pinto et al., 2015).

Structuralists believed that Urbanism should emphasize the network space as a connecting element of the city's physique in structural cohesion and avoid a sheer emphasis on construction mass and buildings' facades. If the urban spatial structure is designed on a large scale, it can make a coherent city (Esmaeeliyan & Pour Jafar, 2012). The designer has to be able to create a variety of spaces proper to specific activities and determine spatial characteristics by using architectural form, fabric, materials, light, shadow, color and creating the relationship between them. Then the designer should connect these distinctive spaces in such a way that their coherence over time and across the entire city be preserved. Coherence arises from the creation of interdependence among urban connection networks. By situating each unit in a larger whole, a close spatial relationship will be created in order to maintain and strengthen the entire collection (Tavalayi, 2008). Also, Salingaros explains the process of creating the network structure by emphasizing on three general characteristics, such as centers, connections, and hierarchy:

Centers: Network structure in the city is established in those centers that the network is created by the inner connection between them (Salingaros, 2011: 62)

Connections: The presence of multiple routes for connecting a center to another leads to competition for locating centers or networks related to the use of space and imposes a fluid geometry to the city.

Hierarchy: Network structures in the city proceed to self-organizing by creating a regular hierarchy of connection at various scales (Salingaros, 2011).

Table 3: Categories of Criteria and Principles of the Network Structure of Public Spaces (Ramezani Aghdash, 2015)

Spatial	cohesion, hierarchy, determination, diversity
Physical	hierarchy, diversity, integrity, Interconnectedness , connection
Functional	hierarchy, scope, diversity, integrity
Perceptual	unity, good shape, determination , continuity
Access	connections, hierarchy , linking

Finally, this can be concluded from the theoretical framework of the literature that spatial construction of the cities has been always based on a mixture of two types of static and dynamic urban space. However, the important point is that the spaces are never functioning separate and apart from each other

in the physical structure of the fabric, and each section is defined in relation to the next element and strengthened the spatial structure of the urban fabric that whole of the spaces has demonstrated as a network of urban spaces in the bone fabric. The structure is a way of organizing a set of interrelated and changeable elements based on the fixed subjective-objective interaction which forms a whole. According to the ideas of different scholars, mass and space should be considered as two basic elements of the urban fabric. These spaces include motion paths and public spaces that form a network in their composition and cut them into pieces and blocks by passing through the masses. The form of a coherent city is a set of interdependent elements in the city in which the mutual relationships between the components occur objectively and subjectively with the aim of creating a targeted, integrated, neat, legible, and meaningful whole. Coherence makes the space units in the city be linked together through the force vectors.

Table 4: Indicators for planning and designing public spaces networks promoting urban cohesion (Ana Julia et al., 2010: 3)

INDICATOR	INPUTS FOR PUBLIC SPACES NETWORKS
MOBILITY / ACCESSIBILITY / CONNECTIVITY	Creation of mobility and accessibility conditions that endorse cohesive urban spaces, connecting the different public spaces and making possible easy access to all the population. Promotion of the existing networks of flows (such as roads, pedestrian circulation, etc.) continuity, in order to allow easy access to the entire urban network, avoiding the creation of barriers.
LAND USES / ACTIVITIES	Promotion of multifunctionality in the network of public spaces, ranging from commerce and services to facilities and entertainment / recreational activities. Promotion of functional complementarity between several public spaces in the city, always keeping the principle of proximity in mind. The development of socio-economical dynamics through the creation of new land uses and activities can also contribute to regenerating a space
SOCIAL DYNAMICS	Generation of social dynamics through the complementarity between public spaces and the activities available. These dynamics promote the arising of urban experience capable of regenerating a site or even minimizing the phenomena of social exclusion and marginalization.
COMFORT / SAFETY	Promotion of safety and comfort in the movements within the urban network. Promotion of security conditions in all modes of movement (road, pedestrian, cycling, rail, etc.). Promotion of comfort, especially at the level of circulation in green transport modes. Thus it is possible to contribute to the success of the socio-economic dynamics generated.

Table 5: Main Principles and Criteria for Integrating the Network Structure of Public Spaces in the Urban Context (Ramezani Aghdash, 2015)

	Design Principle	Criteria
Integrating the network of public spaces	Continuity	Existence of network spaces
		Existence of a skeleton that links public spaces and buildings and landmarks together
		Creation of visual unity through rhythm and harmony in context
		Continuity of elements in space
		spatial continuity of new plan with existing space set in context through the main passages or streets
		Mental-visual continuity and existence of strong corridors
	Hierarchy	Creation of space contrast
		Performance order at different scales
		Existence of hierarchical order in connecting spaces
		Access order in various scales
		Existence of physical order in various scales
		Creation of space and network sequence in the context
	Continued	Creation of access and functional hierarchy for interactive links between different parts of the context structure
		Creation of pause points and rhythm in the hierarchy of access
		Creation of symbols connected to each other
		Creation of the connection between space components
		Creation of a network of centers

	Integration	Strengthening and Continuity of the main axis
		Existence of geometric pattern
		The use of simple geometric forms
		Integration of mass and space through the connection of private and public spaces
		The use of past activities in order to redefine the existing spatial organization
		Integration of access network through explicating the links within the context by applying changes in the passages network
		Continuity of neighborhoods and city centers in the context through the main passages or streets
		The integrity of the access spaces of roadway and pedestrian
		Functional integration to create a network of centers
	Interconnectedness and Connection	Linking of mass and space through the preservation and development of small blocks
		Creation of a network of public spaces connected to each other by various routes
	Connection	Variations in access
		Development of the ability to walk and trails
		Making connections to facilitate the movement
		Making connections in order to increase the movement
		Using small blocks for high permeability

METHODOLOGY

Method

In this research, the content of theories presented in the literature of sustainable urban development and network approach was studied using thematic analysis. An attempt was made to investigate the relationship between these two approaches. After the extraction of concepts, we will find how the network approach will result in the sustainability of the city and its urban public spaces. Then the results will be analyzed in Sahand, and the city's sustainability based on the network approach will be assessed. This evaluation will be based on the current networks in the city.

Case study

Sahand New Town is situated 30 km to the southwest of Tabriz, almost midway between Tabriz and Azarshahr. The purpose of constructing this city was to settle the overflow of Tabriz population, which the people of this metropolis have widely welcomed. Currently, the new city of Sahand has been built in four phases.

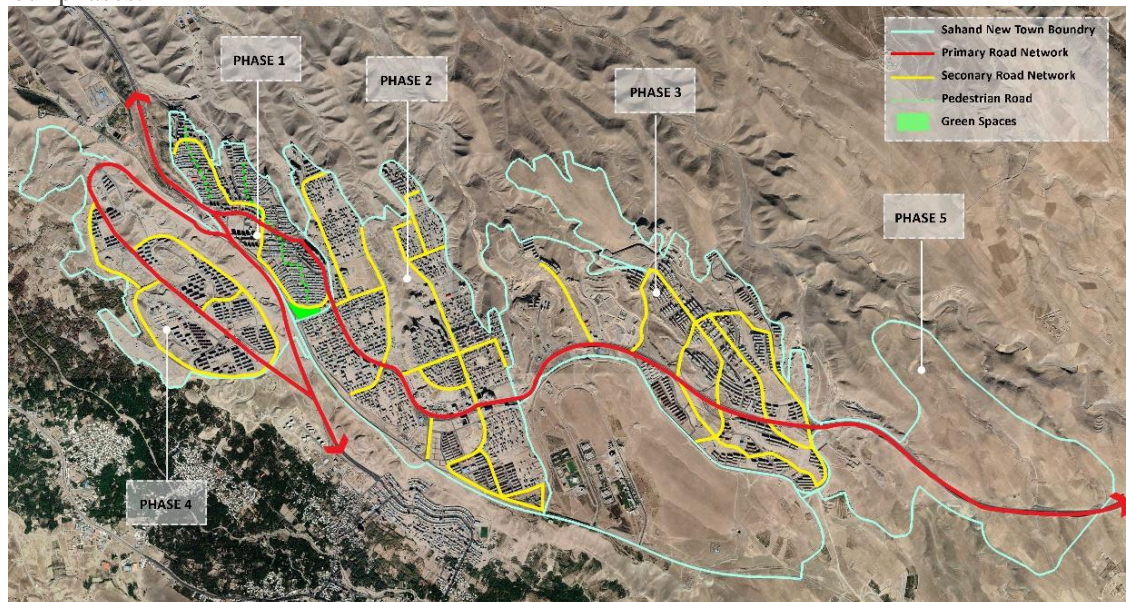


Fig. 1: Sahand New Town main structure

RESULTS

This study investigates the relationship between the network of urban spaces and sustainable urban development. For this purpose, the principles and characteristics of both approaches were extracted

from the relevant literature. Using the pairwise comparison method, each criterion of two approaches is compared together to assess the effect of the urban network approach on sustainability. This shows how urban networks can affect urban sustainability in multiple aspects.

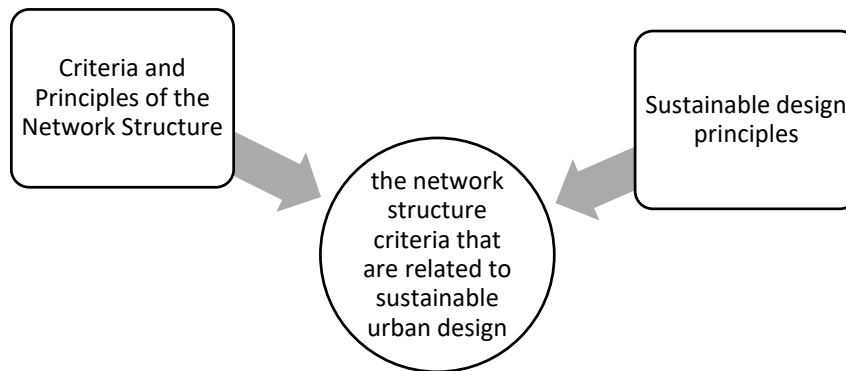


Fig. 2: Steps to achieve the principles of network structure affecting the approach of sustainable urban development

The effect was evaluated at two levels of direct and indirect relation. Direct impact means that a network sub-criterion directly influences another criterion. Indirect impact also means that if one factor directly affects another, a secondary effect will be created on one another factor.

The results of the relation between the principles of network and sustainability approaches (Table 6) is elaborated below:

Environmental aspects: territory management area and resources area: The most influential impact of the urban network is on the environmental dimension, especially on territory management. Among these, the criteria of “proximity to services,” “accessibility,” “pedestrian urban structure,” “roads,” and “urban structure” receive the most impact from the network structure. Additionally, due to the direct effect of the urban network approach on movement and access aspects, an indirect impact will cause improvements in the “energy” and “pollution” aspects. Beyond that, network structure can make a difference in “land use” and “site and land” aspects as a whole. This impact can mostly result from “Land use/ Activities, and social dynamics” aspects that directly influence land use structures and planning.

Social aspects: From the perspective of “social aspects,” the quality of public space was one of the dimensions strongly influenced by the network approach. This effect is such that it can be acknowledged that the network approach will directly lead to the social sustainability of public spaces. In addition, due to the profound impact of the network approach on reducing environmental pollution and encouraging a pedestrian-oriented city and bike-friendly city, the quality of public health will also be significantly affected by this approach.

Governance and Economy aspects: The network approach has the most negligible impact on the governance and economic dimension. For example, “Safety and comfort in the movements” and “Comfort in green transport modes” are the criteria of the network approach, which is in line with “Smart city policy development” as a sub-criterion of “Governance.” In addition, in the economic sector, except for the principles of “Land use/ Activities, and social dynamics” that affected the aspects of “Local resources,” “Labor and skills,” “Employment,” and “Household income,” other principles of sustainability are less affected by the network approach.

Finally, it was found that despite the strong impact that the network approach has on the environmental dimensions of a sustainable city, the effect of this approach on other dimensions is undeniable. For example, this approach affects social, managerial, and economic indicators. In addition, although the direct impact of the network approach on the aspects of water, waste, and pollution in the environmental dimension was less, it has a significant impact on “energy aspects” like the amount of energy consumption in the city. Using the results extracted from the table obtained from the overlap of effective principles and criteria, a descriptive-analytical assessment of the conditions of Sahand new town as one of the new towns that seek urban sustainability was performed. The results are presented in Table 7.

CONCLUSION

The concept of urban cohesion is strongly related to the notion of sustainability. Sustainability is, nowadays, generally well known and applied in several different situations. This concept is associated with the lasting management of time and space. The process of programming, planning, and designing public spaces of a city, as integrating elements of the urban network, has several added values associated, which strongly contribute to urban sustainability. (Ana Julia et al., 2010: 3). The urban structure represents a factor that has been proven to affect city sustainability since it determines the location of pollution emission sources and traffic patterns, as well as it is related to mobility possibilities (Cao et al., 2020: 11). In this study, an attempt was made to find other aspects of urban sustainability that can be affected by urban network and structure.

The results of this study indicate that by using the network approach in urban design, many dimensions of sustainability can be achieved directly or indirectly. Although the impact on the environmental dimension is more significant, the role of this approach in the social, governance, and economic dimensions is undeniable. Therefore, a general assessment of the existing conditions was made by analyzing Sahand new town, as a town in which achieving urban sustainability is one of its main goals. According to the obtained results, it can be said that in order to achieve the goals of sustainability by applying the principles of network approach, this town should consider the following points:

- Strengthen the local economy
- Increase the mobility of citizens by creating a cohesive network of bicycles and encouraging active transportation
- Increase the creation of a network of green and public spaces to increase social identity
- Increasing the mixing of land use and the spatial relationship of the residential sector with service land uses
- Increase the use of renewable energy in the city
- Promoting cohesive public transportation

Table 6: examination the overlap between sustainable urban design and urban spaces network criteria

[illegible]

Table 7: Analysing the Town according to network design principles based on the sustainable urban development approach

		Analysis	Evaluation
Energy	Efficiency	Sahand is good to supply citizens' demands in terms of population density and construction. Strengthening public transportation and land-use mixing is also economically justified.	Very high
	Buildings	It can be said that utilizing renewable energy to supply the energy demands is almost zero in Sahand.	Very low
	Emissions	Due to the limited use of private cars and the weakness of the public transportation system, and the possibility of walking and using bicycles, it can be said that the amount of pollution caused by transportation can be significantly reduced.	Very low
Pollution	Air quality	Due to the balance of mass and space in the area, as well as climatic characteristics and location of the city, there is suitable ventilation in residential spaces and communities in Sahand.	Very high
Mobility & transport	Proximity to services	Lack of the neighborhoods centers and small commercial units in mixing with residential land use in the main streets has caused a lack of access to services within walking distance so that residents have to travel to other regions daily to meet their demands. This, in addition to reducing the vitality and dynamism of neighborhoods, has encouraged the use of private vehicles.	Very low
	Traffic	Because the main destinations of the Sahand's citizens are outside the town and in other surrounding areas to use the facilities, employment centers, etc., the desired mobility and traffic to achieve the stability of Sahand is small, and most of the trips are suburban.	Very low
	Accessibility	Due to the imbalance and inappropriate planning of citizens' destination points (shopping, service, and entertainment centers) and connection routes (roads) as well as connection facilities (public transport system, pedestrian and bicycle), the accessibility of this area can be considered somewhat undesirable.	Low
	Public transport	Sahand lacks cohesive public transportation, and intra-city trips are made mainly by private cars or Internet taxis and yellow taxis. Therefore, the cost of transportation to live in Sahand is high.	Very low
	Pedestrian-oriented urban structures.	Phases 1 and 2 are the only phases whose neighborhoods are connected by pedestrian paths, but due to the lack of proper location of land uses around the routes, they have not attracted a large population. It should be noted that the poor quality of sidewalks, inadequate lighting, lack of attractive activities, and diverse vegetation are other factors in the failure of these routes.	Very low
	Cycling network availability	Bicycle routes are one of the components that the urban management system values, but it can be acknowledged that the lack of a coherent plan for all modes of transportation and inappropriate locating for existing bicycle routes has caused them to be useless or limited and just be used on special days.	Very low
Plan & design	Open/green areas	In the completed phases, there is a suitable network of green and open spaces, especially in the local scale and neighborhood, which is also welcomed by citizens, but Sahand needs to complete the network by placing a hierarchy from micro to large scale of such spaces to continue its development.	Low
	Roads	The existing roads are suitable in terms of quantity, connections, and possibility of travel to and from the town, but they also have weaknesses in terms of quality and encouragement of a sustainable lifestyle.	High
	Urban structure	Although the existing structure of Sahand new town is a suitable set of public spaces and services and facilities in a hierarchical order, it seems that it has weaknesses in terms of pedestrian and human-oriented design.	Low
Site and land	Land use	In Sahand, the per capita requirements for educational, service, commercial, etc. uses are adjusted based on the population and are in good condition in terms of each citizen's share. However, the spatial mixing of these land uses with the residential sector is not still optimal, either quantitatively or qualitatively.	Low
	Conservation	Considering the development of the town, it seems from the beginning that it is not possible to change the nature of the proposed uses and sites, so an appropriate amount of protection can be expected.	High
	Reuse	Due to the fact of being a new town, it was not possible to re-use the lands and the previous land uses in the proposed projects.	-
Social aspects	Housing	Due to the fact that the inhabitants of Sahand are more than the surrounding cities, they do not have a cultural background, although they have a common mother tongue. According to the field studies and the researcher's experience, residents are not interested in introducing themselves as Sahand citizens but introduce themselves according to their place of birth, and many people cite low housing prices as their only reason for living in this city. Considering that most of the residential areas are occupied by social housing and action plan and the variety of construction in such houses is very low, it can be said that in terms of architectural attractiveness and diversity of residential types, they are not at the desired level.	Very low
	Public spaces quality	Lack of public spaces, low quality of life, and lack of programs to strengthen urban identity and social cohesion can be among the reasons.	Very low
	Health and wellbeing	Due to the weakness of the pedestrian network, as well as the coherent network of bicycle routes, including pauses points, as well as routes adapted for this purpose, it can be said that the mobility of citizens is limited and can be improved.	Very low
Local aspect of economy	Local resources	Employment in line with the characteristics of the region can be introduced as agriculture, which due to the urban nature of the development area and also the fact that the resident population does not belong to the surrounding areas, the possibility of employment in this field is very limited.	Very low
	Labor and skills	The town needs to strengthen the local and neighborhood economy, neighborhood workshops, and home and microeconomic activities.	Very low
Labor	Employment	Economically, Sahand is mostly a consumer of services, and most of its people use the town as a dormitory. So that their place of work is in the city of Tabriz or the surrounding industrial units.	Very low

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Chapter 3

Public Space; Quality, Design and Management

“Planning Interventions for the rejuvenation of historic urban public spaces – A case of Jaisalmer city.”

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ABSTRACT

The aim of the research is to find out suitable interventions for the rejuvenation and preservation of urban public spaces in a historic city like jaisalmer. These interventions will try to preserve certain characteristics of the space and at the same time try to accommodate current needs of society.

Open spaces in an urban landscape suffer from deterioration caused by man that leads to loss of visual character of space and loss of traditional activity pattern based on that particular space. On one hand planners tend to create more and more open spaces which become available in abundance, and on the other hand already existing open spaces are being eaten up by ever increasing greed of citizens. Half hearted attempts of municipal authorities also create a grim situation to preserve and rejuvenate such spaces.

This paper tries to investigate the reasons of deterioration of such public spaces and the strategies / policies which can help in rejuvenation of these public spaces especially of heritage importance.

Key words: public space, streets, opla, chowk, holingda

INTRODUCTION

Urban public spaces are the spine of the community living anywhere in the world. More importantly in a desert town like jaisalmer where communities open spaces are precious and aptly celebrated in the original context.

The socio cultural fabric of the city is also getting disturbed by the deterioration in the urban public spaces as residents are not able to use these spaces as intended in the past. The beautiful and glorious city of Jaisalmer has undergone deterioration with time due to unplanned growth and unintended usage pattern. Majority of this abuse has been taken by the urban public spaces. The tourists are not able to experience the original / historic feel of the city resulting in focus getting limited to certain monuments and not the whole city. Thereby, leading to curtailment of economic growth prospects of city & its residents.

We need to immediately address the deterioration of urban public spaces and restore their original glory.

Typology of open spaces in jaisalmer:

1. Building level open spaces
2. Street level open spaces
3. Mohalla level open spaces
4. City level open spaces

Various levels of open spaces are encroached upon on their original shape and idea with different purposes and materials. This paper will try to list all the issues / reasons of encroachment and defacing of public facades and find out how improvements can be done.

METHODOLOGY

Literature survey will be done in order to define the typology and usage patterns of historic urban public spaces. Issues will be identified by surveying the site.

Case studies will be done and analyzed based on the initiatives taken by the planners / authorities. Special attention is to be given to the successful strategies followed in various case studies, which can be applied in some way or other to the site selected.

PREVAILING ISSUES

- Unorganized large open spaces
- Haphazard parking pattern or non- availability of proper parking spaces
- Haphazard movement of traffic due to undefined carriageways
- No defined carriageways / footpaths for pedestrians and cyclists
- Shortage of public amenities (toilets, drinking water etc)
- Infrastructure issues (overflowing sewer lines and overhead electrical lines)
- Unplanned vending areas disturbing all the other essential activities such as parking, pedestrian and vehicular movement etc.
- Absence of seating space for tourists and locals
- Permanent and temporary encroachments in the form of extension of shops
- Absence of proper signage to guide the tourists and locals at suitable locations
- Street lighting not suitable for heritage ambience
- Original façade covered with commercial hoardings etc
- Lack of homogeneity in façade due to layers of growth



Dilapidated heritage structures



Defacing of heritage facades



Improper and unmaintained garbage disposal systems



Large Undefined spaces and activity patterns



Haphazard parking and encroachments of public spaces

REASONS FOR THE DETERIORATION OF SUCH OPEN SPACES

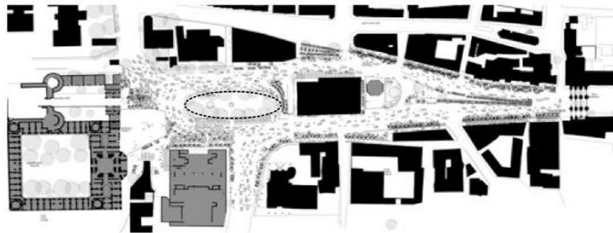
- Increase in population within the same area.
- Unplanned change of land use (commercialization of residential properties).
- Absence of urban management & rules.
- Unplanned and misfit infrastructure network facilities.
- Changed lifestyle of residents (social interaction, lack of belongingness).
- Improper waste management and not up to date collection systems.
- Prevalence and easy availability of new materials and diminishing know how about the traditional materials and construction techniques.

Case study selection:

		Jaisalmer	Bhadra Fort Precinct	Chandni Chowk	Chowkri Modikhana	Edinburgh
Typology of space	Streets					
	Chowk (mohalla level)					
	Chowk (City level)					
Context / parameters	Built Heritage					
	Intangible Heritage					
	Traffic problems	Through				
		Parking				
	Informal Vending					
	Tourist Importance					
	Nature of intervention	Physical				
		Policy				

CASE STUDY; BHADRA FORT PRECINCT

Brief: Bhadra Fort was built by Ahmed Shah, the founder of the city, in 1411 AD. The fort's name was taken from the Bhadrakali Temple that stands nearby. The fort was also called Aark fort centuries ago. The British captured the fort in 1817 and used it as a prison until Independence. It was duly renovated in 2014 so that people could get a glimpse of history.



Before Redevelopment



After Redevelopment

The Issues identified / Problems

- Unorganized Informal Activities.
- Neglected Open Spaces.
- Haphazard Parking.
- Hygiene / Cleanliness issues.
- Increased Noise and Air pollution.
- Neglected state of historic

The Solutions / interventions

The proposal was divided into following parts...

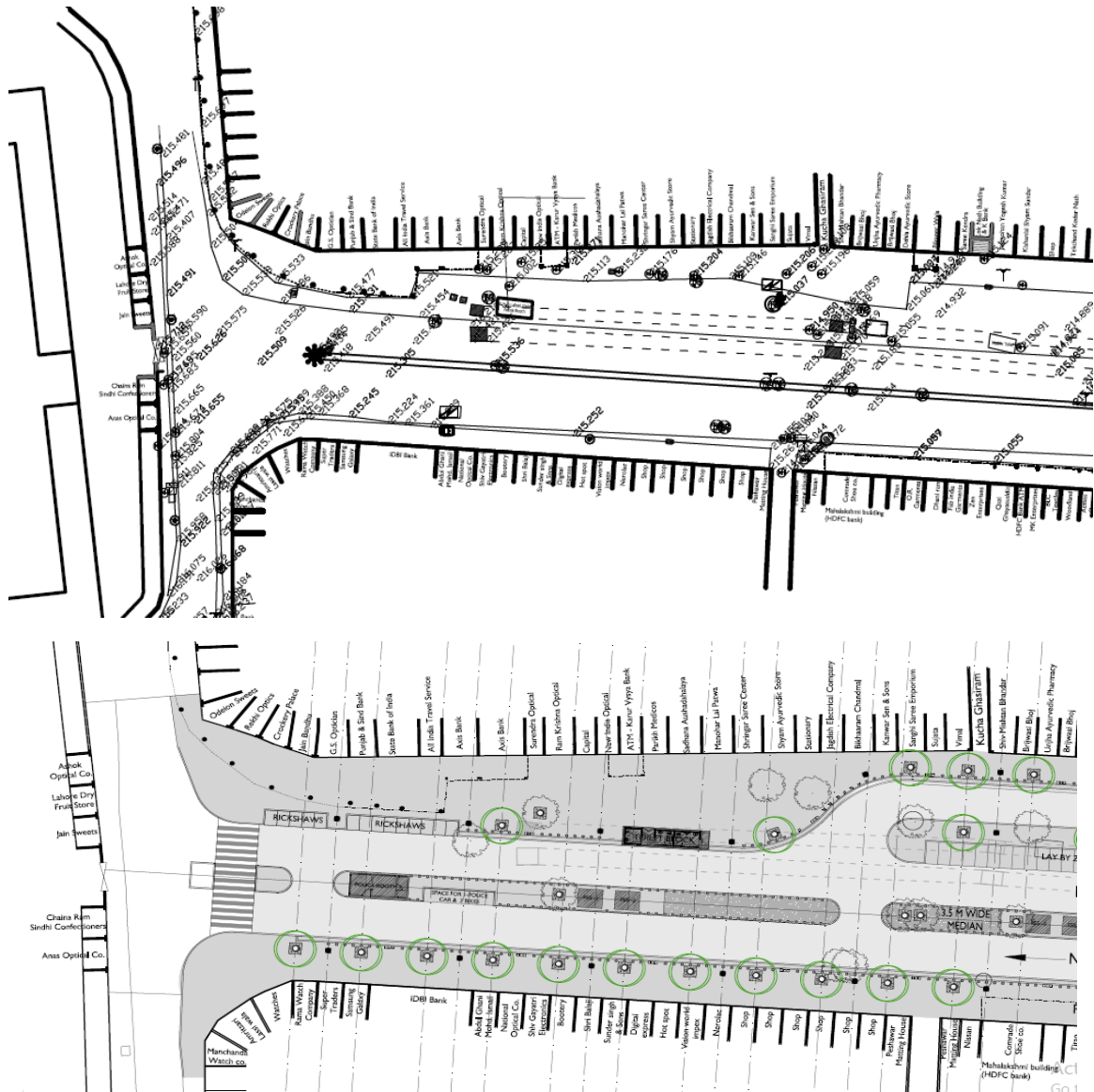
- **Revitalization**
 - a) Pedestrianization of street
 - b) Identification of tourist nodes & corridors along the street for heritage importance
 - c) To reduce encroachments around bhadra plaza to teen darwaza.
 - d) Traffic analysis (including parking)
 - e) Upgradation of required infrastructure along fort precincts and plaza.
- **Urban Design Guidelines**
 - a) Urban design guidelines and architectural controls for surrounding structures.
- **Restoration**
 - a) Restoration of bhadra fort
 - b) Conservation and adaptive reuse



CASE STUDY; CHANDNI CHOWK

The Chandni Chowk begins in front of the Red Fort and terminates at the Fathepuri Masjid. It is approximately 1.3km long.

To the north Chandni Chowk is connected to S P Mukerjee Marg and Delhi Junction via Khari Baoli/Church Mission Road, Krishna Gali, Shanti Desai Marg, Rai Kedarnath Marg, H C Sen Marg & Netaji Subhash Marg.



Issues identified / Problems

Traffic Congestion

- Haphazard Informal Activities such as street vendors etc.
- Spillover activities from commercial activities leading to compromised space for pedestrian/vehicular movement
- Unplanned movement of Goods vehicles for loading and unloading of platforms

Utilities

- Exposed Electrical Cables
- Unplanned layers of utility lines over the period
- Lack of Public Convenience utilities

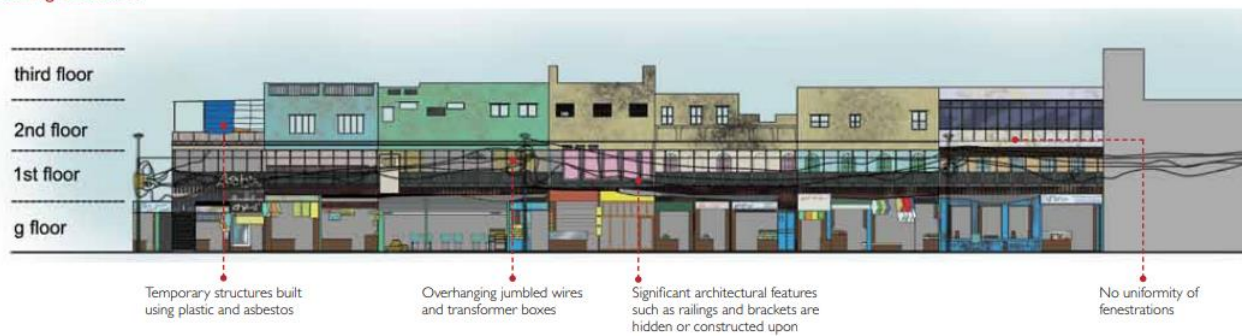
Aesthetic

- No façade control policy
- Overhead utility lines
- Lack of signage standardization

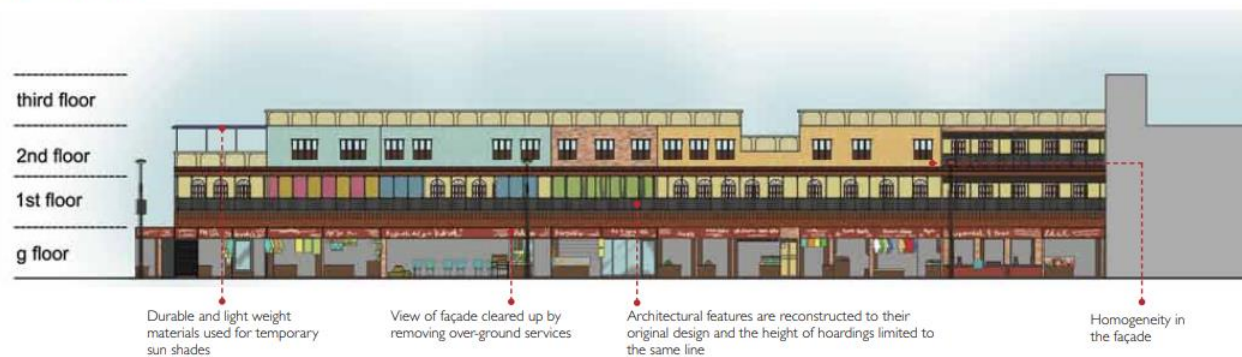


The Solutions / interventions

Existing Condition



Proposed Changes



Ground Floor Level

- Uniformity in signage and treatment of shutters

- Existing columns have been accommodated within the footpath's width and the colonnade accentuated by addition and repair

First Floor and Above

- Uniformity in the façade adhering to the characteristics of the space; repairing and retaining existing architectural features
- Clearing up of views by removing overhanging wires and on-surface utilities
- Temporary shelters on the top most floors to be redone in line with the overall building façade and with the use of prescribed materials and colour themes

Street Level

- Restructuring streets to ensure continuous pathways; accommodating all street furniture, including permanent and temporary seating
- Common share road space to accommodate pedestrian movement and informal commercial activities during peak hours

Case study; Chowkri Modikhana

The precinct is a historic urban quarter with a mix of heritage buildings from 18th and 19th century and new developments from present. The architecture of the precinct is an amalgamation of different layers of growth and development. The regulation is prepared for the users of the buildings in the precinct to help them maintain the historic character.

Issues identified / Problems

- Uncontrolled use of buildings and encroachments.
- Dilapidated buildings.
- Difficult to find expert labor in traditional construction materials & practices.
- Easy availability of modern materials & aspirations for new architectural styles.
- Lack of facilities like water, garbage collection.
- Parking problems.



The Solutions / interventions

- Listing of heritage buildings.
- Restoration of important heritage buildings especially on heritage walk route.
- Garbage disposal and management systems to be developed and maintained.
- New Rain water harvesting systems to be introduced and old systems to be rejuvenated.
- Stray animals' management systems.
- Proper ambient and façade lighting
- Proper signage development.



CASE STUDY; EDINBURGH

In the **12th century** (c. 1130), King David I, established the town of Edinburgh as one of Scotland's earliest royal burghs, protected by his royal fortress, on the slope below the castle rock.

The Old and New Towns of Edinburgh are one of the most beautiful cityscapes in the world, inscribed by UNESCO as a World Heritage Site in 1995. The unique character of the city comes from the striking contrast between the medieval Old Town and the Georgian New Town, with each area containing many significant historic buildings.



Issues identified / Problems

- Dilapidated state of buildings especially in old town.
- Increasing retail activity encouraged development of single storey shops in front of classical facades.
- Increased traffic volume gave rise to vibrations and pollution risks to buildings and its residents
- Reduced public amenity space as pressure of parking rose to high levels.
- Commercial & entertainment activities till late hours were disturbing the local residents.
- Concern of threat to clarity and coherence to the Georgian ensemble.

The Solutions / strategies:

- To stimulate and coordinate action for the conservation & repair of historic buildings in the EWHS.
- To promote the preservation and enhancement of the character of the site and to develop and maintain an action plan.
- To initiate projects and attract funding for the preservation and enhancement of the EWHS.
- To promote EWHS through education, exhibitions, conferences.
- To develop a public space realm strategy.

Proposed Materials Requirements

Location	Footway Material	Kerb / Channel Material	Highway Material
New Town	Sandstone paving slabs	Whinstone	Setted streets or asphalt
Old Town	Caithness paving slabs	Whinstone	Setted streets or asphalt
Town Centres/ shopping streets	Paving slabs- stone or pre cast concrete	Whinstone	Setted streets or asphalt
Conservation Areas	To be considered on an individual basis. Generally	Whinstone	Setted streets or asphalt

	main streets and main residential streets - paving slabs, and suburban residential streets - asphalt or granolithic concrete.		To be considered on an individual basis
Local Centres	Pre cast concrete slabs	Whinstone	Asphalt
Tenemental Areas & Residential Streets	Mix of Pre-cast Concrete slabs and asphalt	Whinstone	Asphalt
Arterial Routes	Mix of Pre-cast Concrete slabs and asphalt	Whinstone / pre cast concrete	Asphalt

SWOT ANALYSIS OF ALL CASE STUDIES

	Bhadra Fort Precinct	Chandni Chowk	Chowkri modikhana	Edinburgh
S	Strong historic connect and heritage character.	Central location and historic connect.	Part of a planned walled city, well known tourism hub.	Awareness among citizens and strong administration.
W	Layers of growth has made changes of permanent nature which are not conforming to the original context.	Increased population which is way beyond carrying capacity of the area.	Less focus on the inner streets / areas in new development projects.	Too many events disturb the residents who want to have peace.
O	Business and cultural centre of the old city and hence large footfall will always be there.	Central business hub within national capital.	World heritage status of walled city.	World heritage status. Also known as literature city and city of festivals.
T	Development pressures, specially parking issues.	Barring the vehicular traffic may discourage some of the businesses who are dealing with large quantities of goods.	Residents wanting to move to outer areas of town due to dearth of open spaces here.	Ever increasing commercial activity may push residents to move towards other residential locations.

LEARNINGS FROM CASE STUDIES

Bhadra Fort Precinct	Chandni Chowk	Chowkri modikhana	Edinburgh
Stakeholder participation has to be given high priority for facilitating the project planning and execution. (locals shall be included for all the redevelopment exercises)	Stakeholder participation has to be given high priority for facilitating the project planning and execution.	Special emphasis shall be put upon the waste collection and disposal systems as this is a major problem in most of the historic cities.	Shall take steps to educate the citizens about their heritage and cultural roots and making them proud to be part of a legacy.
Encroachments shall be removed and continuous monitoring has to be ensured to check this habit. (GPS based systems can be used for keeping a check)	Service lines shall be taken underground to the maximum possible extent.	Lighting and signage guidelines shall be specified in detail.	Shall prepare guidelines for future developments to ensure minimum deviation to the historic values.
Sufficient space for vendors shall be planned to accommodate the existing vendors without hampering other important activities.	Time based allowance of motorized vehicles can be done wherever needed.	Heritage facades shall be restored to their original state with the help of traditional materials and methods.	Use of non motorized vehicles and e- vehicles shall be encouraged in the policy and planning documents.
New activity areas needed in present context shall be created from vacant and underutilized govt plots.	Facade control measures to be prescribed in detail within zoning regulation.	Parking spots shall be identified and developed within first phase of project (to reduce the problems in advance) as per the current requirements.	

The Proposals

- Pan city interventions
- Area based intervention

Pan City Interventions

The projects have been identified on the basis of rapid assessment of all the sectors, discussions with local authorities/ stakeholder consultations, keeping in view the guidelines set in Master Plan 2031 for the various sectors, the projects have been identified in short term, medium term and long term perspective.

Based on the stakeholder consultation meet, the prioritization of projects was done so that the views, aspirations and felt needs of the local officials, residents, experts, NGOs, elected representatives and others are given due cognizance. It also takes into account the aspirations of the residents of Jaisalmer expressed during informal discussions and meetings held for the purpose.

The projects have been divided as per the scope under the following heads:

Pan City Interventions

1. *Parking facilities around the city.*
2. *NMT routes*
3. *Heritage walks (for public awareness and encouragement of traditional arts)*
4. *Solid waste management system*
5. *ICT and e-Governance interventions which majorly include Command and Control Centre, Data Centre, ITMS, Surveillance through CCTV and Video analytics, Smart Parking Management, Solid Waste Management, Smart Street Lighting, Environment Monitoring.*
6. *Rejuvenation of Old City Streets.*



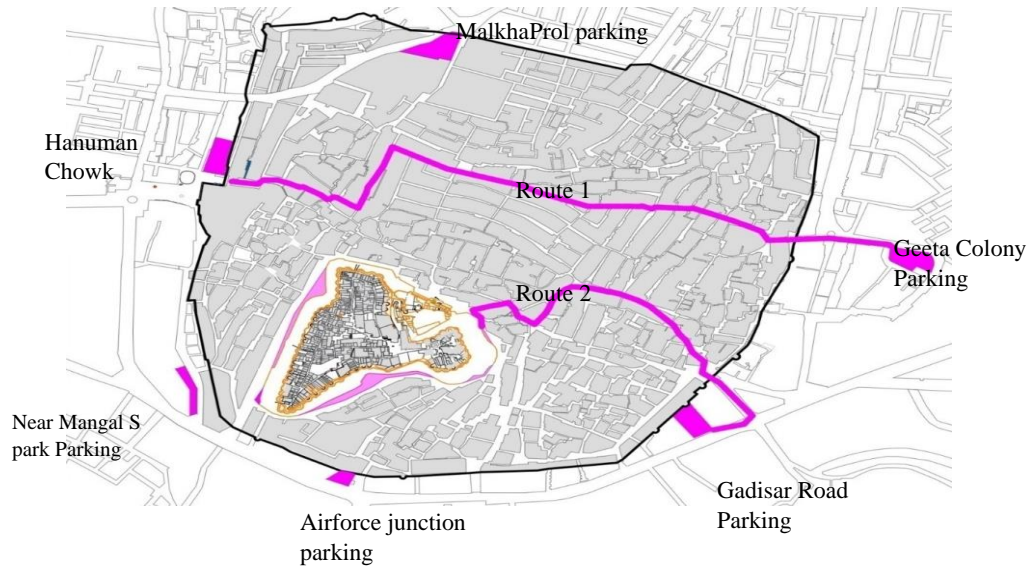
Parking Facilities development

Based on questionnaire 6 parking spot around the walled city are planned to for parking facility. Each parking spot is catering 400 m radius within the city and dedicated parking spots around the fort city is planned for tourist.

NMT routes

Route 1:- Geeta colony parking to Hanuman Chowk Parking.

Route 2:- Gadisar parking to Manak Chowk.

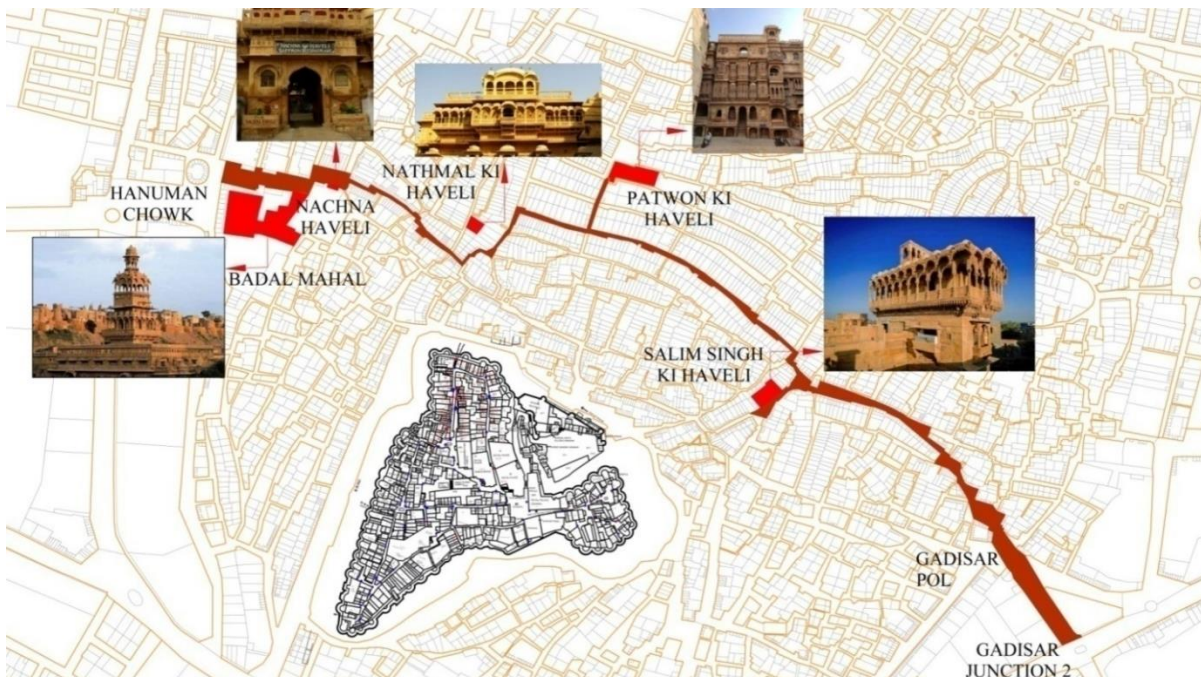


A heritage walk is also proposed along routes which lead to the famous havelies of Jaisalmer.

Points covered in heritage route:-

- Gadisar prol
- Salim Singh ki haveli
- Patwon ki haveli
- Nathmal ki Haveli
- Nachana Haveli
- Badal Mahal
- Hanuman Chowk

All the heritage buildings along this route will be identified and restored to their original state (especially relating to façade).



POLICY INTERVENTIONS

System	Type	Policy
Built	Façade control	<ul style="list-style-type: none"> • Use of local material and traditional methods. • Use of traditional elements as per approved design by the municipal council. • Façade control regulations shall form an indispensable part of the zoning regulations and bye laws. • Different levels of strictness measures shall be followed depending upon the zone and the historic importance of the structure / building. • No building or its any part shall be permitted above a ht, Which obstructs the view of the fort from nearby locations.
	Signage	<ul style="list-style-type: none"> • Allowed as per the standard design and size. • Location of signboard to be guided by the standards manual. • All streets and chowks shall bear their names in stone having design as permitted in the detailed document. • No signage of brands etc shall be allowed on streets and chowks other than the locations specified in the bye laws in detail. • Other advertisements can be displayed on designated locations and on portable signboards (vehicle mounted) with the permission of Municipal Corporation after paying due license fees.
	Design controls	<ul style="list-style-type: none"> • Orla must for all houses on residential streets and orla shall be kept free from any structure over it. • Courtyard planning shall be made necessary for all houses within the walled city. • Commercial usage within the residential premises shall only be allowed based on the traditional employment pattern as detailed in the zoning regulations.
Circulation	Parking	<ul style="list-style-type: none"> • Designated parking spaces shall be earmarked on periphery of the walled city within walk able distance from each house within the walled city. • These parking spaces shall be developed and maintained by the municipal corporation, jaisalmer. • Parking charges shall be kept subsidized for the local residents and tourist vehicles can bear the non subsidized rates of parking.
	NMT	<ul style="list-style-type: none"> • Non motorized route shall be planned for interior blocks of walled city. • These routes shall connect the major parking lots to the inner walled city residential and commercial cores both.
Infrastructure	Street level	<ul style="list-style-type: none"> • Pedestrian only neighbourhoods shall be encouraged. • Utility lines shall be shifted to underground. • The flooring material shall be laid in such a manner that servicing these lines is made possible. • Advance planning for the required capacity of service lines shall be done beforehand and no further densification shall be

		allowed that could put additional pressure on the infrastructure.
Encroachment	Chowk level	<ul style="list-style-type: none"> • Utility equipment such as transformers etc shall be planned and put in a camouflaged manner. • Dustbins which are large in size can be either removed or put underground (mechanical garbage extraction system). • Removal of dustbins can be done by increasing the frequency (twice daily) of the garbage collection vehicles.
	Brown spaces	<ul style="list-style-type: none"> • Otlā to be restored as per original scheme. • All construction shall be removed from chowks
	Green spaces	<ul style="list-style-type: none"> • New parks shall be planned on periphery of walled city so that the residents of walled city can also use them. • Each chowk must have a neem or peepal tree as the original scheme within the walled city area.
Tourism	Blue spaces	<ul style="list-style-type: none"> • Water bodies shall be restored to their original shape. • Catchment areas shall be cleared of all illegal constructions. • Declaration of the catchment areas as no construction zone.
	Heritage walk route	<ul style="list-style-type: none"> • Vehicular movement shall be controlled by time slots, especially on the heritage walk routes and major tourist movement routes. • Strict façade control guidelines. • Façade lighting of the route. • Encouragement to the traditional artisans on these routes.
	Open spaces	<ul style="list-style-type: none"> • Rejuvenate the public open spaces by organized traffic patterns and providing public amenities. • Reuse strategy of these spaces for economic activities such as introduction of vending zones. • Creation of community gathering spaces within these open spaces shall be done to encourage people and tourists both for using them as the original intended pattern. • Street furniture shall be placed wherever necessary to encourage people using these public spaces.
Solid waste management	Garbage disposal	<ul style="list-style-type: none"> • Waste Segregation at collection. • Residential authority representatives to report with mobile apps on a daily basis for waste collection and street sweeping performance • Fleet and asset management system: GPS based tracking of primary collection and transportation fleet • Solid waste management operations center: central operations monitoring with data integration platform • Communication and change management: ICT and social media based communication to create behavioral change to achieve waste management and cleanliness awareness and action.
	Integrated Asset Management System	<ul style="list-style-type: none"> • All the new developments to have provisions of dedicated management system with dedicated asset management teams following modern technologies such as smart metering, IOT Analytics for efficient management

AREA BASED INTERVENTIONS

Introduction of the Site; Hanuman Chowk

The hanuman chowk is an important entrance portal of the walled city of jaisalmer. It is one of the largest open spaces in and around the walled city.

The chowk got its name from the Lord Hanuman Temple, which is situated on one of the corners of the circle.

The circle is a busy junction as one of the roads goes to the Sam village and almost every tourist crosses this junction at some point of time during his visit in jaisalmer.

Identifying the Issues & Problem



The Issues identified

- Unorganized large open space
- Haphazard parking pattern
- Haphazard movement of traffic due to undefined carriageways
- No defined carriageways / footpaths for pedestrians and cyclists
- Shortage of public amenities (toilets, drinking water etc)
- Infrastructure issues (sewer and electrical lines)
- Unplanned vending areas
- Absence of seating space for tourists and locals
- Permanent and temporary encroachments
- Absence of proper signage
- Street lighting not suitable for heritage ambience
- Original façade covered with commercial hoardings etc
- Lack of homogeneity in façade due to layers of growth



The Proposed Plan



	EXISTING		PROPOSED	
	Sq.mt.	Percent (%)	Sq.mt.	Percent (%)
Total Area	7580.14	100	7580.14	100
Use For Vehicular Moment	2609.08	34.42	3563.61	51.01
Use For Footpath & Cycle Stand	Not Defined		1804.23	28
Defined Open Space For Gathering	Not Defined		558.15	7.36
Parking	Not Defined		Area identified for parking	
Vending Area	Not Defined		774.18	10.21
Space For Traffic / incidental greens	Not Defined		347.2	3.42

	EXISTING	PROPOSED
	Number	Number
Total Venders	22	36
Fruit Vender	7	
Vegetable Vender	6	
Mobile Accessories	3	
Mobile Recharge	1	
Dress Accessories	3	
Dresses	1	
Tea Stall	1	

CONCLUSIONS

The urban public spaces play a significant role in the life of citizens. The fabric gets disturbed when the urban public space loses its original purpose to the commercial outlook. Especially in historic cities like jaisalmer, the loss of the character of its public spaces means eventual loss of the cities city's character and ultimately the loss of economic opportunities through tourism sector.

The urban public spaces shall be restored to their original glory keeping in mind the present usage pattern and life style of the users (locals and tourist both).

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Redesigning public spaces with an emphasis on the principles of women presence (case study: Hashemi plaza, Tehran, Iran)

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ABSTRACT

Public spaces are a crucial tool for strengthening civil society as an area of participation for all groups. Due to different territorial factors such as localization, mobility, and accessibility, cities are not experienced in the same way by both men and women. Women deserve equal rights for use of urban open spaces, despite this, various criteria decrease their presence including inappropriate design of space. This paper aims to study how women's needs are met through the physical form of public spaces in urban designs. Direct observations and questionnaires were used in the fieldwork, in addition to interviews with women and relevant people who influence the women's attendance. Maps and SPSS techniques were used to interpret the data. Through a questionnaire survey of one hundred females, the criteria affecting their use of place are investigated. Results show that environmental quality factors are more effective than socio-cultural factors on the presence of women in urban open spaces such as accessibility, green spaces, mobility, safety, lighting, etc. Using as a case study the city of Tehran, Hashemi plaza, which has been significantly influenced by the redesign of place by these items with a result of increased women's attendance. The findings will help develop a better understanding of the relationship between women's presence and the physical form of public spaces that women can use comfortably and actively to participate in urban life. Gender-sensitive planning will help mitigate adverse and unequal impacts and build resilience. Decision-makers must ensure that gender-sensitive planning is mandatorily included for access to and eventual work in urban spaces.

Key words: Women, Presence, public space, gender-sensitives public spaces principles.

URBAN PUBLIC SPACES IN THE FRAMEWORK OF URBAN DESIGN

Urban public spaces provide a shared service to different groups of society; namely where individuals and groups of different social, cultural, and economic structures, from different ages, sex, and level of education, traditions, customs, and backgrounds are together. Meeting the needs and demands of this large user group is the common task of urban planners, urban central designers, and urban furniture designers. As a matter of fact, urban life will be interpreted in terms of urban furniture and public space. This shared responsibility is also valid for the formation and sustainability of urban identities[1].

Public spaces require something in their physical form that allows us to distinguish them from their surroundings as a clear and identifiable place. Typically this is a sense of enclosure, where the buildings and landscape, to greater or lesser degrees, first open up to create a space, and second, wrap around and 'contain' space in order to hold the eye and create a distinct place. While the factors determining a sense of enclosure are contested, many formal public squares are of this type and planners will need to work closely with developers and other interested parties to ensure they exhibit the sorts of qualities discussed in the second half of this paper[2]. Public urban spaces provides a comprehensive overview of the principles, theory and practices of urban design for those new to the subject and for those requiring a clear and systematic guide. [3].

WOMEN

Public spaces for women

Urban public spaces have been considered as an essential spatial element of cities throughout history. Public spaces play a particular role in the livability of urban areas, whether as memorable, cognitive, or meaningful places. One of the important factors that affect the use pattern of people in these places is the impact of their gender.

Women and men use urban spaces in different ways, according to their roles and responsibilities in the city. Women have always been responsible for the direct care within the family and the community, which should put them in a central position in the urban planning process, and the shaping of the built environment. Urban planning was more often done through the male perspective and understanding of the built environment and its different users and needs. Now, for many reasons the built environment needs to be reconfigured in a manner that promotes gender equality [4].

Society has always identified women as caregivers, mothers, householders, and at least often, workers. This vision about women's roles has given the perception that their activities are limited to their direct environment, in other words, the boundaries of their neighborhood. But the reality is that women need a more convenient built environment even within the caregiver role. "Unfortunately, the built environment is defined as manmade surroundings that include buildings, public resources, land use patterns, transportation systems, and design features." [5]

Women's presence

A common criticism of newly built or redeveloped public spaces is that they are beautiful, but dead. These public spaces are lack of presence. In order for public spaces to be safe and lively, it depends on people who are able and willing to invest time, energy, creativity, their presence and their social networks locally. Gender as a hidden factor in relation to location and space, especially in connection with city spaces, has been neglected. In other words, it has become a lost element in space and its design. Gender includes behavior, actions and social thoughts which the dominant culture in the society leaves it to men and women.

Analysing factors intersecting with gender is key to avoid overlooking or overemphasizing gender differences(e.g. age, comorbidities, disabilities, environment, ethnicity, geography, religion, sexual orientation, socioeconomic status...)[10].

Sociologists also believe that the differences between men and women are caused by the behavioral differences which society assigns for them. Two genders do not differ; however, society makes them find different inclinations and lead different paths. Key differences between men and women, which are created by the social issues and development of men and women's individual identities, impact their direction and participation in the environment. Gender plays an undeniable role in understanding of the environment. Environment as whole and in its various components is understood and perceived differently by women and men. For instance, safety and security of their surroundings is importance in their evaluation and it greatly impacts on their perceptions. Moreover, they divide city spaces into safe and unsafe spaces. Overall, men have more positive feelings towards their environment in comparison to women[6].

There are different attitudes considering women's presence in urban spaces which could be categorized into two sets of inclusionary and exclusionary approaches. Analysis has revealed the power of symbolic hierarchical dichotomies of public/private, male/female, and work/home in the planning and designs of built environments, which are intended to reproduce these dichotomies and so emphasize on women's exclusion in urban spaces. Feminist scholars' studies on women and their needs have proved the importance of women's presence in urban spaces which is referred to as "inclusionary approach"[7]. In this perspective, urban open spaces must also provide the possibility of women's presence as a prerequisite in a civil society. It is possible to examine the limitations of women's

presence in open spaces related to the socio-cultural norms. Today, it is well accepted that in order to respond to the needs of women for socialization and participation in civil society, a level of equity must be considered in spatial planning and design of public spaces. We should restrict factors including limitations through design and planning of urban spaces as well as limitations imposed through socio-cultural norms which decrease the presence of women in urban spaces[8].

Gender-sensitives public spaces principles

Gender-sensitive planning is a differentiated planning culture that employs a site- and group-specific approach. The added value of gender mainstreaming in planning administration becomes evident at several levels. This type of planning considers the needs of persons who are often overlooked. Thus gender-, age- and group-specific interests and effects are systematically examined in connection with each new planning task and planning step. The objective lies in meeting current demands for space by individual groups, creating flexible and adaptable spaces to satisfy different needs and generating new potentials of space appropriation by inhabitants. As you see in the table, gender-sensitive planning also has an eye on the equitable distribution of space and time. The usability and functionality of a space are measured by its usefulness for people who due to their individual life phase tend to spend a lot of time in the immediate vicinity of their homes.

Source	Gender-sensitives public spaces principles	Explanation
[9]	access	○ Using services and spaces in the public realm, free from constraints and barriers
	Mobility	○ Moving around the city safely, easily, and affordably
	Safety and freedom from violence	○ Being free from real and perceived danger in public and private spheres
	Health and hygiene	○ Leading an active lifestyle that is free from health risks in the built environment
	Climate resilience	○ Being able to prepare for, respond to, and cope with the immediate and long-term effects of disaster
[10]	Security of tenure	○ Accessing and owning land and housing to live, work, and build wealth and agency
	Sustainable and gender-sensitive transportation	○ Different uses: It has been shown that, on average, men and women do not use the same means of transport and use them differently. ○ Gender-sensitivity and accessibility: As women make up most public transports users, theirs needs should be considered. This includes accessible stations and step-free entrance to the transport.
	Housing and neighbourhood design and gender	○ Gender-sensitive neighbourhoods: To support them (as well as working parents) and reduce pollution, neighbourhoods can be organised in a gender-sensitive way, i.e. by including on-site child and elderly care facilities, shops, and primary-care medical facilities. ○ Gender-sensitive housing: included different types of apartments in the buildings for inter-generational living and giving the possibility for families to have their elderly, who are predominantly women, in the same building/neighbourhood.
	Safety issues	○ Men and women face safety issues in public spaces and transports. It has been shown that men face more violence and robbery while women face more sexual harassment and gender-based violence.

[11]	Walkable route network	<ul style="list-style-type: none"> ○ Avoidance of barriers ○ Potential for small-scale zones to rest and linger in ○ Short distances between residential blocks and public open spaces ○ Short distances between residential blocks and social infrastructure/campus ○ Short distances between residential blocks and public transport stops
	Subjectively perceived safety and security	<ul style="list-style-type: none"> ○ Clear-cut organization of route structure ○ Focusing of central functions (shops, social infrastructure, etc.) ○ Avoidance of main axes crossing unpopulated areas (at night) and underpasses
	Quality of public and semi-public open spaces	<ul style="list-style-type: none"> ○ Small share of continuously shaded open spaces ○ Boundary between semi-public and public open spaces ○ Functional variety of open spaces ○ Good usability, compact configuration
	Quality of housing space	<ul style="list-style-type: none"> ○ Remarks regarding wing depth (maximum wing depth) ○ Remarks regarding building heights
	Quality of social infrastructure	<ul style="list-style-type: none"> ○ Spatial link to public open spaces ○ Short distance to public transport stops ○ Minimal barrier effect of site
	Power	<ul style="list-style-type: none"> ○ Space is the base of each of power ○ Explaining the relationship between gender and space and power
	Gendered space	<ul style="list-style-type: none"> ○ Clarifying the role of space in constructing symbol and the structure and the strengthening of gender relations
	Life space	<ul style="list-style-type: none"> ○ Space is a social production ○ Ability to challenge or change the dominant spatial arrangement of the space users
	Social notion of gender	<ul style="list-style-type: none"> ○ Gender is not a former concepts and essence and universal, but also is created during social practices
	Social structure	<ul style="list-style-type: none"> ○ The structure of social relation leads to gender division of urban space
[12]		

Table 1: Gender-sensitives public spaces principles

CASE STUDY: HASHEMI PLAZA

For several years, the city of Tehran has been suffering from undesigned public spaces, but the approach that developed in modern urban planning is “inclusive design” which creates and develops places for all. Therefore, the purpose of this research is to have a practical approach to this global perspective at the plaza scale. Hashemi plaza is located in District 9 municipality of Tehran, which is placed from north to Azadi Street, from the west to Ayatollah Saeedi highway, and from the east to Shahidan Street and Yadegar Imam Highway, and from the south to Dast Gheyb Street. It is around by green spaces, mosques, schools, and residential houses.

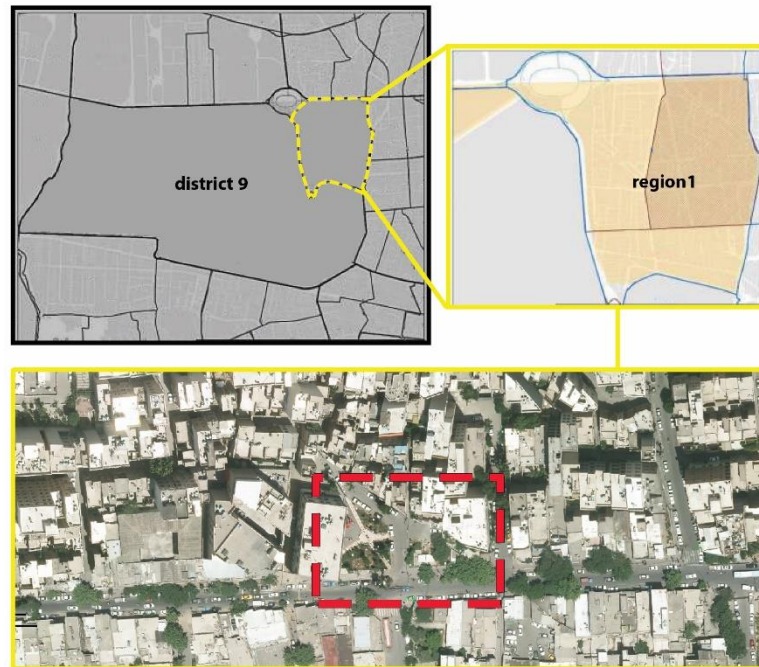


Fig. 1: Location of the site in the 9th district of Tehran

The potentials of redesigning Hashemi plaza to increase the level of social interaction of women are as follows

- Proper location of the place at the intersection of main streets (Hashemi Street and Kashani Street)
- Existence of active shops for the local needs of dwellers.
- Access to the bus stop in the vicinity
- Existence of greenspaces around the field
- Economic efficiency of Rezvan cultural and artistic center behind the site.

As mentioned in the table there are some factors that affect physically Hashemi's plaza that must be paid attention to design.

Physical factors affecting Hashemi plaza

Surrounded by buildings	Climate comfort	Lightening
Proximity to public transport	Accessibility	Timeless
Being familiar	Cosy	Peaceful
Artistic	Landscape	Furniture
Sociality	Compatibility	Have barrier
Pedestrian	Safety and security	Sense of place

Table 2: Physical factors affecting Hashemi plaza



Fig. 2: picture of Hashemi plaza before implementation

METHODOLOGY

This research is an attempt to identify and evaluate effective factors of increasing women's presence in public spaces as communal spaces at the urban scale and propose key components for design to promote design for women. To do that, after expressing definitions and framework, and extracting main effective factors, we collected information about each factor by library and field methods and the factor analysis model evaluated the data using SPSS software. Finally, a regression analysis model was used to prioritize factors and the design guidelines were proposed accordingly. Hashemi plaza was selected as a case study because of its various usages of surroundings, and the presence of different groups of people. After choosing the site, a questionnaire was used to reach the research goals. Participants were selected from dwellers in regards to the core research question, all of them were women. To have a comprehensive sample, the study was done on both weekends and weekdays, 120 questionnaires were answered. Recording to the methodological model the questionnaire was combined with Physical factors affecting urban spaces and Gender-sensitive public spaces principles*[1]. The questions used during the survey, distribute in main topics: General questions, Public Places, Streets and connectivity, Pedestrian and cycle paths, Greenspace, Infrastructure and comfort, Public safety. During different visits, many parts of place discussions were done as well. Besides, and to get new ideas about a better future, we took the opportunity of thinking freely.

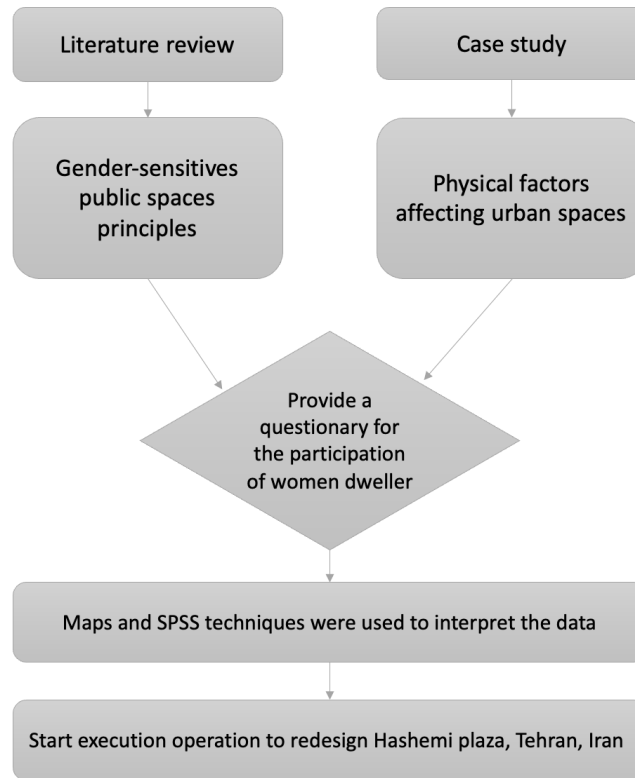


Fig. 3: Methodological model

RESULTS

Direct observations and questionnaires were used in the fieldwork, in addition to interviews with women and relevant people who influence the women's attendance. Maps and SPSS techniques were used to interpret the data. Through a questionnaire survey of 120 females, the criteria affecting their use of place are investigated. As a result, by summarizing the important values of public spaces in the format of main topics, necessary key components for designing were determined. The primary purpose is to determine factors that remained in analysis so some mathematical criteria are used to retain the intended factors.

Row	Factor	Percentage
1	Public spaces design	15.8%
2	Streets	4.3%
3	Connectivity	9.2%
4	Pedestrian	7.3%
5	Cycle paths	4.4%
6	Green space	16.8%
7	Infrastructure	4.1%
8	Comfort	7.3%
9	Public safety	18%
10	Lighting	12.8%

Table 3: extracted factors for women's presence

Then, by obtaining the criteria affecting the presence of women with their participation, Hashemi Plaza was designed with the cooperation of consulting engineers as follows, after adapting it to the field and

Results show that environmental quality factors are more effective than socio-cultural factors on the presence of women in urban open spaces such as accessibility, green spaces, mobility, safety, lighting, etc. Using as a case study the city of Tehran, Hashmi plaza, which has been significantly influenced by the redesign of place by these items with a result of increased women's attendance.



Fig. 5: picture of Hashemi plaza after implementation



Fig. 6: picture of Hashemi plaza after implementation in night

CONCLUSION

Through global history of undervaluing women and ignoring their needs has led us to the situations we stand in today. Some organizations and local governments have become concerned with this issue and made themselves vehicles for change using gender mainstreaming. Gender mainstreaming is a concept used in public policy where the different implications of action are examined for men and women separately so that issues for each group can be addressed. The findings will help develop a better understanding of the relationship between women's presence and the physical form of public spaces that women can use comfortably and actively to participate in urban life. Gender-sensitive planning will help mitigate adverse and unequal impacts and build resilience. Decision-makers must ensure that gender-sensitive planning is mandatorily included for access to and eventual work in urban spaces.

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APPENDIX 1

MAIN TOPICS

General questions

QUESTIONS

- Who uses public spaces the most?
- How is the social life of people in the area?
- Are all groups of people equally use public spaces?
- Where is the prettiest and ugliest place in the area?
- Is it easy to find your way in the area? Or any maps and signs needed?
- How is the quality of lighting at night?

- What condition are pavements and stairs? Are they good enough to use by different people including mothers with strollers and with some mobility problems or disabilities?
- Are there any kinds of barriers for women in the area?
- Is there a need for more recreational environments, meeting places or cultural centers for women?
- In what ways can women and young girls contribute to urban public spaces?
- Is there anything that needs to be changed?
- It is possible for women and young girls to be active in the area?
- Are there any places that is used with a certain groups of people?
- How often women use public spaces? And with what purposes?
- Are spaces connected physically and visibly to nature and green spaces?
- How women can participate in social activities happening in public spaces?
- Are spaces alive during nights?
- Are there any unusual activities in spaces?
- Are there enough lights around courtyards?
- Do courtyards work as a place for socializing in the place?
- Who uses the courtyards the most?
- In what ways can women and young girls participate to improve the design of courtyards?
- Are there suitable and safe cross lanes in the streets?
- Are there enough parking places close to the workplace or residential area?
- Is it visible to see coming cars through the streets?
- Are streetlights sufficient at night?
- Are there sufficient bus stops?
- Are there any eyes on the street to have a view of the bus stops and the subway?
- Is it safe and secure for women to stand and wait at the bus stop at night?
- In what condition is the accessibility to the subway in the daytime and after dark?
- Are there sidewalks surrounding the public space?
- Do the paths within the park take people where they want to go, or are people consistently walking off paths for more convenience?
- Is there adequate directional signage or wayfinding within the space?
- Do women use different routes for walking?
- Are there suitable and enough places that bicycles can be parked at the end of the trails?
- Which pedestrian ways are more popular?
- Are pedestrian ways equipped with qualified lightings and seats along?
- Are the pedestrian and cycle paths visible from residential buildings or any other places nearby?
- Are there any alternative safe ways to use during the night?
- Do men and women feel differently about green places?
- Are there any alternative paths through the green space?
- What can be done to make the green space more attractive and pleasant?
- Are there enough seats around the green space?
- Are there well-maintained and adequate public toilets for both men and women?
- Are there rubbish bins throughout the public space?
- Are there places to sit and rest?
- Is there adequate shade?

Public safety

- Are there vendors or kiosks?
- Are there clear sight lines within the public space? Is the interior of the space visible from the street or entrances?
- Are there fences or walls that block clear pathways to exits?
- Is there any visible policing? If so, when are they on duty?
- Are there people or groups of people within the park that make women feel unsafe?

Evaluating the performance of Qom urban management in order to increase the social participation of citizens

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ABSTRACT

Evaluation is the act of measuring, recognizing, and clarifying the path we are taking; therefore, the purpose of reviewing the performance of Qom urban management to increase the social participation of citizens is to improve the quality of urban life to attend, visit and receive people in Qom. People's participation in the urban decision-making process is one of the main elements of people's government and increasing people's participation in urban affairs can play a valuable role in creating urban balance. The importance and necessity of citizenship for empowering urban management paying attention to this concept is essential for solving many of the problems of cities. In this research, a quantitative method with a questionnaire technique has been used; therefore, residents' views on the performance of urban management with emphasis on the dimensions and indicators of social participation have been questioned. The level of participation, cohesion and solidarity, trust and awareness as the most important indicators of performance evaluation to evaluate the efficiency and effectiveness of social security based on the views of Qom residents are presented in this article. The results of the studies and field study of the research, the level of participation, awareness and trust of citizens in the urban management of Qom according to the five Likert scales, has been evaluated at low and medium level. Attracting trust, opinion polls, direct communication of citizens with managers, fair distribution of income and facilities and services in the city, creating a fundamental change in the planning, management and executive system of city affairs and presenting the annual performance of suggestions for improvement, growth and development in this The article is presented.

Keywords: participation, urban management, Qom, citizen, trust

INTRODUCTION

Urban management is a comprehensive concept that aims to strengthen governmental and non-governmental organizations to identify various programs and policies and implement them with optimal results. Basic ideas of urban management efficiency are seen in components such as hiring more capital, industrialization, more labour, and, in general, little growth; Therefore, global experiences, especially World Bank studies, show that this approach has not been able to improve the environment, especially in metropolitan areas, and the environmental, economic, social and, in general, spatial barriers of these approaches are becoming more visible. The relationship between the city and citizenship is two-way, people build the city and the conditions of cities have a decisive and impossible effect on their lives. Improving the urban structure and optimizing urbanization requires reforming and optimizing this relationship, which the urban management is responsible for organizing this relationship and requires it to consider and study the aspects of the issue (Jajarmi et al, 2004: 10) Civic life consists of the three main pillars of citizenship, the body of the city and urban management. Citizen and urban management have a practical nature and the body of the city is passive. Man, due to his civic nature, has a desire for citizenship and needs civil life, and urban management is obliged to organize and manage the body of

the city. In the city of Madar, to improve and empower the management of urban affairs, the need for participation requires all beneficiaries, including the government (municipalities), the private sector and non-governmental organizations, the people and the citizens. Citizens, in turn, must take effective steps to improve the city (Papli Yazdi, Sanajerdi, 2003). Citizens' participation in decision-making, planning and all activities and urban affairs is considered by managers, planners and social development experts. Participation in the process of involving all people in all stages of development for the emergence of abilities, capabilities and as a result their material and spiritual growth and excellence. There are social and political discourses in society, and everyone should speak of it as an important element in achieving democracy and sustainable development. Therefore, it can be said that people's participation in the urban decision-making process is one of the main elements of people's government, increasing people's participation in urban affairs can play a valuable role in creating urban balance (Abbasi, 2008: 44). At present, in Iran, people participate in urban management only through councils and have no participation in the process of preparing and implementing urban plans and urban management, while more attention should be paid to the role of people in urban management. Now, considering the lack of a long history of participation in urban management of cities and also paying attention to the issues of participation in big cities, the need to pay attention to participation in middle cities is determined because the context of citizen participation is more available in middle cities (Ziari et al, 2009: 233). Considering the importance of citizen participation in evaluating the performance of urban management, in this study we examine and recognize the level of social participation of citizens in Qom urban management.

THEORETICAL FOUNDATIONS

The management of cities, especially metropolises, is significantly different from the management of large cities in the past. Cities with populations of millions and hundreds of streets and alleys and thousands of small and large shops now need scientific and knowledge-based management. Organizing traffic, garbage collection, sweeping and cleaning of city roads, implementation of construction, cultural, traffic projects, etc. are among the needs, each of which is implemented at a staggering cost by city managers and their affiliated organizations in the city and their successful implementation. It just depends on the level of people's participation (Bashirzadegan, 1389: 2). In the meantime, the role of city managers in educating and informing citizens, preserving material and social interests, creating the possibility of participation and laying the groundwork for participatory behaviour such as the formation of associations, etc. is important. Daniel Lerner deals with the phenomena of urbanization, literacy, media, participation and modernization. According to him, the first three factors are interrelated and participation in them means participation in the general system of society (Mohseni Tabrizi, 1995). Because the concept of participation requires the mental and emotional engagement of individuals in different social situations, so in today's societies it is no longer possible to act on past development approaches, urban issues have reached such a level of content and performance complexity that requires the use of all forces. Citizenship is in the process of urban development projects and in all stages of the project, (before implementation, during implementation and after implementation) citizen participation plays an important role (Kakavand, 1390: 8). In addition, the tools, models, techniques, and patterns of participation reveal that partnerships come in many different forms and levels, which, with the right design, can reflect the real presence of people in different areas, or as a means to an end. Be. Participation includes all activities that affect decision-making and resource allocation and should be designed and organized in a way that meets the expectations of society (Papli Yazdi, Sanajerdi, 2003). Although the citizen-ceter city as a new approach has been one of the most important issues in the last decade, especially in recent years, and on the other hand, many various governmental and non-governmental organizations and institutions still emphasize these issues, but this

important issue has not been realized in practice. And it has many problems. Even in the theoretical field, there has not been much comprehensive research on it. On the other hand, issues such as civil society, democracy, pluralism, quality of life, social justice, popular participation, citizen-centred, decentralized and accountable management, highly cultural, citizen-oriented, cultural citizenship, citizenship, citizenship and is considered in various fields. Therefore, most of the researches and studies conducted by researchers in the mentioned fields have considered special dimensions of this issue. Therefore, considering the importance and necessity of citizenship to empower urban management, attention to this concept is necessary to solve many problems of cities (Khosravi, 1998).

Citizen-centered city

The citizen-centered city and its key components in the idea of citizenship define the right of all persons to enjoy legal rights and the responsibilities that they must assume to enjoy a better life. It should be noted that the only physical location in the city is not equivalent to the word citizen. The citizen must play a role in the participatory roles of the optimal management of the city because the citizen provides a suitable social context for the individual's activities so that he can achieve everything in the service of his progress towards excellence (Parsa, 2007). In a citizen-centered city, as a participatory process for the improvement of urban affairs, all stakeholders, including the government (urban management, especially municipalities), the private sector and non-governmental organizations, people and citizens, must take effective steps to improve the city. Therefore, it is necessary to eliminate instability in cities, eliminate instability from the bodies of management institutions and urban planning and be more efficient in managing city affairs and delegating duties and power to neighborhoods and people, rule of law, spatial justice in accountability, transparency and capacity building, increasing capacity and capacity. It is also a non-governmental organization. Citizens should also supervise the affairs of city managers in this city. Good cooperation with the municipality and city officials is one of the necessary conditions for its realization. Its features are considered.

The characteristics of the city of Madar citizens are as follows:

- 1- A city in which the urban management, while being transparent and accountable in its performance, makes every effort to achieve social justice and pay attention to the will and opinion of the people.
- 2- A city whose citizens, while participating and taking responsibility in all the affairs of the city, trust the city administration and belong to their city.
- 3- A city where access to urban facilities and services is suitable for the use of citizens and citizens have access to the facilities they need without worries and in complete comfort (Nazarian, Shohani, 2011)

The relationship between urban management and participation

The most important goal of urban management can be considered in improving the working and living conditions of the resident population in the form of different social and economic strata and groups and protection of super-citizens, encouraging sustainable economic and social development and protection of the physical environment. Therefore, when the city has problems and inadequacies in its work cycle and suffers from urban health problems and environmental pollution and various social ills, and crises such as housing, lack of adequate capacity of public facilities, unemployment, low income, slums, hardship, The city car experiences anonymity in the formation of textures and buildings, it can be concluded that its urban management is in a tight spot. Following this issue, the city management, while having a plan for the current situation of the city and overcoming its problems, should formulate the plans of the city and draw an ideal future based on them; which is based on the facts and conditions of time and place. Urban management must be the guardian of cities and the interests of urban people. Now that we are witnessing an increase in human needs and urban environmental problems on a large scale, issues such as traffic compliance, attention to green space, cooperation with municipalities in the

field of construction, garbage collection and many other issues represent the problems we face today. Among the positive consequences that strengthen, legalize and rationalize the bilateral relationship between citizens and municipalities, as well as urban management, especially municipalities, the following can be mentioned (Nejati Hosseini, 2001: 40).

Table 1- Mechanism of citizen-municipality relationship, mutual rights and duties

<ul style="list-style-type: none"> • Citizenship <ul style="list-style-type: none"> -Sense of social belonging and urban trust -Payment of taxes and city duties -Continuous reproduction of urban cultural patterns and citizenship -Legal-civil compliance with the law of municipalities Citizenship responsibility 	<ul style="list-style-type: none"> • Rights <ul style="list-style-type: none"> - Enjoying citizenship rights - Equal use of urban goods and services - Influence on urban decisions - Effective interference in the elections of local and city officials - Enjoying urban safety - Access to urban information
<ul style="list-style-type: none"> • Duties <ul style="list-style-type: none"> - Accepting the culture of citizenship and urban life - Receiving city taxes and duties - Obedience to municipal laws - Partnership and cooperation with the municipality - Urban responsibility - Lawful use of citizens' resources and facilities 	<ul style="list-style-type: none"> • Municipality <ul style="list-style-type: none"> - Having a citizenship participatory attitude towards life and urban management - Urban education and culture - Providing goods and services required by citizenship - Accountability and responsibility - Improving urban life - Notices

Source: (Nejati Hosseini, 2001: 42)

In participation views and theories, there are two main approaches called micro-attitude and macro-attitude, which at the micro-level, emphasizes motivations, attitudes and behaviours, and at the macro-level, contexts, conditions and structural elements are considered (Royterz, Gorge, 1994). Hence, participation has two parts, mental and behavioural. The mental part considers individual tendencies and tendencies and the behavioural part considers voluntary collective activities (Alavi Tabar, 2000). In other words, to explain the phenomenon of bipartisan participation, the theory is considered:

The first category: Max Weber's theories, in which the system of beliefs, tendencies and ideas is confirmed, which according to the main assumption of these theories, action arises from cultural aspects and is influenced by its various elements. Therefore, the perception of the actor is effective in his behaviour. These theories, which are often empirically presented in the field of social psychology, consider the powerless variable as the most important variable.

The second category: Theories that emphasize the behavioural aspect and consider the behaviour of individuals as the result of their profit and loss difference rather than the result of their beliefs and tendencies. The premise of this view is that behaviour takes shape over time, is stabilized, and ultimately becomes institutionalized, with benefits outweighing costs. For this reason, participation expands when its objective benefits are the individual's perception of its benefits more than its costs, the individual's mental perception of its costs (Congress of Non-Governmental Organizations and Future Challenges, 2001: 93).

Evaluate the performance of urban management with emphasis on increasing the social participation of citizens

Considering that the evaluation method should be consistent with the theoretical complexity that exists on the multiple dimensions of the concepts of urban management performance and social participation, in this study, a quantitative method with a questionnaire technique has been used; Therefore, residents'

views on the performance of urban management with emphasis on the dimensions and indicators of social participation have been questioned, which is briefly expressed in the table.

Concept	Dimension	Indicators	Criteria
Evaluating the efficiency and effectiveness of citizens' social participation	Social_structural participation	participation	Increasing the desire of citizens to participate in the affairs of their neighbourhoods Citizens' willingness to participate in neighbourhood meetings and sittings Ease of communication with city managers Citizens' participation in increasing the facilities of neighbourhoods
	Social_cognitive participation	Awareness	Collaborate in education and raise awareness Create a basis for information on urban approvals Creating a platform for awareness of the urban landscape Media coverage of actions taken at the city level Identify and assist vulnerable groups in the city
		the trust	Increase trust in urban institutions Increase trust in government agencies
	Social_relationship participation	Cohesion and solidarity	Increase satisfaction with living in the city Increase security in urban areas Expanding the relationship between urban management institutions and citizens Expansion of public socio-cultural centers and spaces Assistance in organizing social events (such as mourning ceremonies, celebrations, etc.) Control and reduction of social harms at the neighbourhood level

Table 2_ Dimensions, indicators and criteria for evaluating the performance of urban management with emphasis on social participation of citizens

EXAMINING THE CURRENT SITUATION

Research area

Qom Municipality was officially established and started working on the 17th of Farvardin 1305 with the appointment of Seyyed Ahmad Khan Rafat as the mayor. Since then, this holy city has seen the presence of 58 mayors. At the beginning of its formation, Qom Municipality, like other municipalities in the country, was called "Baladieh", which was changed to "Municipality" with the approval of the Persian Language Academy on June 30, 1935. At first, Qom Municipality had only one central building, and to facilitate the administration of affairs, according to the relevant laws at that time, the city was divided into some "Barzan", which is now obsolete and instead of the word "region" is used. Currently,

Qom Municipality is ranked eleven according to the laws of national divisions and has ten approved districts (year, 2011). The city has eight districts so far and each district is divided into some districts. Qom city has 26 municipal service districts.

Also, to manage the specialized affairs of the city, six deputy districts have been formed in the municipality, which is as follows:

1. Deputy of Planning and Human Capital
2. Deputy of Transportation and Traffic
3. Deputy of Municipal Services
4. Deputy of Urban Planning and Architecture
5. Technical and civil deputy
6. Financial and economic deputy

Qom Municipality currently has about 3600 formal and contract staff; each of them is responsible for providing part of the services required by the people. Regarding the number of respondents to the questionnaire, based on Cochran's formula, the sample size in the analysis units is 383 citizens of Qom and using the 5-point Likert scale, each index is scored and the information obtained is analyzed.

Analysis of existing data

The level of participation, cohesion and solidarity, trust and awareness are presented as the most important indicators of performance evaluation to evaluate the efficiency and effectiveness of social participation based on the views of Qom residents in this section.

A) Social participation

According to the data collected in Table 3, 44.7% of the total respondents in Qom (383 people) underestimated the participation of citizens in Qom urban management.

Participation rate	Present
very little	42.5
Low	44.7
medium	11.5
Much	1
very much	0.3
Total	100

Table 3. The level of social participation of citizens in Qom city management from the respondents' point of view

B) Awareness

According to the data collected in Table 4, 52.8% of the total respondents in Qom (383 people), the level of social awareness of citizens in Qom urban management is underestimated.

Awareness level	Present
very little	32.8
Low	52.8
Medium	5.9
Much	8.5
very much	0
Total	100

Table 4. The level of citizens' social awareness of Qom city management from the respondents' point of view

C) Trust

According to the data collected in Table 5, out of the total number of respondents in Qom (383 people), 51.2%, the level of citizens' trust in Qom city management is moderate.

The level of trust	Present
very little	27.3
Low	13.5
Medium	51.2
Much	8
very much	0
Total	100

Table 5_ Citizens 'trust in Qom city management from the respondents' point of view

D) Cohesion and solidarity

According to the data collected in Table 6, out of the total respondents of Qom city (383 people) 42.8%, the level of cohesion and solidarity of citizens towards Qom city management is underestimated.

The degree of coherence and correlation	Present
very little	30
Low	42.8
Medium	26.5
Much	0.5
very much	0.2
Total	100

Table 6. The degree of cohesion and solidarity of citizens to Qom city management from the respondents' point of view

RESULT

In this study, to evaluate the performance of Qom urban management to increase participation, with emphasis on social indicators, dimensions and indicators were stated, which are: participation, awareness and trust as indicators of cognitive social capital, participation as an indicator of structural social capital and cohesion. Correlation as an indicator of communication social capital. The results of studies and field research show that the level of citizen participation in social affairs of urban management is underestimated, the respondents to the questionnaire, citizens 'awareness about social affairs of urban management is low and the level of citizens' trust in urban management is moderate. And the cohesion and solidarity of the citizens towards the urban management of Qom are low; therefore, the following suggestions can be made:

- Gaining citizens 'trust by actualizing citizens' opinions
- Asking citizens for their opinion on the implementation of urban plans
- Establishment and operation of direct telephone lines for direct communication of citizens with managers to present problems

- Holding local celebrations and ceremonies to increase the social belonging of citizens
- Fair distribution of income and facilities and services in the city; if citizens do not have access to the facilities and services they need, participation will quickly give way to apathy.
- Establishment of neighbourhood councils at the level of all districts to increase the level of participation and involvement of citizens in the decision-making of city affairs.
- Creating a fundamental change in the planning, management and executive system of city affairs in such a way as to provide a basis for coordination of various organizations involved in the city.
- Presenting the annual performance of city budgets and programs at the city level and informing the public to build citizens' trust and attract their participation.

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Investigating the interaction of citizens and the landscape of urban squares with the extent of their presence in order to promote urban sustainability (Case Study: Valiasr Square, Hassan Abad Square, and Imam Hossein Square)

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ABSTRACT

Interactive landscape is one of the most important concerns of designers in urban open spaces because many problems today are due to the absence of citizens and lack of a sense of belonging and memory of urban spaces. Interactive landscape in urban squares has been considered as a center of social interactions in the past. Interference and the presence of the car, as the main culprits related to lack of socialization, reduce interaction with the landscape in various ways. Recently, intrusions and seizures have taken place in three urban squares of Tehran. Separation of pedestrians and pedestrians has been the main way to strengthen social interactions and vitality. This study seeks to answer the question of whether changing the body of squares and reducing the presence of cars alone can improve the quality of interaction with the perspective of these places and increase social interactions? For this purpose, after the relevant theoretical literature and extracting their qualities, Depth map software has been used to analyze the data and different scenarios of car and pedestrian presence have been modeled. 20 people in each square have been asked the reason for their presence in the place. Finally, the results of the analysis of information related to the syntax of space and navigation are compared. The results indicate that physical changes, especially changes in the movement of cavalry and pedestrians can be effective in terms of penetration depth, strengthening the connection and visions of the surrounding streets, but by analyzing socialization maps and field questions, it is clear that these changes alone increase Interacting with the perspective of increasing social interactions is not effective. It seems that not paying attention to various activities appropriate to the needs of citizens and lack of meaning in the spaces of squares is the most important issue that is not considered in improving the quality of urban squares. It is suitable for interacting with the landscape and performing social interactions of citizens. Therefore, in order to improve the quality of urban squares in order to increase interactions with the landscape, it is necessary to pay attention to both aspects of physical and semantic perception

Keyword: Landscape, interaction, urban open spaces, Depth map, square

INTRODUCTION

The importance of paying attention to the interactive perspective in recent decades is due to the basic need of human beings today to interact, which is a basic need for the flow of social life. He noted the sense of belonging to the place, as well as interacting with others and observing people's activities by creating grounds for socialization and contributing to individual human growth. Public spaces made it possible for people to meet face to face. Mediators are needed to make the appointment. These intermediaries may be people who bring others together or a joint activity and subject that provides social conditions that may be less relevant to the body of public spaces. Urban public spaces attract people if they have fun activities. Opportunities to meet others are a prerequisite for promoting informal and unpredictable social interactions. Recreation and entertainment are defined among the basic needs of human life, which include rest, socializing, socializing and publishing. These different needs can be met by interacting with the landscape and users in urban spaces (Efroymson, et al, 2009). Social

interaction is one of the needs of human beings. Social relations must be "meaningful" and done "consciously." Social relationships can be "temporary" or "permanent"; If the interaction is done continuously and regularly, it can be described, identified and relatively constant. (Tulaei, 2003: 113) In the past, urban squares were an arena to meet the need for social interaction because different functions were present in these squares and people came to connect with the city and citizens in these places. But with the presence of cars in cities, over time, these open urban spaces have lost their important feature and have given way to the passage of cars. Citizens and the increase of social interactions In recent decades, various plans have been prepared for the physical revitalization of urban squares, such as Valiasr, Hassanabad and Imam Hossein squares, whose bodies have changed so that the presence of cars in parts of the space is a threat to pedestrians. Not be. However, the presence of people in these spaces indicates that these projects have not been able to increase interaction with the landscape and the presence of citizens and strengthen social interactions in the square. It seems that components such as meaning and activity alongside the body can guarantee the presence of citizens in open urban spaces, which has been ignored in improving the quality of these squares. Now, the question that arises in this research is how to increase social interaction in urban areas while strengthening the interaction with the landscape in urban squares?

REVIEW OF LITERATURE AND RESEARCH PRINCIPLES

The Interaction

Humans need social relationships based on the Maslow pyramid. Interaction is a concept that is established in a two-way relationship. Lang says in the book *Creation of Architectural Theory*: If people need social contact, they provide the ground in any environment. (Lang, 2006) The concept of interaction in architecture and the city has different types. Constructed components are defined, and ultimately the interaction between humans and physical conditions outside the building. In general, the types of interaction in architecture can be divided into three general categories: 1- human interaction with man-made environment 2- Human - Human interaction in architecture 3- human interaction with building environment (URL3, 2016 Man-made environments have two separate dimensions. The first is physical dimensions, which include form and function and settings related to human comfort. And second, the meanings in the building that people displayed according to their motives (Yazdanfar et al. 2013: 856). Man is always in interaction with the environment of which he is a part, so the relationship between man and the environment is intended as a reciprocal and interactive relationship

The spatial body can be considered an important qualitative component in human interaction with others. According to Fergus, the patterns of social interaction and the capabilities of the constructed space are important because there is a close relationship between social interaction and people's belonging to social and constructed environments (Fergas, 2000). In general, it can be said that interaction is the result of the collective presence of individuals in a specific body that is adjacent to each other. Lang considers spatial proximity as one of the fields of interaction and believes that when the fields of interaction are based on spatial proximity that mutual help is needed. Social interactions must indeed be formed entirely in the body, but just having the desired body, the necessary interactions are not done in perspective because interaction emphasizes the two bases of activity and meaning, and until these two concepts exist in the spatial body of the city, the interaction does not exist. It cannot be formed in the desired way.

URBAN OPEN SPACES

Social interaction depends on a sociable space to meet this need. Two general types of social interactions are known in public spaces, which include random social interaction, such as street conversation opportunities, and organized social interaction. Opportunity for random interaction is one of the valuable aspects of public spaces (Dines, et al, 2006). Public spaces of the city are not only a

physical concept but also include the action of citizen interactions and urban activities. (Sheikhi, 1396) Space and human interactions have an interaction with each other. Space with activities can take different forms. Space can be such that it causes the accumulation or dispersion of different activities and can allow the interaction of activities and people with each other or together provide or cause a complete separation of activities (Pakzad 46-47, 1385). Urban open spaces are a container for social interactions that have their characteristics. The public sphere has two physical and social dimensions. The physical dimension of the public sphere is considered to be a set of publicly or privately owned spaces that support or facilitate public life and social interactions. The social dimension makes it easily accessible to all cultures and strata through the activities and events that take place in these spaces and collections. Urban spaces should be interactive spaces. Interactive spaces are places for social, cultural, and artistic exchanges in a society, so with this attitude, interactive space can be named as a place for culture and a place to create vitality. Interactive spaces in traditional society cause the excellence and flexibility of space. They were urban (Ghaem Maghami 1373: 233). The interactive space has a concept beyond the physically visible body. Interactive spaces as the bed and place of human beings must meet all types of individual and collective needs (Fatehi Nobarian, 1390: 1-10). Therefore, the presence of various activities, human and physical interactions are the characteristics that are the perceptual and qualitative components of the place in open urban spaces and are one of the main criteria for measuring the quality of these places and is directly related to the sociability of these places (graph 1). Therefore, the presence of different activities, human and physical interactions are the characteristics that the perceptual and qualitative components of the mentioned places are directly related to (Figure 1).

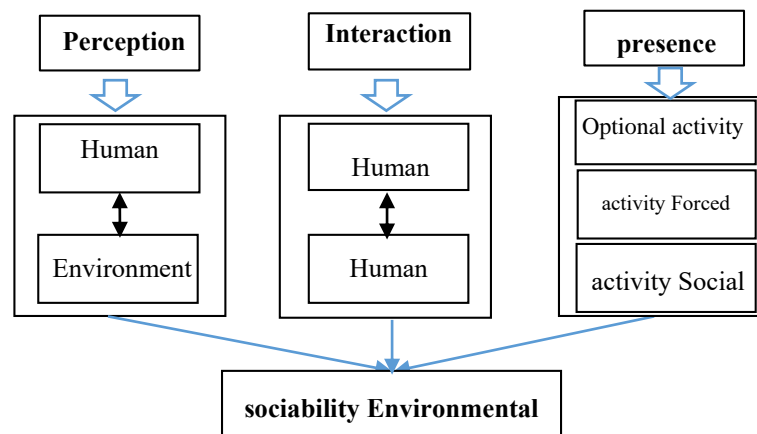


Fig. 1: Factors affecting the sociability of the environment. (Source: Alitajer, Sajjadzadeh, Saadati Waqar and Shahbazi 1394).

Squares are one of the main types of open urban spaces. It is a place where citizens go to spend their leisure time and see each other. A mechanic on a human scale and in proportion to personal perceptions and behaviors, and fact, it is the place that forms the most collective memories and the most effective urban space.

The city recognizes different areas of their city by it (Pakzad, 2006: 6). Squares, as the main urban spaces that are directly related to the formation and strengthening of citizens' interactions, are of special importance among urban spaces. Therefore, the quality of the field is of special importance and various characteristics are important in this regard (Table 1) .

Theorist	Indicators	definition
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Pakzad	Leisure on a human scale, fit with perception and pedestrian behaviors, collective memories, urban landmarks	A square is a place where citizens go to spend their leisure time and see each other. A mechanic on a human scale and in proportion to personal perceptions and behaviors, and fact, it is the place that forms the most collective memories and the most effective urban space. The city recognizes different areas of their city by it (Pakzad, 2006: 6)
Kunirsh	Flexibility, scalability and collective participation, multifunctionality, accountability, signage, unique identity	Urban squares are the meeting place and daily dates and scenes for people to show off, as well as they, provide a screen for performances, games, family events, celebrations, and a place for markets. The square is a space for political and social movements. These spaces must be flexible and scalable. Users should be emotionally addressed by visual attractions and inviting movements (Kunirsh, 1392: 7). Elsewhere, the two factors "space and space enclosure" describes the field as a space phenomenon, The ideal field should also provide ample space for comfortable passage, play, cycling, standing, and talking. The field must meet the general needs in a multifunctional way. Also, the field must show a unique sign to be able to create human identity and attachment to itself (Kunirsh, 2010)
Maurice James	Continuity and variety of activities	Squares in urban planning means conscious and coherent activity and were consciously created in three thousand years BC in Greece and also five hundred years ago in India and Egypt (Maurice James, 1347)
Goodman	The core and foundation of the city	There is no city without squares such as sales squares, plazas, and political forums (Goodman, 1960: 78)
Sultanzadeh	Specific physical and spatial values, presence and social interactions	Physical spatial values in squares such as enclosures, walls, space scale, etc. have strengthened the sense of place in squares and have created valuable spaces for presence and social interactions. (Sultanzadeh, 2001: 82)
Taghizadeh	Variety of activities, confinement	The square is usually the scene of those who stand next to it. In this way, each field is the result of the three main elements of the side (middle) (courtyard) and the activity whose collection defines the identity of the field (Naghizadeh, 1385: 17 and 16). The most important of them is openness to the proportions of one passage, the location of the intersection of several passages, special function permanently or at certain times, the presence of physical elements in the center in Iranian culture. It played a role and its naming has sometimes been attributed to the main activity of the field. The perimeter of the square was also appropriately occupied by uses, so what represented the square was its main function and confinement.
Pourjafar	Accumulation, different activities, special identity, separation from the surrounding space	Accumulation in the square In addition to crystallization in place, the possibility of gathering citizens has also depended on the absorption of various activities in space. The square space must have a special identity to be able to separate itself from the surrounding spaces. (Pourjafar, 1388)
Madanipour	Demonstration of collective life, peaceful coexistence	The square is a stage on which the play of collective life is exposed. It is a space in which we share with strangers, people who are not our relatives,

		friends, or colleagues. A space for politics, religion, trade, and sports; A space for peaceful coexistence and personal encounters "(Madanipour, 1379: 211)".
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Table 1: Characteristics affecting the spatial quality of urban squares based on the definitions of experts. Source: Authors

ACCORDING TO THE ABOVE TABLE, THE SPATIAL QUALITY INDICATORS OF URBAN SQUARES CAN BE COMPILED AS FOLLOWS

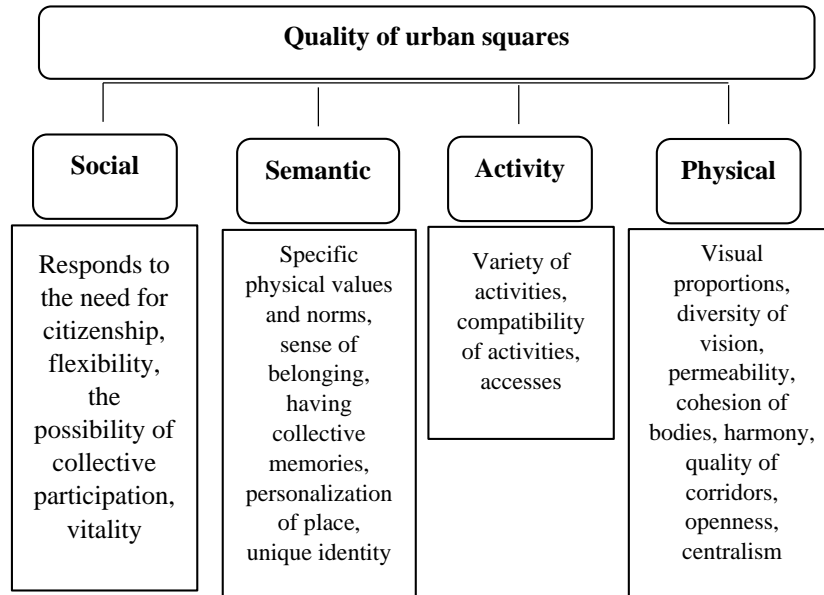


Fig 2. Spatial quality characteristics of urban squares. Authors' references

As mentioned before, since 2001, decisions have been made to improve the quality of Tehran's urban squares. Therefore, it was decided to restore the lost identity and quality of these places by making changes in the body of urban squares. The squares that have changed again during these years include Hassan Abad Square, Imam Hossein Square, and Valiasr Square. In this research, by examining the mentioned examples and the changes made, the issue has been examined whether the changes made have been able to strengthen the interaction with the landscape and increase the social interactions in these places?

RESEARCH METHOD AND MODEL

To answer the research question, a practical and effective computational approach has been adopted in the analysis of case samples. The studied variables of physical factors in the three mentioned squares are components of the spatial arrangement that are analyzed using Depth map software. The results of these quantitative analyzes of the physical properties of space provide a more accurate insight into the landscape of these important urban squares. Also, to investigate its impact on attendance and social and activity components in the squares, socialization maps prepared by the authors and the study of users' behavior at different hours of the day and night in the square have been used. The syntax method of space is based on the concept of spatial configuration, which is formed in the form of communication between interior architectural spaces and with emphasis on the relationship between space-social systems. This method shows that social relations are not only influential in the formation of the desired interactions but also are located in the heart of spatial systems (Hanson 2003). In this regard, configuration refers to a set of relationships between spaces that exist in a particular situation in time. Configuration may provide conditions for facilitating or limiting physical visual connections

(Rismanchian et al., 2013). In the method of space syntax, they describe the functions in space in a quantitative way and based on the numerical values extracted from this method, specific social and cultural interpretations about the desired space can be offered. In these analyzes, the spatial distribution, motion pattern, and presence in space are discussed. The indicators used in the following research are:

CONNECTIVITY

In this concept refers to the relationship between two spaces and the properties of space are examined in two modes of proximity and permeability. These spaces are defined and the relationships between them are generally described as "maps". Depth: The depth index has two types, relative and step. In relative depth (Step Depth), by moving from one space to another, one step is higher than one's origin, and the number of depths increases (from one step to another). In other words, it can be said that it shows the spatial hierarchy. The relative depth increases. The integrity of the space decreases. Also, the spaces at lower relative depths have more spatial relevance and greater permeability to them. (2007 Beck, 2012; 266, Hillier & Hanson, 1984; 108.) In the syntax method of space, the concept of depth is used to describe the distance of spaces from each other (Abbaszadegan, 2005).

INTEGRATION

This indicator is related to the depth and number of spatial connections and human movement in space. The smaller the number of spaces that are at a shallower depth than the space, the higher the degree of interconnection or integration of the space, and the spaces that have a high interconnection are considered to be available and widely used in the whole space. The average number of spaces that can reach space is one of the main features of interconnection (Turner & et al, 1999; Hillier 2007, 25, 37; Teklenburg & et al, 1993, 347; summer, 2015,:5)

Therefore, correlation in the syntax of space has a concept of relation, not distance, and it applies more than the concept of metric depth. Physical Accessibility Visual Metric Depth Visibility: Accessibility is examined by the metric depth and visibility Metric depth means checking the "depth" at metric intervals. The difference with step depth is that in this evaluation, the measurement criterion is measured parametrically (regardless of whether the space is changed or not); Vision is examined and analyzed (Hillie, 2007, 79) -Convex Convex Space and concave Conserve Space: Concave spaces are spaces that due to their failures, vision is limited to one axis and part of the space is out of sight, while convex spaces are fully integrated spaces and their design is such that one stands at one point. It has overlooked the integrity of the space. As mentioned, the concave space is less integrated than the convex space. (Vieira & Kruger, 2015, 23:12)

ISOVIS

Isovis is essentially the same visual cone that was first introduced by Benedict, and by this method, the perceptual dimensions of the environment were quantitatively described by humans (Benedikt, 1979). The range of vision, at each stage during human movement, is defined according to the natural range of vision as well as possible obstacles. The relationship between each component of spatial syntax measurement with the physical quality index of the squares shown in Figure 2 is discussed.

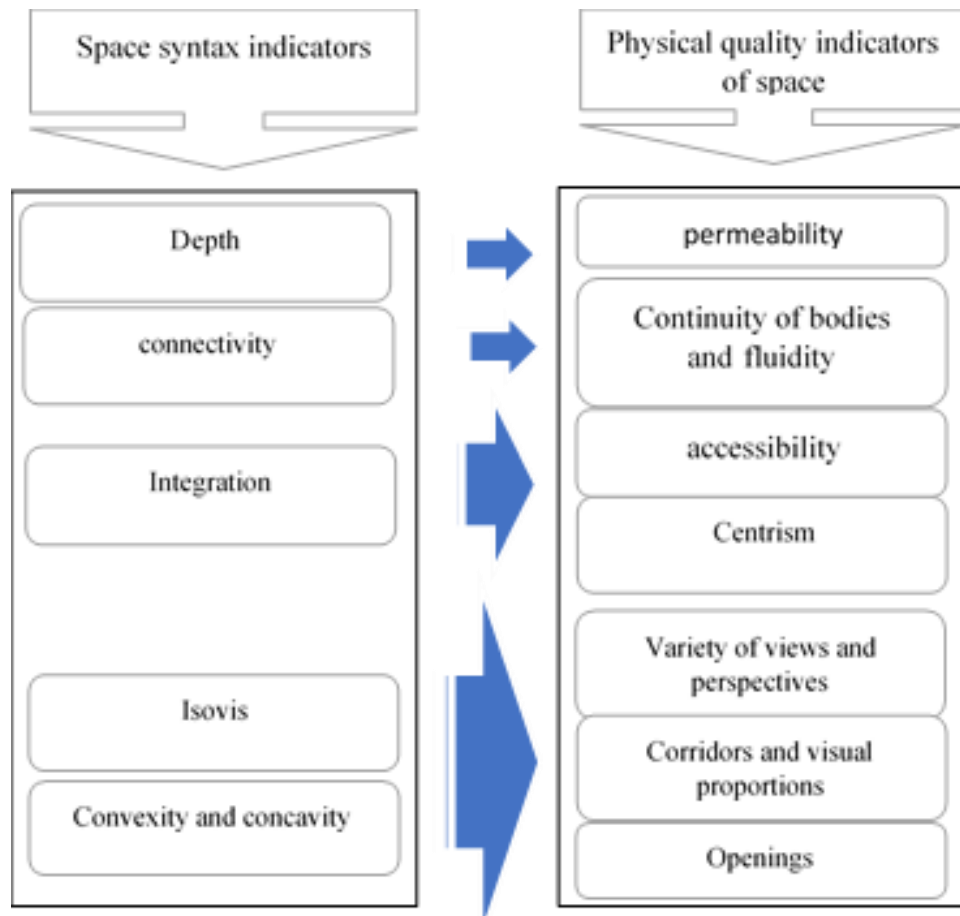








Fig 3: Measurement of physical spatial quality indices of the field by spatial syntax indices, Source: Authors

CASE STUDY

The following table introduces three square under study:


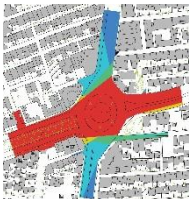
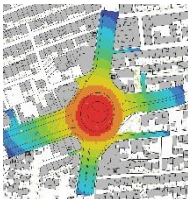
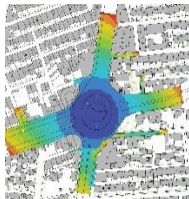

Table 3 Review of case studies of authors' sources				
Square	Changes made	Intervention goals	Photo before changes Aerial image after changes	Photo before changes
Valie Asr square	Two-story square - pedestrian transferred open space created in the center of the basement with the roof of the sky	Creating an urban plaza for social interactions, separating pedestrians and pedestrians with the idea of subduing pedestrians Deputy of Architecture and Urban Planning 2008	 The image was taken by Google Earth in 2020	 The image was taken by Google Earth in 2008

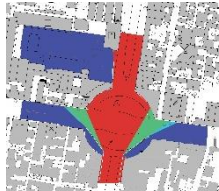
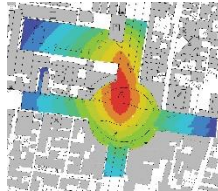
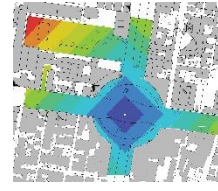
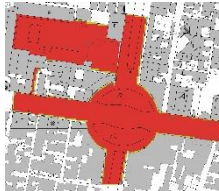
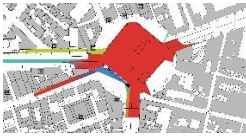
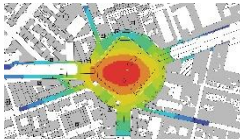
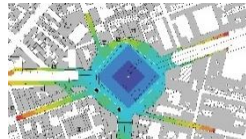

Hasan Abad	Restricting vehicles on the center axis of the square and pedestrians on both sides of the square, creating an underpass on the vertical axis for riding	Existence of valuable historical buildings around, restricting the passage of cars around the square, the presence of pedestrians in the center (Sultanzadeh, 313: 1390).	 The image was taken by Google Earth in 2020	 The image was taken by Google Earth in 2000
Emam Hossein	The rider has been completely moved down and the square space is completely dedicated to pedestrians.	Creating a collective place for holding religious ceremonies in front of Imam Hossein Mosque (Asadollahi, 2012) - Spatial planning and physical design of Imam Hossein Square and neighboring textures - Geometric and traffic improvement plan for the intersections of Imam Hossein (AS) Square (Site of the Municipality of the Thirteenth Region, 2/9/2010)	 The image was taken by Google Earth in 2020	 The image was taken by Google Earth in 2010

DATA ANALYSIS

In this section, based on the predicted process, first the syntactic components of the research are examined, and then the quantitative and numerical results and diagrams obtained from the syntax of the space are compared with the socialization maps obtained from the presence in the spaces and examined and analyzed. Been paid. Software data analysis: The tool used to measure the behavioral characteristics of the software is Depth map software, the data of which are quantitative tables and graphs that have been used for analysis. As mentioned, the purpose of this study is to investigate the impact of changes in Valiasr Hassanabad and Imam Hossein squares on increasing citizens' interaction with the environment. Therefore, in Table 4, assuming that the plan is completed and all vehicle movements Areas are limited in squares. It is considered that in Valiasr Square and Hassan Abad Square, the presence of cars is still evident around the square, which in turn reduces people's interactions with the environment, and has caused physical and visual restrictions for citizens.

Table 4 Graphs and numbers extracted from the syntactic components of the three squares. Source: Authors.

Squares	Isovis			Integration			Comparative depth			Connectivity		
												
Max												
Min												
Valiasr square												
	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min
	35996	32304	20309	0.296	.210	.122	138	60.72	0	4	3.76	1

Hassanabad square				
	Max Average Min	Max Average Min	Max Average Min	Max Average Min
	13520 9754 3571	.213 .150 .086	113 54.87 0	4 3.85 1
Imam Hossein square				
	Max Average Min	Max Average Min	Max Average Min	Max Average Min
	10607 5197 1935	.222 .158 .072	149 50.84 0	4 3.67 1

CONNECTIVITY

In this section, based on the predicted process, first the syntactic components of the research are examined, and then the quantitative and numerical results and diagrams obtained from the syntax of the space are compared with the socialization maps obtained from the presence in the spaces and examined and analyzed. Been paid. Software data analysis: The tool used to measure the behavioral characteristics of the software is Depth map software, the data of which are quantitative tables and graphs that have been used for analysis. As mentioned, the purpose of this study is to investigate the impact of changes in Valiasr Hassanabad and Imam Hossein squares on increasing citizens' interaction with the environment. Therefore, in Table 4, assuming that the plan is completed and all vehicle movements Areas are limited in squares. It is considered that in Valiasr Square and Hassan Abad Square, the presence of cars is still evident around the square, which in turn reduces people's interactions with the environment, and has caused physical and visual restrictions for citizens.

SPACE CONTINUITY

The degree of continuity of space, which is a necessary physical feature of urban interactive spaces, is measured by the syntactic component of the connection in the theory of spatial syntax. This indicates the favorable condition of the squares concerning this index. It also shows the space that can socialize the people of the community. It is in the possession of cars and therefore the fluidity and connection is poor and the use of solutions such as Valiasr Square has doubled this problem.

ACCESSIBILITY

This component can also be measured in space syntax theory by Integration index. As discussed in the theoretical literature, spaces that have a high level of access attract more people to them than other spaces, and people are more inclined to attend these places (Carrier, Pakzad, and Tulayi), so interaction in this space. On the other hand, spaces that have visual access also have better security and people are more comfortable there. By examining the correlation index in the above three fields, it can be concluded that the continuity and fluidity in the center of all three squares are at their highest, and on the other hand, this feature makes access to this space easy for all users from different parts of the field.

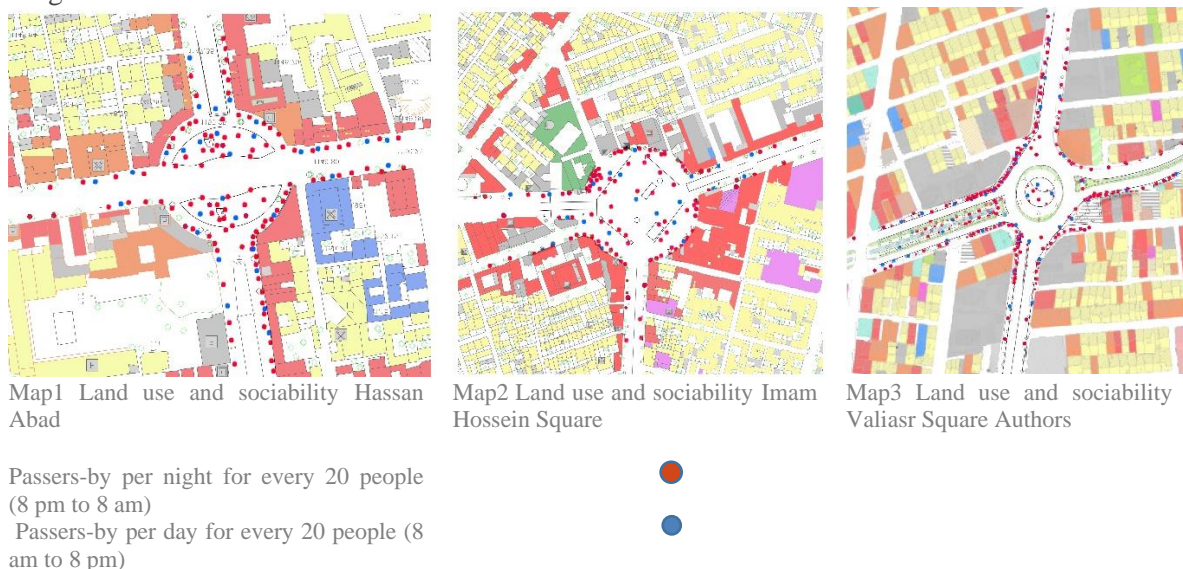
And it is possible. Also, the maximum Integration makes the view better from those points to other points. Therefore, field evacuation from cars can be an indicator of the quality of the squares.

Corridors and openings: One of the physical factors of interaction is the degree of concavity and convexity of space to achieve visibility and corridors. This factor can be investigated by Isovist in several stages, which according to the pedestrians considering the centers of the 360-degree cone square in the center of the square of view is suitable from other adjacent streets (Valiasr Square, Hassanabad Square, and Imam Square Hossein).

From the above observations, it can be concluded that the required indicators for the physical interaction, which include Integration, fluidity, access, corridors, and square openings, are all to a good degree in the absence of cars in the squares, and can be used if vehicles interfere with one. Separate from pedestrians by ascending or descending methods. Physically, squares were considered interactive spaces. Of course, car climbing methods can affect the corridors and openings of visibility and fluidity, and cohesion of the space and therefore are not recommended. However, in the current plans implemented in Valiasr and Hassanabad squares, the presence of cars is not limited in general, which makes physical and visual access difficult for users and has not been able to have a fundamental effect on the quality of the square.

REVIEW AND ANALYSIS OF SOCIAL MAPS AND PRESENCE

By examining the socialization maps of the current situation of the squares (after changes) which have been prepared from the registration of traffic and gathering of people in different parts of the mentioned squares for a week, it can be concluded that people due to special uses around the space. Squares are present in them and the parts that are physically intended for pedestrians in the center of the square (Imam Hossein and Hassanabad squares and in the center, Valiasr square below) are not welcomed by the public. It is also observed that at night, when the uses and activities around the square are closed, the presence of people in the spaces becomes much less. Also, with a random interview of 20 people in each of the squares, the reason for their presence in space was asked, the results of which can be seen in Figure 4.



The attendance rate in all three squares at its periphery is at a maximum, and after 9 pm when the uses around the square are closed, this attendance rate decreases sharply.

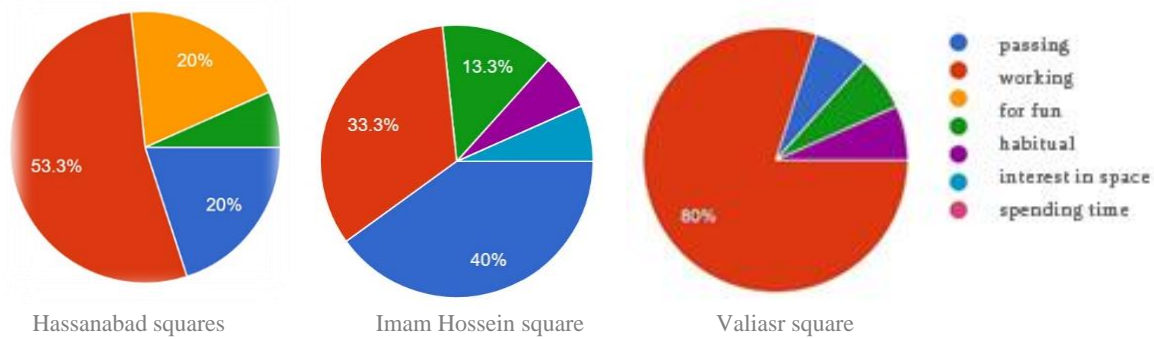


Fig 4: Percentage of people in the field. Writers' source

As mentioned above, the reason for the presence or passage of people in these squares or because of a special activity that, for example, in Imam Hussein Square due to the presence of the mosque, people come to this space to interact and perform religious ceremonies, but in Hassan Square, The maximum number of people (54%) are present in this square for doing business and commercial activities. Functional meanings resulting from peripheral activities and traffic are the most important factors for the presence of people in these places and special hyper-functional meanings in the form of collective memories due to cultural and social activities or participation and social interactions in these squares are not colorful and do not excuse people.

CONCLUSION

According to the theoretical literature discussed in this study, the quality of squares consists of various dimensions, including physical, spatial, activity, semantic, and ecological, and to achieve interaction with the landscape, all these qualities must be strengthened in the squares to These spaces are, as in the past, a place for social interaction. In the space arrangement method, the physical quality of three squares of Imam Hossein, Hassanabad, and Valiasr in an ideal state was examined in terms of interaction, which is the separation of passenger and pedestrian paths. Qualitative (Figure 3) including Integration Connectivity, fluidity and continuity, accessibility, Isovis, corridors, depths, and openness were examined to determine the degree of success of the squares relative to the interactive space. If the connecting car is removed in the center of these three squares, it will show the maximum value, which will give citizens easy access to space. Because in this case, it has a relatively equal distance from all routes. Also, the depth in the center of the square is very low compared to the average, which causes high permeability to the center of the square, and both of these characteristics cause the presence of different strata in the place.

Also, if the space is reinforced, the connection of different parts in these squares will be very high, which will help the fluidity and continuity of the space. Therefore, the elimination of separation of cavalry and pedestrians can be a very effective factor to strengthen the interaction and communication of citizens with space and people, but intrusions and seizures in the current situation in Valiasr Square by transferring pedestrians to the lower space, in addition to undue interference in fluidity and Field continuity have weakened pedestrian corridors and consequently reduced interaction with the field landscape. In Hassanabad Square, the interference of riders and pedestrians in the center of the square has caused a loss of interaction with the landscape of the square and also weakened the social interactions of citizens. The only successful example in terms of rider and pedestrian separation of Imam Hossein Square was that the lack of attention to fluidity and continuity of vision in physical design and the lack of attention to the hyperfunction meaning of the square throughout the year, could not be successful. In relation to Isovis, which identifies the corridors of view, it can be pointed out that

in the current situation in Hassanabad Square, car parks, in Valiasr Square, passing cars, and in Imam Hossein Square, high walls have disturbed fluidity and visual communication. By eliminating these factors, the fluidity and continuity of vision can be felt. Examining the sociability of squares and the presence of people at different hours of the day and night shows that the improvement of the body alone can not be a guarantee for the presence and sociability of today's squares. Paying attention to activities and meaning in urban spaces, especially squares, is a very important indicator. A quantitative and qualitative study of the three open squares designed in this study shows its lack because if the people present in the squares do not have a common memory in space and no special activity is done in space, they will not show interest in continuous presence in space, which causes People interaction, which should be considered in the redesign and improvement of urban squares.

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Assessing desirability of coastal public space with focus on gender*Golkou Giyahchi, Mojtaba Rafieian*

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ABSTRACT

Due to its multidimensional and complex nature, people perception is different for public space. Therefore, it is essential to identify the main factors and quantify their importance in order to invite a diverse range of individuals to enjoy their presence in an urban area. This study statistically analyses the quality of coastal public space, namely “Environmental Quality”. To this, two different methods have been implemented and compared, (i) SPSS and (ii) Structural Equation Modeling (SEM). The first method includes frequencies and statistics of centripetal orientation and inferential statistics that have been performed with non-parametric difference tests of Mann-Winnie and Crescal-Wallis. SEM, the second method, shows the causal relationships between variables. According to the results of this study, using different methodologies may lead to slightly different results and conclusions. For instance, SPSS results showed no meaningful relationship between gender and the quality of coastal open space while the analysis done by SEM indicated some differences between women’s and men’s opinions regarding the most important criterion. Furthermore, each method provided a different pattern on the priority of the components. In conclusion, to have a better understanding of stakeholders’ needs and requirements for coastal public spaces quality, it is important to implement a method that can consider the interconnection and hidden relationships between various factors.

INTRODUCTION

Public space is an essential component of urban structure that serves a variety of physical, social, and economic functions (Wojnarowska, 2016). “Publicness” could describe the quality discussion in public space (Akkar, 2005). According to the literature, “Public” can be defined as open to all and accessible to the whole society (Gove, 1976 and Makins, 1998 cited in Akkar, 2005: 2). Attention to the quality of public space is significant due to the opportunities created by a successful public space such as engagement and discussion, planned and spontaneous encounters, learning of diverse attitudes and beliefs (Crowhurst Lennard and Lennard, 1995, Lennard et al., 1987, Mehta, 2014).

Coastal public spaces as a result of i) environmental sensitivities which bring more sustainable considerations, and ii) social and economic attractions of coastal urban environments that make coastal cities more populated rather than other urban areas, are remarkably important. (Rahmat et al., 2016, Tonmoy et al., 2020) Therefore, it is highly important to identify main coastal public spaces features and quantify their importance in order to invite a diverse range of individuals to take pleasure in their presence in the coastal areas. It seems high-quality coastal public spaces are open to the whole society. This feature is crucial to defining an area as a public space (Belge, 2020).

According to Mehta (2014), several studies concerned certain target groups in public areas, for instance, a specific gender, racial groups, people with a disability, people belonging to a specific social class, and certain age groups such as the elderly people. Based on Mehta’s (2014) findings, women and men had different perceptions. Women found the spaces more integrated and enjoyable but less safe. Women felt that public spaces are not open and accessible enough. Moreover, they believe that the design and arrangement of spaces are less suited. Women were more dissatisfied with their safety in urban public

spaces, particularly at night. The majority of public space studies focus on terrestrial places and accessibility while coastal areas take a dimension that notices other issues such as maritime culture and territorial authority besides the previous ones (Craghan and DeFilippis, 2000). Attia and Ibrahim (2018) investigated the accessibility and inclusivity of public space from regeneration lenses on the waterfront in informal areas. Piyapong and others (2019) worked on the roles of public spaces in promoting community relations and a sense of place in a coastal community. Moreover, libraries were considered a public space and studied by Suharso and others (Suharso et al., 2019). Another study noticed the extent of privatized public space in the Durban Inner city coastal area (Subramoney, 2016). Others examples are the coastal areas of Kalk Bay, St James and Fish Hoek in the Cape Peninsula, coastal public space in Nha Trang city, and the coastal park in Mersin are the other cases (Belge, 2020, Dyer, 2014, Thi Viet Ha and Thi Bich Ngoc, 2018). Ujianto (2019) formulated the design of tourism public space in a seaside area with attention to the image of an area and its public space quality. In another study, the role of public access in willingness to pay (WTP) for coastal land conservation was investigated (McGonagle and Swallow, 2005). Eventually, from a systematic and historic point of view, Geng et al. (2020) studied Tianjin, a coastal metropolis in Northern China. Their study showed how the continuation mechanism study on urban public space landscapes can help to provide a better understanding of their evolution patterns.

Cities and urban environments were traditionally designed and planned as locations for men's presence, prior to the introduction of a gender equity approach to urban space design and planning (Rezazadeh and Mohammadi, 2013b). However, it is important because almost fifty percent of society has been made by women (Group, 2020). Therefore, the identification of women's points of view becomes essential and necessary (de la Torre-Castro et al., 2017). Based on United Nations and World Bank, gender equality provides survival of cities and economic growth (www.un.org, 2009). Thus, the current study aims to answer the question "whether gender consideration has an impact on coastal public space desirability perception?" Moreover, to provide a better insight, the efficiency of two different methods has been tested and compared the effect of "Internal interactions" on the final results.

METHOD AND MATERIAL

Methodology

Using two quantitative methods and survey techniques, a combination of 286 face-to-face and online questionnaires (due to Covid-19 restrictions) were analyzed to examine the gender impact on the desirability of coastal public spaces. Statistical Analysis relies on frequencies and statistics of the tendency to the center (mean, median, etc.) whilst Structural Equation Modeling (SEM) combines factor analysis and multiple regression analysis, and it is used to analyze the structural relationship between measured variables and latent constructs. The statistical analysis method is implemented at two levels of descriptive statistics, including frequencies and statistics of centripetal orientation (mean, median, etc.) and inferential statistics which contain non-parametric difference tests of Mann-Winnie and Crescal-Wallis. In the second method, to investigate the indirect impacts on pre-established causal linkages, the gathered data is analyzed by SEM. SEM is a multivariate approach for testing and evaluating multivariate causal linkages that are increasingly being used in scientific research (Fan et al., 2016). The main difference between these two models is in variable relation analysis. Fig. 1 presents that 60 percent of studied people are men (160 individuals) and 40 percent are women, 108 people.

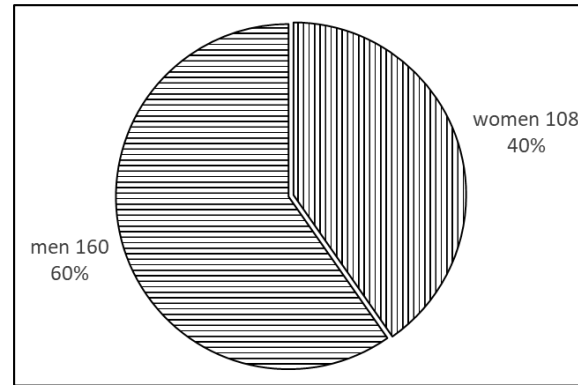


Fig 1- Descriptive statistics of sample society

Mean

Mean provides information about variable distribution and this value illustrates the entire distribution. Representative value of mean is compared to make comparisons between two or more groups (Mishra et al., 2019).

Kolmogorov–Smirnov test

For testing the normality of data, Kolmogorov–Smirnov test is utilized widely. Normality tests can be calculated in the statistical software “SPSS” (Mishra et al., 2019). For small sample size ($n < 50$), z value ± 1.96 is sufficient to establish normality of the data (Ghasemi and Zahediasl, 2012). However, medium-sized samples ($50 \leq n < 300$), at absolute z -value ± 3.29 , concludes the distribution of the sample is normal (Kim, 2013).

Mann-Whitney U Test

The Mann-Whitney U test is used to compare differences between two independent groups when the dependent variable is either ordinal or continuous, but not normally distributed (Karadimitriou et al., 2018).

Loading

Loading shows the reliability of variables. In addition, this criterion depicts how much variables are affected by the latent variable in reflective models (Davari and Rezazadeh, 2017).

Coastal public space quality

This study considers seven features of coastal public spaces defined by different urban experts (Garau and Pavan, 2018, Kriken et al., 2015, Rafieian et al., 2012, Tabibiyan and Mansuri, 2014). As most studies have been related to public space in non-coastal cities, the current study has combined the public space quality features with coastal areas considerations such as “Sea protection against construction” and “Surface water and wastewater treatment” (Hataminejad et al., 2012, Kriken et al., 2015, Rafieian and Khodayi, 2009). Tables 3 to 9 present the list of factors and indicators that have been considered and examined.

RESULT AND DISCUSSION

Result

Table 1 presents the Environmental Quality Variable Normal Assumption Test (Kolmogorov–Smirnov) in Public Space analysis and the results of the I-Whitney U test for gender and indicators of environmental quality variables in public space are summarized in Table 2. According to Guo et al.

(2018) when the level of significance is less than 0.05, the distribution of dependent variables is not normal and nonparametric methods need to be implemented. Therefore, instead of an independent t-test, a non-parametric, the “I-Whitney U test” is used to measure the difference between gender variables and environmental quality indicators in coastal public space.

Environmental quality in coastal public space	parameter
Sample size	268
Mean	4.16
The standard deviation	0.69
Kolmogorov Smirnov Z Statistical value	1.78
Significance level	0.003

Table 1: Environmental Quality Variable Normal Assumption Test (Kolmogorov-Smirnov) in Public Space

Statistics	Statistics Z	Sig
Efficiency	-0.94	0.35
Sociability	-1.29	0.19
Meaningfulness	-0.75	0.45
Permeability	-0.76	0.45
Sustainability	-0.09	0.92
Diversity-Flexibility	-0.44	0.65
Proportion- Compatibility	-0.84	0.4
Environmental quality	-1.73	0.08

Table 2: Mann-Whitney U Test for gender and indicators of environmental quality variables in public space

Table 2 depicts the I-Whitney U test for gender and indicators of environmental quality variables in public space which is done by SPSS. As the significance level of the I-Whitney U test is higher than 0.05 in all cases, it seems the differences between gender variable and environmental quality components are negligible. One can conclude that gender segregation has no impact on public society opinion toward the desirability of coastal public space quality. However, this result is not compatible with the findings of some other studies (Goghait et al., 2014, Pozarny, 2016, Rezazadeh and Mohammadi, 2013a). Therefore, the more indepth SEM method has been implemented which considers the latent relationships between dependent and independent variables. The results of SEM analysis are shown in Fig. 2.

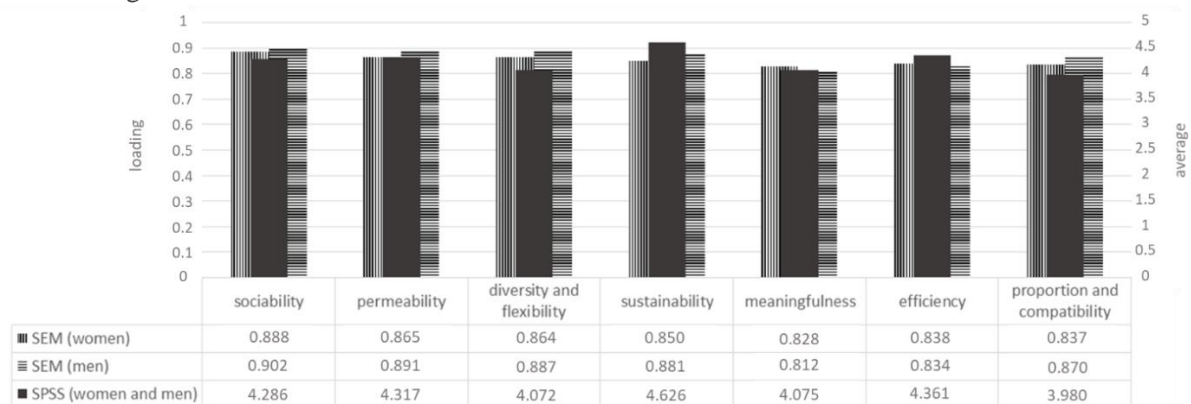


Fig. 2: coastal public space indicators priority

Result of coastal public space quality assessment using SPSS and SEM

Fig. 2 depicts the loading of different qualities of coastal public space which is analyzed by the SEM method and the importance of them which statistical analysis (SPSS) calculates. There are differences

in the priority of coastal public space quality variables when they are analyzed by two different approaches.

Based on statistical analysis, sustainability has the highest measure of importance, 4.62 out of 5. The second highest mean belongs to efficiency with 4.36 out of 5. With a slight change, the permeability importance mean is 4.31. The importance means of sociability, meaningfulness, diversity-flexibility and proportion and compatibility are 4.28, 4.07, 4.07 and 3.98, respectively.

According to SEM results, by changing the environmental quality of coastal public spaces, sociability changes more than other variables. The measure of changes in this variable for women and men are 88% and 90%, respectively. In women's opinion, the next most affected variables are permeability and diversity-flexibility with 86 percent. Whilst, men believe that only permeability exists in the second rank with 89%. From this gender group outlook, diversity-flexibility and sustainability are affected by environmental quality in 88 percent. The percentage of sustainability in the women group is 85, less than men's one. With an exception which is proportion-compatibility, the desirability of coastal public spaces reflects in other variables less than 83 percent in both groups. The status of proportion-compatibility is reflected in coastal public space quality at 87% from men's point of view.

Sociability

According to the results shown in Table 4, there are differences in both percentage and priority of sociability sub-indicators from women's and men's points of view. Women believe that the sociability of coastal areas reflects in safety and night security in 77 percent which is higher than other related sub-indicators. Whilst, men choose climate comfort as the most important sub-indicator in sociability, which shows the quality of coastal public space in 81 percent.

Variable	Women	Men
Safety	0.771	0.728
Security	0.768	0.647
Night security	0.771	0.714
Presence of different social strata	0.749	0.448
The quality of children game space	0.603	0.695
Climatic comfort	0.735	0.809
Acoustic comfort	0.711	0.698
Interaction space	0.696	0.626

Table 1: SEM loading of sociability's variables (Firuzjah Shokri et al., 2017, Garau and Pavan, 2018, Hataminejad et al., 2018, Lotfi et al., 2012, Rafieian and Khodayi, 2009, Tabibiyan and Mansuri, 2014)

Permeability

According to Table 4, the sub-indicators' rank in permeability is the same in both social groups. There are just some differences in the sub-index loading. The most significant factor which reflects permeability status in coastal public spaces is "pavement and roadway quality", at around 85 percent in both groups. The most noticeable difference is in "walking and biking possibility". Women and men express that environmental quality in coastal public space can define the changes of this sub-indicator roughly 68 percent and 47 percent, respectively.

Variable	Women	Men
Walking and biking possibility	0.680	0.471
No space confusion	0.748	0.768
Pavement and roadway quality	0.842	0.860
Landscape Visibility	0.822	0.842

Table 2: SEM loading of permeability's variables (Hataminejad et al., 2012, Kriken et al., 2015, Lotfi et al., 2012)

Diversity and flexibility

Table 5 provides some details about diversity and flexibility's sub-indicators percentage and their priority in both social groups. In the women group, diversity and flexibility of coastal public space are reflected in "services to disabled" up to 83 percent, meanwhile, this measure is 75 percent in the men group. On the other hand, more men consider "open space flexibility" than women. Loading of this sub-index is 83 percent in the men group and 80 percent in the women group.

Variable	Women	Men
Activity variety	0.698	0.671
Open space flexibility	0.799	0.830
Services to disabled	0.830	0.751
Visual variety	0.772	0.764
Space variety	0.824	0.822

Table 3: SEM loading of diversity and flexibility's variables (Garau and Pavan, 2018, Kriken et al., 2015, Rafieian and Khodayi, 2009, Rafieian et al., 2012, Tabibiyan and Mansuri, 2014)

Sustainability

Based on demonstrated results in Table 6, sustainability in this study consists of eight sub-indicators. Moreover, the opinion of women and men differs in percentage and priority of the sub-index. "Surface water and wastewater treatment" are considered up to 91 percent and 88 percent by women and men, respectively. According to women's opinions, "waste collection" reflects coastal public space quality in 88% whilst this measure is 82% in the men group. At the same time, more men notice "sea protection against construction" than women; there is a 17 percent difference in these sub-index loadings.

Variable	Women	Men
Urban infrastructures	0.694	0.724
Urban services	0.812	0.763
Open spaces	0.680	0.740
Sea protection against construction	0.668	0.839
Environmental protection	0.854	0.711
Surface water and wastewater treatment	0.915	0.887
Waste collection	0.885	0.82
Soil, water and air clearness	0.850	0.829

Table 4: SEM loading of sustainability's variables (Garau and Pavan, 2018, Hataminejad et al., 2018, Hataminejad et al., 2012, Kriken et al., 2015, Rafieian and Khodayi, 2009, Tabibiyan and Mansuri, 2014)

Meaningfulness

Table 7 depicts this study considers four variables in order to investigate meaningfulness importance in coastal public space desirability. Based on achieved results, the percentage and priority of variables in this area differ in the two studied groups. "Identity" is the most important indicator in the meaningfulness context from the women group's points of view (82 percent), while men notice "cultural values conservation" the most (79 percent).

Table 5: SEM loading of meaningfulness's variables (Kriken et al., 2015, Rafieian and Khodayi, 2009, Tabibiyan and Mansuri, 2014)

Variable	Women	Men
landmarks	0.785	0.767
Visual beauty	0.639	0.623
Cultural values conservation	0.728	0.791
Identity	0.819	0.781

Efficiency

Table 8 illustrates efficiency consists of three sub-indicators: "lack of limitation in the use of space", "positive sense experience" and "reasonability of costs". There is no difference in the priority of the sub-index. The only difference is in percentages. Women consider "Positive sense experience" as the most significant sub-index of efficiency (88 percent) whilst in the men group, this sub-indicator percentage is 82. It should be noticed that efficiency is more important for women than men in general.

Variable	Women	Men
Lack of limitation in use of space	0.809	0.744
Positive sense experience	0.880	0.842
Reasonability of costs	0.859	0.808

Table 6: SEM loading of efficiency's variables (Rafieian et al., 2012)

Proportion and Compatibility

The sub-indicators of proportion and compatibility are shown by Table 9. Although there are differences in percentage and priority of sub-index, it is evident there are some similarities. For instance, for both groups, apparent features are more significant. "Form and size coordination of buildings" reflect coastal public space quality up to 86 percent in men group, and for women, "buildings appearance compatibility" is the most considerable characteristic (84 percent). The second most important factor for women is "space proportion" with 82 percent, while for men, the next most significant sub-indicator in proportion-compatibility is "color and outside coordination of buildings", as proportion-compatibility reflects this variable in 82 percent.

Variable	Women	Men
Form and size coordination of buildings	0.733	0.866
Color and outside coordination of buildings	0.711	0.823
Activities compatibility	0.742	0.702
Buildings appearance compatibility	0.845	0.744
Scale compatibility	0.817	0.704
Space proportion	0.826	0.770

Table 7: SEM loading of proportion and compatibility's variables (Kriken et al., 2015, Rafieian et al., 2012)

Discussion

Based on Fig.2, according to the results of SEM analysis, coastal public space quality affects sociability more than other features, while statistical analysis demonstrates that sociability is the fourth important factor in the desirability of coastal public spaces.

Moreover, before running the model in SmartPLS and using the SEM approach, permeability is in the third rank of coastal public space quality indicators with a mean of 4.3 out of 5. After Smartpls calculation, it comes up to the second level. From women's and men's points of view, it is the second most significant indicator in a high-quality coastal public space, with 86 percent and 89 percent, respectively.

Also, although based on SPSS analysis diversity-flexibility variable has a less important role except for proportion- compatibility, according to the results of SEM which is implemented in Smart PLS, it has the third rank from women's point of view (86%) whilst in men's opinion, it is at the fourth level (88%). Other studies prove the importance of diversity-flexibility too. This indicator has been known as a significant index in public space which strongly impacts the vision of the area (Thi Viet Ha and Thi Bich Ngoc, 2018).

Sustainability has been widely considered in different studies (Gargiulo et al., 2020, Ortiz-Lozano et al., 2005). As statistical analysis considers the mean of measures which have been given by people,

naturally sustainability stands in the first rank based on SPSS calculation, since people pretend that sustainability sub-index is very significant in coastal areas. However, by SEM and considering the latent relationship between indicators, sustainability drops to the fourth level and third rank from women's and men's points of view, respectively.

One of the most arguable features of public spaces is "Meaningfulness". Especially, wherever as a result of tourism activities, two various approaches form: conservation and development (Thi Viet Ha and Thi Bich Ngoc, 2018). Based on the findings of the current study, if researchers just continue men-oriented planning in coastal public spaces, they will notice this indicator less than its real importance. Because men consider meaningfulness sub-indicators less than women. Therefore, the SPSS is not able to show meaningfulness's correct position among other coastal public space quality indicators in this case. The SEM's results are really close to Yang and Tian's (2020) findings which emphasize marine identity and culture.

Efficiency apparently seems the second most important coastal public space quality indicator from the statistical analysis approach. However, SEM illustrates that although it benefits from a high mean, coastal public space quality reflects in this indicator less than others. For both women and men, it stands on the sixth level.

The proportion and compatibility of public spaces, especially coastal public spaces, are one of the most challenging features of this kind of space. Conflicts between individual group interests and community interests have been observed in these features (Thi Viet Ha and Thi Bich Ngoc, 2018). Based on the findings of SEM, men pay more attention to the characteristics which are related to proportion and compatibility. The results of the current study prove the findings of other studies which focused on the negative impact of industrial activities and their pollution (Ortiz-Lozano et al., 2005, Wu et al., 2020). Both gender groups believe that the proportion-compatibility variable reflects in "activities compatibility" is between 70 and 74 percent.

CONCLUSION

The impact of gender factors on coastal public space desirability has been investigated and evaluated using two different methods, (i) statistical analysis (ii) structural equation modeling. The indicators' importance and the effect of gender difference on a high-quality coastal public space definition are examined.

According to the findings of this paper, statistical analysis and difference test methods are not able to show a correct view of the society's realities in case of coastal areas and public space quality. Instead, SEM, as a result of considering latent relationships between variables, reaches a slight difference and more reliable results.

Sociability has been identified as the most effective indicator of coastal public space by SEM, while SPSS analysis showed that sustainability was the most considerable factor. Moreover, it is recommended to urban managers and decision-makers in urban areas notice the effect of gender on stakeholders' opinions. Specifically, it becomes more essential when social diversity is the goal of an urban project.

This study illustrates that in order to increase the social diversity of coastal public spaces, specifically in man-oriented planned areas, urban planners and designers need to work on the meaningfulness and efficiency indicators (Fig. 2). What has been found out more noticeable than the primary results is that women are not aware of coastal public space sufficiently. There are different strategies to raise women's awareness that should be taken. Relying on a study done in Los Angeles in 2001, media is more effective than coastal education campaigns in climbing perceptions of environmental quality (Pendleton et al., 2001).

In order to achieve a comprehensive and profound understanding of coastal public space desirability, it could be useful to separate different aspects of coastal areas from public space ones. Specifically, it is necessary to be aware of other aspects of coastal public space quality which are environmentally special and other researchers recommend notice (Lins-de-Barros, 2017, Pérez-Albaladejo et al., 2016). Eventually, according to this study's findings, if indicators are analyzed by SEM, it would be possible to obtain the details of their direct and indirect effects.

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A review of implementation challenges of the plan called "Renovation and Rehabilitation of deteriorated urban area" in Abkooh neighborhood of Mashhad

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ABSTRACT

Despite the several plans developed for Abkooh, this 400-year-old neighborhood in Mashhad is yet being developed and renewed and have often failed in the implementation phase of its several plans. This paper identifies the implementation challenges of the latest of these plans, which has been approved in 2016 and is called "Renovation and Rehabilitation of Abkooh deteriorated urban area". In this regard, firstly, based on the urbanism literature in general and urban design literature in particular, factors affecting the implementation of urban design and neighborhood development plans have been identified. Secondly, the approved plan of Abkooh neighborhood has been evaluated addressing factors of the first step. Eight factors in the first level; including "Conditions and political views of the design context", "Identifying effective forces in design", "structure of management-planning systems", "Economic considerations", "Social participation", "Legal considerations", "Compliance with design context and existing documentation" and "Institutional structure and human resources" and 29 factors in the second level have been identified. Afterwards, the importance of these factors in relation to the steps of the urban design process has been investigated based on the opinion of a number of experts. In the next step, different project managers' views regarding each of the aforementioned factors have been obtained and implemented through deep interviews and qualitative content analysis using MAXQDA 2018. The content of the project's documents and reports have also been analyzed qualitatively, and in addition to observations, the approved plan has been analyzed based on the implementation components. Finally, strategic proposals have been presented to suggest modifications to the project's structure. Considering that Abkooh neighborhood is an example that has faced several challenges in implementing its approved plans, the results of this paper could prove to be effective regarding the process of urban design and neighborhood development plans.

Keywords: Implementation, Urban design, Renovation and Rehabilitation, Abkooh neighborhood of Mashhad

INTRODUCTION

With the study of Pressman and Wildavsky in the early 1970s, the literature on implementation began to emerge, raising questions such as how implementation could regulate the planning process by conceptualizing and measuring its feasibility (Golkar, 2011; quoted in Saghafi Asl et al., 2014, p.186). Despite this long history in the formation of this concept, the failure to implement urban plans has long existed as an important and significant obstacle to achieving effective planning (Saghafi Asl et al., 2016, p.188).

In Iran, usually the consultants prepare the plan and leave the implementation to other organizations and bodies, which due to the unrealistic plans and lack of attention to their implementation aspects, face problems in the very early stages of implementation (Bahrainy, 1998, p.430). The most important aspects of the non-implementation of urban design projects in Iran include poor quality of execution, long execution time or even non-execution of plans, poor project management of project preparation and in many cases preparing parallel plans or the difference between the implemented plan and the prepared plan (Safavi, 2011, p.255).

One of the main challenges of Mashhad, which has attracted the attention of city authorities for decades and numerous decisions have been made in this regard, is the rural area of Abkooh, which has been integrated over time in the city of Mashhad.

THE CONCEPT OF IMPLEMENTATION AND ITS POSITION IN URBAN DESIGN

Different scholars have used different terms on the concept of implementation, some equate this stage with feasibility studies and some consider it as implementation or achievement stage. Others equate it with bringing projects closer to reality, while some equate materializing and putting projects into action with the word implementation (Alikhani, 2012, p.31). One of the definitions that deal with the implementation aspect of the project is the process of operationalization and achieving the content and goals of a development plan (Zekavat, 2011; quoted in Alikhani, 2012, p.31). Definitely the interpretation of a word with different meanings can create different and sometimes wrong understandings in the applied field (Alikhani, 2012, p.31).

Implementation is defined by two criteria of effectiveness and efficiency. Effectiveness means how far a plan or project has reached its goals. Efficiency is the ratio between the input and output of a project or the ratio of resources spent and the outcome of the work. The problem here is why urban development projects do not have the presumed effectiveness and efficiency, in other words they usually do not achieve their goals and their outcomes are often dissatisfactory compared to the resources spent to achieve them (Rezaei, 2018, p.48).

Implementation from Cowan's (2005) point of view is occurrence, completion of program and policy (Saghafi Asl et al., 2014, p.184-185). It's a specific set of design activities to implement an activity or program with known dimensions (Fixsen et al., 2005; quoted in Saghafi Asl et al., 2014, p.185). Nutt defines feasibility as a process and a "Framing Activity" that has a special place in planning and design. He defines feasibility as a set of activities that influence the flourishing of creative ideas and designs (Nutt, 2007; quoted in Saghafi Asl et al., 2014, p.185).

Most general models suggest step-by-step procedures that begin with problem recognition and end with post-implementation evaluation; but according to Lang, urban design is a controversial process of forming ideas and testing them on a round-trip basis. He presents the place of feasibility in the urban design process as Figure 1 (Lang, 2007, p.41). In addition, Moughtin presents the four steps of a project as shown in Figure 2 (Moughtin, 1999, p.173).

Bahrainy introduces the "implementation forecasting" stage in the urban design process (Figure 3). The task of this stage of the process is to fully anticipate the means and tools of project implementation. This stage is in fact a test of the project's executive adequacy before the project implementation (Robinson, 1997; quoted in Bahrainy, 1998, p.429). Factors that are effective in predicting implementation include legal structure, financial resources, political-administrative structure, manpower, legal fields and technical field (Bahrainy, 1998, p.432).

Pakzad's proposed urban design process includes nine stages (Figure 4) and in his opinion, this whole process is valid and efficient when its implementation is considered in all stages. In fact, the problem in the implementation stage makes the whole process problematic (Pakzad, 2006, p.166).

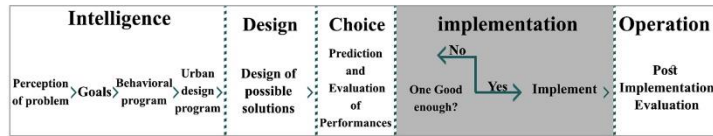


Fig. 1: The place of implementation in the urban design process (Lang, 2007: 41)

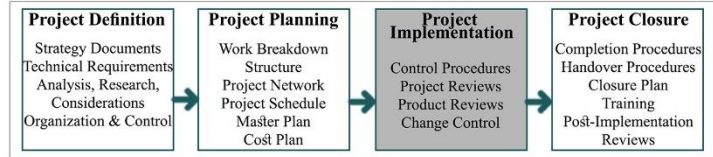


Fig. 2: The place of implementation in the urban design process (Moughtin, 1999: 173)

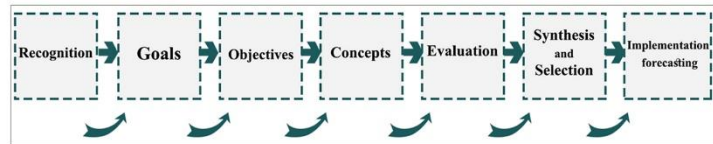


Fig. 3: The place of implementation in the urban design process (Bahrainy, 1998: 442)

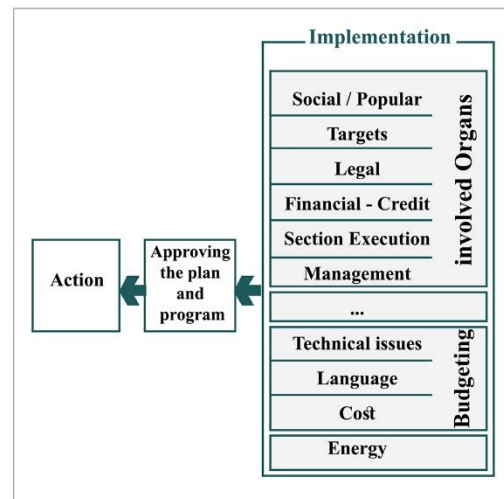


Fig. 4: The place of implementation in the urban design process (Pakzad, 2006: 166)

CASE STUDY RECOGNITION

Abkooh is located seven kilometers west of the holy shrine of Imam Reza in zone 1 of Mashhad municipality (a zone with development indicators) and is one of the oldest neighborhoods of this city, which was used to be a village near the city center of Mashhad, where most of its inhabitants worked in the lands endowed by Imam Reza. With the development of Mashhad to the west, this neighborhood was located in the middle of the new urban area and while maintaining its organic structure, it creates a distinct zone in the middle of its surrounding residential areas. In the early 1980s, Dastgheib Boulevard runs through the middle of the neighborhood to extend Abkooh Street toward Sajjadshahr neighborhood, dividing it into northern and southern sections (Figure 5), two parts that are functionally separated from each other over the years. In the last decade, Mashhad Municipality has made efforts to change the conditions of this neighborhood, which has resulted in the formation of a large area of vacant lands and the departure of a significant portion of its residents (Rezaei and Fazel Madani, 2019, p.80). (Figure 6)

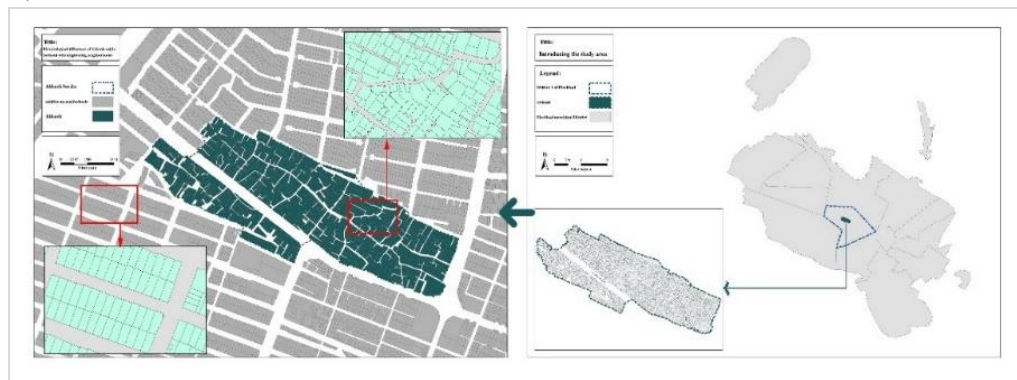


Fig. 5: Location of the case study in Mashhad (Source: Authors)



Fig. 6: Images of abandoned parcels in the study area (Source: Authors)

Renovation and Rehabilitation plan of Abkooh neighborhood (approved in 2016) is the last approved plan for this neighborhood and is the third plan that has been prepared from the revision of previous plans in completing and moving towards greater implementation. The first plan, called *the strategic plan for reconstruction and renovation of Abkooh neighborhood*, was prepared in 2006 by Naghshazin Shahr Consultant. Then, according to the management structure in order to implement the mentioned strategic plan with a new approach, in 2011 Farnahad Consultant prepared *Abkooh urban quality improvement plan*. Due to the change in the management structure and with the aim of more flexibility to make the proposed plan More implementable, the final and current plan (*renovation and rehabilitation of Abkooh deteriorated urban area*) approved by Shahr Ziba Khavaran Consultant (Abkooh neighborhood development document, 2020, p.304). The vision of the mentioned plan claims that by emphasizing the identity of Abkooh, it will be an active and vibrant part of the city, which with its favorable living conditions and activities is functionally and physically similar to its surrounding neighborhoods (Abkooh neighborhood development document, 2020, p.327). Figure 7 shows Abkooh during the course of interventions in these three plans.

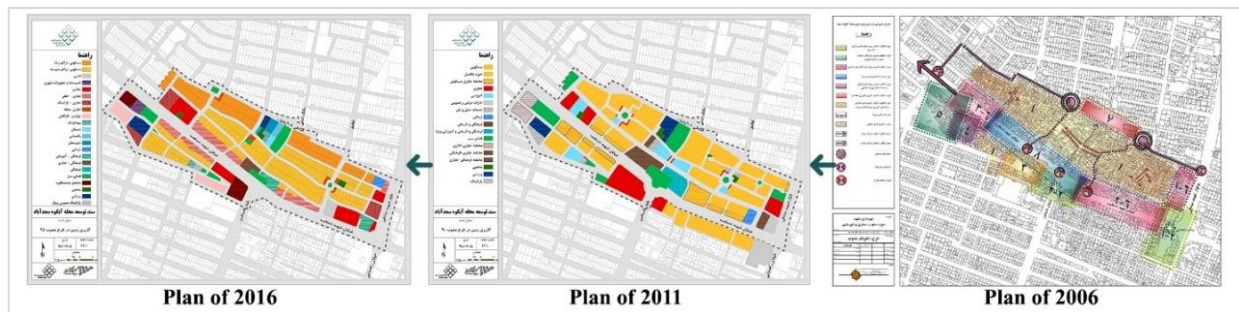


Fig. 7: The course of interventions in Abkooh from 2006 to 2016 (Abkooh neighborhood development document, 2020)

IDENTIFYING AND EVALUATING FACTORS AFFECTING THE URBAN DESIGN AND PLANNING PLANS IMPLEMENTATION IN THE CASE STUDY

In this part of the research, first, with the help of documentary research method, an attempt has been made to identify the factors affecting the implementation of urban design and neighborhood development plans. For this purpose, after the initial conceptual labeling of researchers' theories, the accuracy and validity of the labels have been ensured in consultation with two experts. Finally, from summarizing the views of various theorists, eight factors at level 1 and 29 factors at level 2 have been extracted to assess implementation as shown in Figure 8.

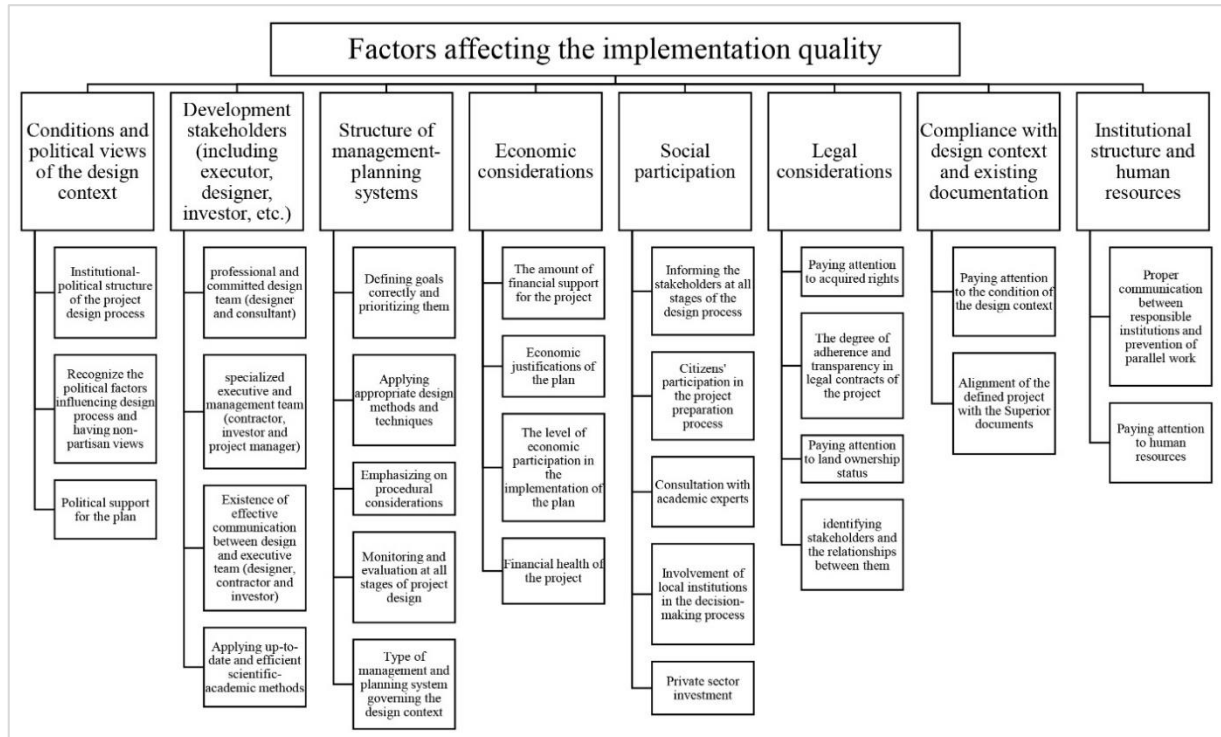


Fig. 8: Factors affecting the Implementation of urban design and neighborhood development plans (Source: Authors)

In order to identify the impact of each of the factors affecting the urban design and neighborhood development plans implementation in each step of the urban design process based on the Likert scale, scientific experts (faculty members and teachers of the urbanism department of Ferdowsi University of Mashhad) have been consulted.

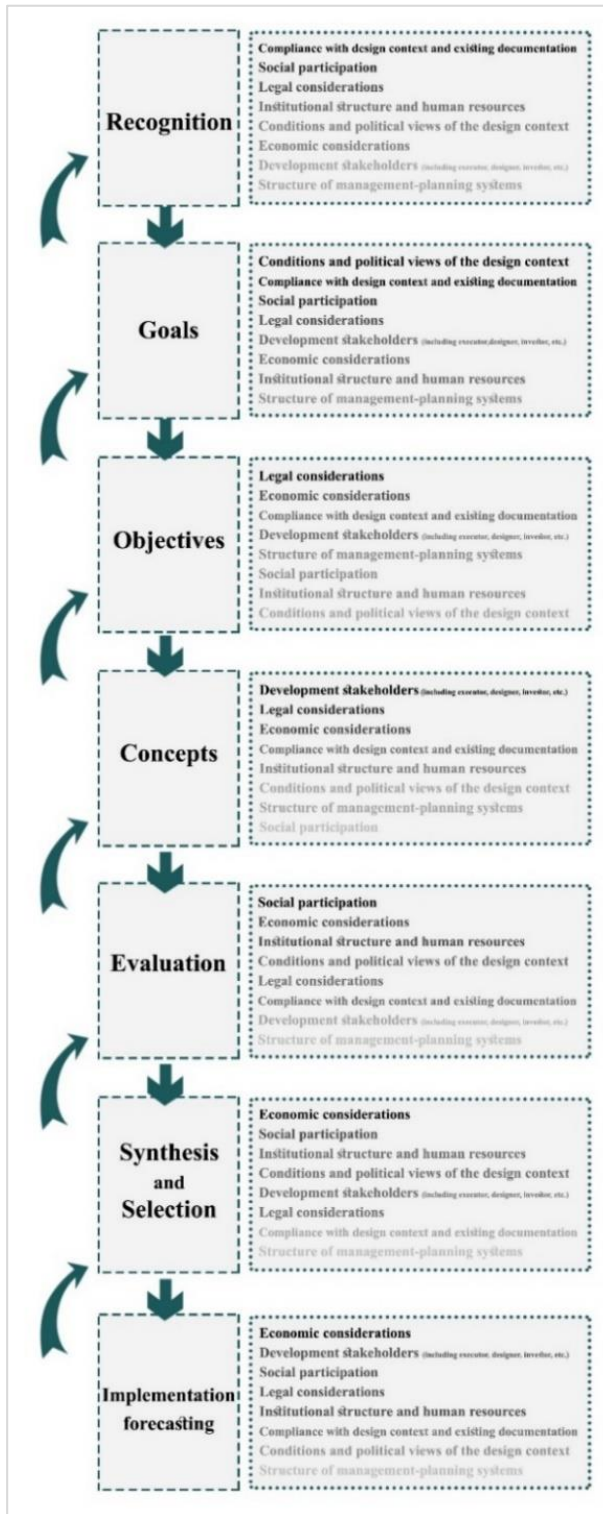
According to the results of this questionnaire, the priority of the impact of factors in each step of the urban design process is shown in Figure 9. These results have been influential in providing design solutions for this study.

Then the factors affecting the implementation of the plans, which were mentioned earlier in the theoretical foundations, were evaluated. It should be noted that interviewees 1 and 2 were former executive directors of the Abkooh Neighborhood Development Office and interviewee 3 was one of the current directors of the office. Also in the implementation of these interviews, research ethics have been considered and the opinions of the interviewees have been taken into consideration impartially (direct quotations are bold, italic and in quotation marks).

Regarding **conditions and political views of the design context**, it can be said that *"during the last two decades, the macro-political structure of Iran and consequently the regional and urban political structure has been affected by rapid changes in governance approaches"* (Interviewee 2) during

a decade, many changes occur in the first place of Mashhad metropolitan management and the governor's deputy for civil engineering, which has changed the future of Abkooch neighborhood and has prepared three distinct plans for it. In 2011, after the preparation of the second plan for Abkooch neighborhood, the mayor and the city council members have changed, different views from the previous ones emerged and special attention is paid to low-income groups. Therefore, the plan has been revised and the large blocks of the previous plan have been divided into smaller more affordable ones, while it was still not affordable for the residents of Abkooch. As a result, *"there was no political will or support for the project, and senior managers were reluctant to discuss renovation issues and address challenges that could not be addressed by middle managers"* (Interviewee 3).

Regarding the factor **development stakeholders (including executor, designer, investor, etc.)**, it can be said that *"the design team was composed of municipal employees and experts who were not skilled in urban design and were only proficient in a number of softwares"* (Interviewee 1); therefore, there was no proper scientific view of this plan. Regarding the executive team, after the minutes of the 2009 meeting, a structure entitled "Executive Management of Abkooch" was created to intervene in the issue of land acquisition, and in this regard, an office was allocated to hold the meeting and satisfy the people. In addition, the plan was reviewed by the same institution. Also, at the beginning, when the plan is prepared, there is no executive experience and executive team in Abkooch to communicate with the design team, but after preparing the plan for 2011, two members of the design team were recruited.



Implementation in the Steps of Urban Design Process and Based on the Perspective of Scientific Experts and the Likert scale (Source: Authors based on a questionnaire completed by scientific experts)

Despite the presence of these people in the executive management and the preparation of the revision plan by the same people, this was not effective for greater implementation. In addition, up-to-date scientific-academic methods have been neglected in this project and many objections can be made to its urbanism and architecture structure. However, *"Nowadays, the scientific approach is regeneration and empowerment of residents, which is contrary to the process that this project has undertaken"* (Interviewee 3).

Regarding the factor structure of management-planning systems, the main and primary goal for initiating intervention in Abkooh is defined as social anomalies and security issues; but without social studies, it has intervened in the context and it can be said that the dominant approach in practice has been physical and economic. In fact, there is a discrepancy between the goal and the adopted technique, so that for the social purpose, the technique of physical intervention has been used. In addition, the esoteric goal of the plan seems to be replacing the lower class with a higher-level group; to this end, *"scattered acquisitions have been formed to destabilize the neighborhood and expedite the gentrification process"* (Interviewee 1). Regarding the evaluation in different stages of the project, it can be said that despite the presence of the consulting team in the executive management of Abkooh, the evaluation was limited to the economic dimension only. In addition, *"this plan is shown to be one of the contemporary regeneration plans, but in fact, renovation and reconstruction in the form of aggregation and definition of new project has been the criterion for action"* (Interviewee 2).

Regarding the factor economic considerations, the economic justification for the project was to acquire existing parcels at low prices through participation bonds; in such a way that the municipality, in exchange for receiving a low-quality plot of land and calculating the effect of the plan on it, assigns the plot of land at a high price; but *"due to the lack of proper economic management, the municipality has suffered losses"* (Interviewee 1). We can also mention the contract between the municipality and the major land owners in 2009; in other words, the municipality would receive only 21% of the value of the land that has a profitable function to be documented in exchange for the Taghdimi right of Astan Quds and the Pazireh right of Awqaf, which is about 70 to 80% of the property. The plan approved in 2016 is more in line with the conditions of the residents than the previous plan, and the plots have become smaller in size so that the residents of the neighborhood could participate; also, large commercial plots that were seen in the shape of a tower were turned into linear fine-grained plots and all this led to a decrease in the economic value of the project, in return for which Astan Quds and Awqaf were willing to accept 21% of the value of the land instead of 70%; *"It should be noted that the major owners were willing to accept this percentage only in exchange for the acquisition of a total of 32 hectares of land in the neighborhood, not scattered plots"* (Interviewee 2); all these cases have left this number uncertain and due to the reduction of data and economic justification of the plan, the process of its implementation has faced many problems.

Regarding the factor social participation, it can be said that no consultation has been held with local residents to prepare and change the plan, and all decisions have been made in the executive management process within the *black box*. With the aim of attracting more public participation, the 2011 plan was revised and the current plan was approved by adjusting the segregation thresholds and reducing street width, *"but this plan was practically stopped due to managerial changes and economic crises"* (Interviewee 2). In explaining consultation with academic experts, scientific opinions have not been effective in changing the design; only the conference "introduction and review of the process of modernization of the deteriorated urban area of Abkooh neighborhood" was held on December 9, 2011 in the Faculty of Architecture and Urbanism of Ferdowsi University of Mashhad with the aim of introducing and reviewing the project. However, in order to increase the participation of the local community, a team of representatives was formed by voting in the neighborhood mosque and entered into negotiations with the executive management of Abkooh, but the focus of their discussion with the

executive management was often to achieve reasonable prices. Regarding the participation of the private sector in the neighborhood, *"several investment projects were signed during this period, but none of them led to a contract; the investor's view regarding gaining more profit in the shortest possible time has not been consistent with the operational action taken with regard to the physical condition, small plot size and definition of large-scale projects"* (Interviewee 2). Meanwhile, during this period, some local investors in the neighborhood held consultations, but due to the lack of support from side of the city administration, they were not implemented and only led to people distrusting the municipality more than before. In addition, *"the city administration had wrongly incurred costs that required investment return, and this was contrary to the interests of local and non-local investors"* (Interviewee 2).

Regarding the factor **legal consideration**, the most important issue is the tripartite agreement that is formed between the municipality, Awqaf and Astan Quds in 2009 in the governor's civil office with the theme that the municipality will own the entire area of 32 hectares and instead of 70% of the value of the land, the major land owners will receive only 21% of the value allocated to the for-profit uses so that the municipality can transfer the lands to the investor by re-documenting it. In other words, the whole neighborhood is major owned by the two owners of Astan Quds and Awqaf, and the residents of the neighborhood are the tenants of these two institutions. Also, the approval of successive plans has in some cases led to the disregard of the acquired rights of the residents; for example, a person who had two accesses in the previous plan was deprived of this right by changing the block in the current plan. The next challenge is related to design segmentation; for example, with the regular separation of land for the organic context of Abkooh, several parts are involved and then problems such as receiving a document from the registry office occur, and this factor initiates problems with the registry office, Awqaf, Astan Quds, etc. so a plot that is specified in the plan and even acquired cannot be constructed. Regarding the factor **compliance with design context and existing documentation**, *"although the vision of the plan is to be in line with the design context it has no adaptation to its design context."* (Interviewee 1). Only parts of the plan have tried to maintain the status quo, however, no attention has been paid to the compatibility of the status quo to the proposed design solution, in a way that in some cases the land needs to be consolidated by three or four owners. The plan ignores issues such as old public Thermaes, old trees, Saadabad Garden, old gardens and backyards in the east of the neighborhood. In general, despite maintaining the existing ossification and flexibility in terms of separation, segmentation and use, the project did not conform to the actual existing context and the preparation approach has been adopted. In addition, in this plan, a level one housing model has been considered for the area, meaning high-density coarse-grained plots and a kind of gentrification, this approach has moved to level two housing by changing the plan over time and converting its parts into smaller plots.

Regarding the factor **institutional structure and human resources**, as mentioned earlier, the executive management of Abkooh was responsible for land acquisition, preparation of the plan, intervention, sale of land and issuance of licenses. In addition, the connection between institutions that can facilitate modernization is limited, so that there are many conflicts between institutions such as the municipality, Awqaf, document registration and Astan Quds; and these institutions have not tried to facilitate the renovation process in any way. *"Given that regeneration as a comprehensive development requires the participation and synergy of all institutions, in practice there is no special commitment and view of this context, and agencies other than the municipality are not considered"* (Interviewee 3).

A summary of the implementation challenges of Abkooh neighborhood renovation and rehabilitation plan, which has been obtained from the results of interviews with the managers and informants of this project, can be seen in Figure 10 classified in eight factors derived from theoretical foundations.

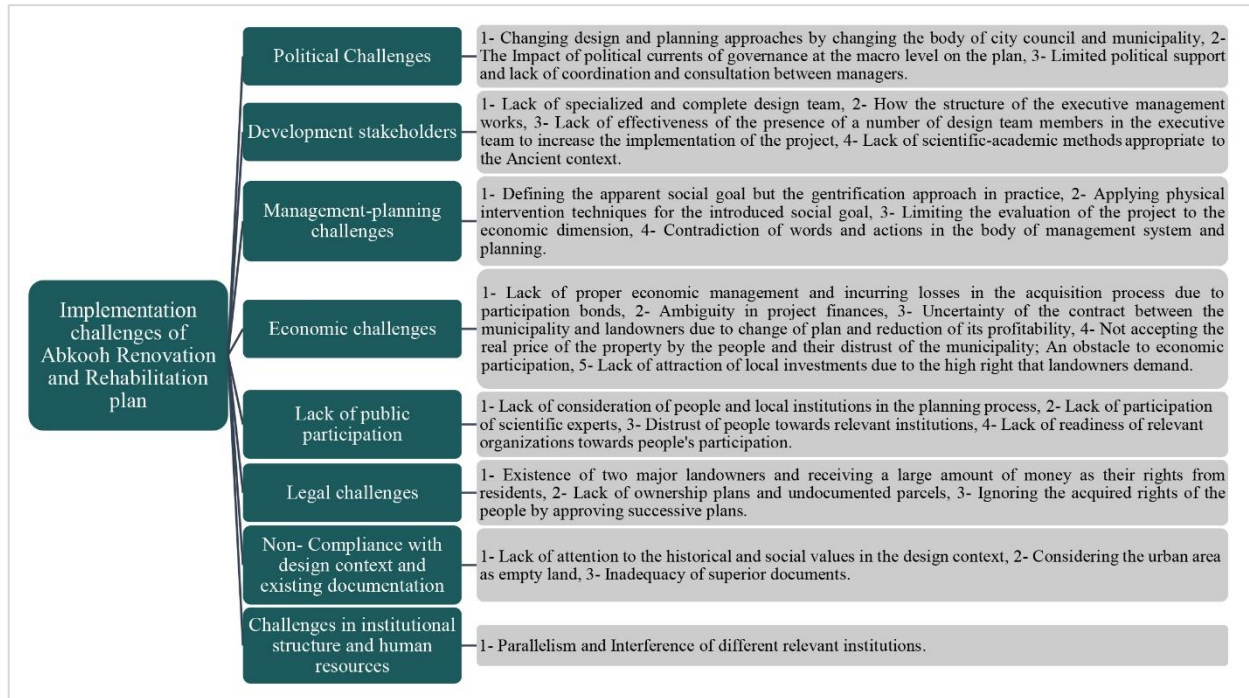


Fig. 10: Summarizing the implementation challenges of the Abkooch neighborhood Renovation and Rehabilitation plan
(Source: Authors)

PROVIDING STRATEGIC PROPOSALS FOR STRUCTURAL REFORM

At this stage with the help of the superior documents and interviews with the managers and officials of the Abkooch project, summarizing the strengths, weaknesses, opportunities and threats of the approved plan for renovation and rehabilitation of Abkooch neighborhood has been done in the form of a SWOT table classified in eight dimensions corresponding to the factors affecting the implementation of urban design and neighborhood development plans. Table 1 summarizes the strategies extracted from the SWOT table.

Components affecting Implementation	Type of strategy	Strategy
Conditions and political views of the design context	WT	<ul style="list-style-type: none"> - Controlling Political impacts of urban management changes in planning decisions - Supporting and facilitating the project process by relevant authorities, especially Astan Quds and Awqaf
	WO	<ul style="list-style-type: none"> - Delegation of all authority to the executive management of Abkooch during the design process and after that
Development stakeholders (including executor, designer, investor, etc.)	WT	<ul style="list-style-type: none"> - Delegating all authority in the field of implementation to the executive management while the design team is constantly supervising - The presence of specialized design team in the whole process, from preparation to implementation of the plan - Benefiting from the opinions and experiences of urban design experts in all stages of the design process.
	WT	<ul style="list-style-type: none"> - Formulating goals tailored to existing needs and issues - Using intervention methods in accordance with the goals adopted in the plan

Structure of management-planning systems		- Constant monitoring of the design team in all dimensions and stages of design and implementation
		- Attention to macro goals tailored to the context in all stages of the design process.
	SO	- ensuring investment return of local and private investors
		- Convincing the landowners about the vulnerability of the strata living in the Abkooh neighborhood
Economic considerations	ST	- Clarification of the reasons for the difference in land prices in Abkooh neighborhood compared to adjacent neighborhoods
		- Guarantee of implementation and transparency in financial and economic contracts
		- Guarantee of public interest in case of using participation bonds
	ST	- Attracting the real participation of local residents and institutions
Social participation		- Attracting the participation of scientific experts in the design process
	WT	- transparency in relation to the property claims of residents
		- Consensus among stakeholder groups
Legal considerations	ST	- Transparency in legal issues and proper communication among people with different and sometimes contradictory interests
		- Maximum attention to the acquired rights of residents in reviewing the plan
		- Checking the boundaries of land ownership
Compliance with design context and existing documentation	WO	- paying attention to the type and scale of performance of the proposed land uses appropriate to the context
		- Structural adaptation of the revision plan to the current situation
	WT	- Paying attention to the ancient values and identity of Abkooh neighborhood in presenting land use suggestions
Institutional structure and human resources	WT	- Cooperation and coordination among individuals and institutions related to regeneration

Table 1: Summary of Strategies Corresponding to the Factors Affecting Implementation (Source: Authors)

DISCUSSION AND CONCLUSION

Since the purpose of this study is to investigate the challenges of Renovation and Rehabilitation plan of Abkooh deteriorated urban area, findings indicate that the most important challenges of this project include the top-down process of preparation, changes in design approach due to changes in members of the urban management body and not considering the opinion of residents. The main focus is one-dimensional and highlighting the physical and economic aspects, while the social aspects and contextual conditions are often overlooked. This process has led to a failure in achieving the goals of the plan for the target group, which can lead to gentrification in the long run. In addition to the above-mentioned challenges, the most important challenge in the context of Abkooh, which gives rise to other challenges in various dimensions, is the legal issues arising from the existence of the two main land owners, namely Astan Quds and Awqaf, who seek to realize their rights.

Studies in this research showed that the implementation of urban design and neighborhood development plans are affected by eight factors: *conditions and political views of the design context, development stakeholders (including executor, designer, investor, etc.), structure of management-planning systems,*

economic considerations, social participation, legal consideration, compliance with design context and existing documentation and institutional structure and human resources. Based on the methodical steps of the study, it was revealed that in the first step of the urban design process, namely the recognition step, compliance with design context and existing upper-land documents was the most important factor. In the step of formulating goals, the factor of conditions and political views of the design context and in the step of formulating objectives, legal requirements have had the greatest impact. In providing concepts, development stakeholders (including executors, designers, investors, etc.) have a significant impact, and public participation is effective in evaluating these solutions. In the two steps of synthesis and selection and implementation forecasting, the factor of economic consideration plays a decisive role. Then, corresponding to these factors, the implementation challenges of Renovation and Rehabilitation plan of Abkooh deteriorated urban area were evaluated in eight dimensions and appropriate strategies were suggested.

According to the political assessment, there were challenges such as changing design and planning approaches due to various changes in the members of the city council and municipality, the impact of political currents of governance at the macro level on the plan and fluctuations in political support. Due to these challenges WT strategies such as controlling the political implications of changing members of urban management and supporting the plan by related authorities have been proposed.

The most important challenges in the development parties include the lack of a specialized design team, how the executive management works, the lack of effectiveness of the presence of a number of design team members in the executive team and lack of scientific-academic methods appropriate to the ancient context; Corresponding to these challenges, WT strategies such as delegating all authority in the field of implementation to executive management, the presence of an specialized design team and benefiting from the opinions and experiences of urban design experts and WO strategy delegating all authority during the design process and then to the executive management of Abkooh has been adopted.

Studies in the management-planning dimension showed that words and actions in the management body were somewhat inconsistent, so that the purpose of the plan was initially introduced as a social goal but the approach and technique adopted to intervene in the context proved to be completely physical and the project evaluation has only an economic approach that leads to gentrification in the long run. In order to overcome these challenges, WT strategies including formulating goals appropriate to the existing needs and issues, using intervention methods in accordance with the goals adopted in the plan, constant monitoring of the design team and attention to macro goals appropriate to the context have been proposed.

In the economic dimension, the most important issue is the unclear status of the contract between the municipality and the two major owners regarding Taghdimi¹ and Pazireh² right which have not been implemented due to changes in the plan and decreased profitability and this has led to a lack of attraction for private investors. On the other hand, people have lost their trust in the municipality over the years and are not willing to accept the real price of their property. In order to overcome these challenges, ST strategies such as justifying the major landowners about the vulnerability of the strata living in Abkooh neighborhood, clarifying the reasons for the difference in land prices in Abkooh neighborhood compared to adjacent neighborhoods, executive guarantee and transparency in financial and economic contracts and guaranteeing public interest and an SO strategy to ensure investment return of local and private investors were provided.

The participation of residents, local institutions and scientific experts in the project preparation process has been very limited and their participation has not been provided by the city administration and even in some cases, if the people participated in the process of consolidating, the responsible institutions including Astan Quds and Awqaf did not have effective feedbacks, which has led to more distrust of residents. For this purpose, ST strategies including attracting the real participation of residents, local

institutions and scientific experts and a WT strategy of transparency to the requests of residents were presented.

Despite the significance of resolving conflicts between stakeholders, it can be said that the main problem of Abkooh, which has caused problems in other dimensions, is the legal challenges that arise from the presence of the two major owners of Astan Quds and Awqaf. Also in this dimension, Lack of effective interaction in the field of acquired rights due to the approval of successive plans between 2006 and 2016 has created challenges and dissatisfaction. Therefore, ST strategies such as consensus of stakeholders, transparency in legal issues and proper communication between people with different interests, maximum attention to the acquired rights of residents in reviewing the plan and verifying land ownership have been developed.

In dimension of Compliance with design context and existing documentation, it can be said that the approach to Abkooh neighborhood is similar to the preparation plans and the social dimension and the identity values of the neighborhood have not been considered. For this purpose, WO strategies considering the type and scale of performance of the proposed land uses and more structural adaptation of the revision plan to the current situation and a WT strategy considering the values of the old and identity neighborhood of Abkooh in presenting land use proposals have been proposed.

In dimension of institutional structure and human resources, the main challenge is parallelism and lack of coordination of the responsible institutions, in order to overcome this challenge, a WT strategy of Cooperation and coordination between individuals and institutions related to regeneration has been adopted.

Finally, by modifying the design process and recognizing aspects affecting the implementation of urban design and neighborhood development plans, also paying attention to the fact that the view of urban design products is influenced by the decision-making environment in which the relationship between urban design product and urban designer is not a direct relationship like architectural projects. There are factors affecting the implementation of different steps of the urban design process from recognition and targeting to alternative and evaluation, and the important issue in many similar projects as Abkooh neighborhood is looking at the issue as a large architectural project, not an urban design product. By modifying this view and adjusting the relationship between the urban designer and the urban design product as an indirect relationship and with a realistic view of the decision-making environment (factors including economic, law, social, politics and etc.) and considering the factors identified in this study, the probability of qualitative implementation of urban design plans can be improved.

NOTES

1. "Taghdimi" is the amount that Astan Quds organization receives in exchange for the transfer of property to a person, and the tenant also pays the rent on a monthly or annual basis.
2. "Pazire" is the amount that Awqaf organization receives in exchange for the transfer of property to a person, and the tenant also pays the rent on a monthly or annual basis.

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Comparison of Urban Spaces based on Women-friendly Cities Approach (Case Study: Azadi Park, Besat Park, Janat Park, Shiraz, Iran)

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ABSTRACT

Urban public spaces should be available to different social groups, and women, as half of the users of urban public spaces, should easily use urban spaces and feel comfortable in them. This study aims to compare three popular urban spaces in Shiraz, including Besat park, Azadi park, and Jannat park, according to a women-friendly city approach. In this regard, factor analysis is used, and five factors of security and safety, responsiveness, vitality, legibility, and accessibility are extracted as the most critical factors influencing the presence of women in urban spaces. Finally, the calculation of factor scores showed that Azadi park, with a factor score of 2.48, is more in line with the indicators of women-friendly spaces than the two parks of Jannat with a factor score of 2.47 and Besat with a score of 2.44. Examining the opinions of women provided valuable insights into the challenges they face when using urban spaces. Therefore, we can upgrade parks according to a women-friendly city approach by implementing strategies such as creating a safe environment for women's activities, monitoring urban spaces, increasing facilities for children, and beautifying the urban spaces.

Keywords: City, Women, Woman-friendly city, Urban Space, Park, Shiraz.

INTRODUCTION

Urban public spaces belong to the general public and should have the characteristics of being democratic, accessible to all groups, and relative freedom of action. In order to achieve civic justice, these spaces should provide a safe, healthy, stable, and attractive environment for all citizens so that they can participate in urban life (Fazeli and Ziachi, 2014).

In other words, urban space is the space of everyday life of citizens that is perceived every day, consciously and unconsciously (Pourmohammadi et al., 2015). The desirability of urban space, especially for some activities, depends on the level of perception of the needs of the space users (Amani et al., 2009). Several factors influence the experience and understanding of urban spaces, such as age, gender, culture, and social class (Rezazadeh and Mohammadi, 2008). Among individual characteristics, gender is one factor that plays an essential role in the perception of space (Shakibaei and Rafieian, 2013).

Urban space, as the realm of social groups with different gender, class, racial, ethnic, and cultural characteristics, allows and limits some actions and behaviors. Thus, urban space is a realm in which presence becomes a problem, and all kinds of inequalities are observed in its use; including gender inequalities that are represented in different ways (Dadashpoor et al., 2017).

In this regard, as half of the users of public spaces, women should be able to use urban spaces and feel comfortable in them. However, studies show that women do not enjoy urban space as much as men (Habibi and Alipour Shojaei, 2015). Meanwhile, studies on the relationship between women and the environment show that public urban spaces are much more effective in women's daily lives than men.

Because women have to follow different plans during the day and, as a result, have different travel purposes. The significant presence of women in shopping malls, parks, streets, and public transportation also confirms this (Pourmohammadi et al., 2015).

Meanwhile, Amani et al. (2009) believe that the concept of a woman-friendly city has not been fully understood in theory or practice, and no specific planning has been done to achieve it (Amani et al., 2009). Azimi (2015) emphasizes the factors such as security, suitable infrastructure, transportation, and accessibility in making a women-friendly urban space (Azimi, 2015).

However, Sedaghati and Etehad (2014) state that factors such as masculinity of space, insecurity, restriction of women's freedom, and lack of activities can limit the women's presence in society. Thus, to increase the presence of women in urban spaces, they have offered suggestions such as providing security, reducing fear, creating a favorable environment, improving the transportation network, upgrading nightlife, paying attention to urban furniture design, and providing essential services in the neighborhood. Fazeli and Ziachi (2014) believe that by considering eight characteristics, Tehran becomes a woman-friendly city: safe Tehran, comfortable Tehran, active Tehran, participatory Tehran, and leisure Tehran, fair Tehran, beautiful Tehran, and child-friendly Tehran (Fazeli and Ziachi, 2014). Cooper and Sarkisian (1989) identified general guidelines for designing a women-friendly neighborhood. They emphasized the proper access to the neighborhood and housing, open spaces that encourage social relationships between neighbors, and the hierarchy of spaces from "public" to "private" to increase security and comfort. However, Abada (2013) states that a women-friendly city includes three fundamental aspects: universality, comfort, and safety. In addition, success in a project requires the participation of both men and women, stakeholders, social, political, and economic parties, and most importantly, the desire and commitment of city leaders for the success of the project (Abada, 2013).

In summary, to consider the different aspects of the social, legal, cultural, physical, and health of the women, the concept of a woman-friendly city is proposed to facilitate women's activities and make their lives easier by creating suitable spaces in the city. This study aims to compare three popular urban parks in Shiraz with the approach of a women-friendly city. Urban parks are part of public green spaces with recreational, cultural, and environmental aspects and provide services to different city areas (Kamali et al., 2021). Many studies show that green space effectively improves the health, well-being, and happiness of people. For example, Kaplan's (1995) study shows the effect of green space on physical health, and the study of Alrich et al. (1991) shows the effect of green space in reducing stress (Pak Fetrat and Taqvaei, 2017).

METHOD

Case study

The three popular parks of Jannat, Besat, and Azadi, located in different parts of Shiraz, have been examined in this study. Figure 6 shows the location of these three parks in Shiraz. Janat Park is one of the most beautiful urban parks in Shiraz, which was initially built as a garden with a mansion inside it by Haj Mirza Abolhassan Khan Moshir al-Molk. After development and progress over time, this park became modern. Pine trees around sidewalks, beautiful fountains, fresh flowers, and green lawns have given special beauty to this park. Of the 57 hectares of the park, about 27 hectares belongs to Shiraz Municipality.



Fig.1, Fig.2: Janat Park

Besat Park is one of the most beautiful urban green spaces and tourist attractions of Shiraz, which was designed in 2006 by Mehrdad Iravanian, a famous and postmodern architect of Shiraz. This park has an area of about 1.6 hectares. Facilities at Besat Park include sports facilities such as table tennis and football and picnic areas.



Fig.3, Fig.4: Besat Park

Azadi Park is one of the oldest parks in Shiraz, built in 1966 with an area of more than 21 hectares or 210,000 square meters in the north of the city. This park is known as the largest park after the mother garden and Janat park. The park has a community hall, a religious-cultural complex, prayer hall, culture house, theater, playground, food stalls, birds nest, an artificial lake, and beautiful fountains.



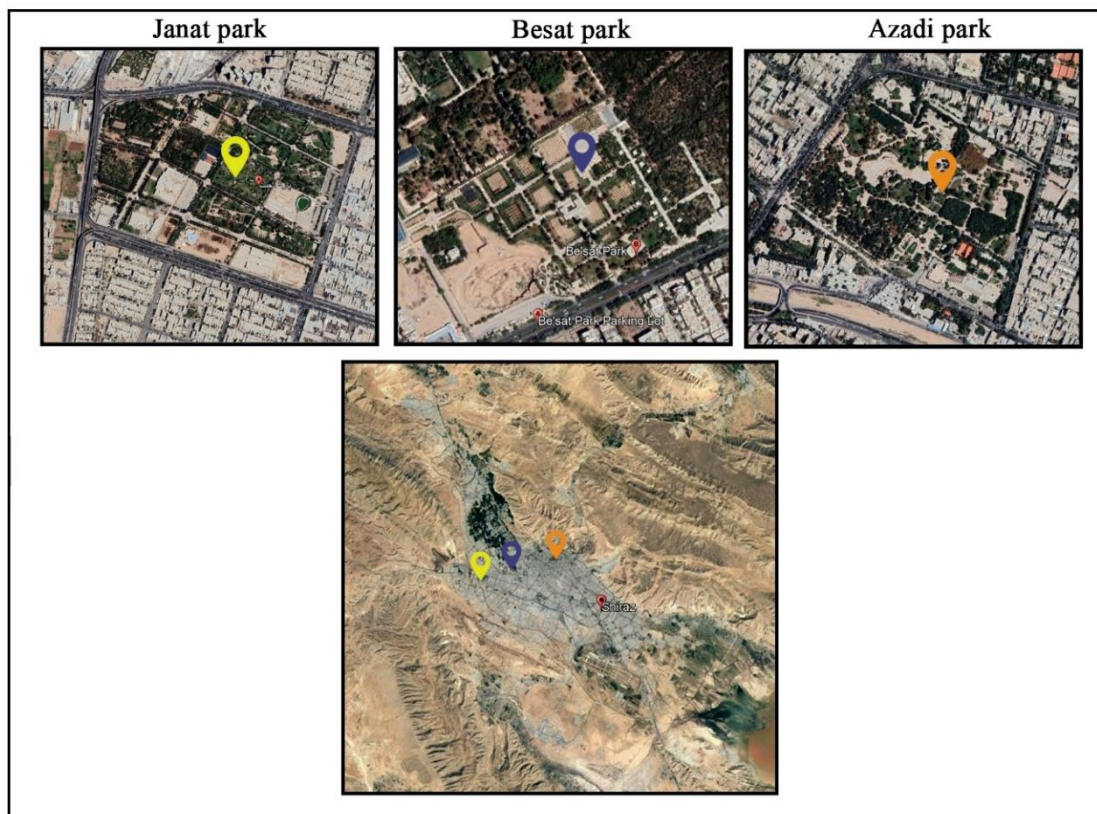


Fig.6: Location of the parks in Shiraz

Research design and data collection

In this regard, after examining the theoretical foundation of the research and extracting indicators of women-friendly urban spaces, a questionnaire was designed based on 25 indicators. Due to the prevalence of the coronavirus, this questionnaire was sent online to women over 15 year's old living in Shiraz. A total of 222 questionnaires were completed. Table 1 shows the characteristics of the respondents.

Table 1: Respondents Characteristics

Respondents Characteristics	Groups	Total	Percent
Age	15-30	160	72/1
	31-46	45	20/3
	47-62	15	6/8
	63-....	2	0/9
Marital status	Single	164	73/9
	Married	58	26/1
Education	PH.D.	9	4/1
	Master's Degree	24	10/8
	Bachelor's Degree	125	56/3
	Diploma	55	24/8
	High school	9	4/1

Data analysis

Factor analysis is a multivariate method used to summarize or reduce data. This method converts a large number of variables that explain a subject into a smaller number of hidden dimensions, which are called factors. Factor analysis is performed by two methods of exploratory and confirmatory. In this study, exploratory factor analysis is used to analyze the data. The exploratory factor analysis method is used in cases where the purpose is to explore or produce the latent dimensions that make up the phenomenon under study. Explanatory variables of the studied phenomenon are extracted after reviewing the relevant theoretical and experimental texts. The researcher using this method converts the various variables indicating the studied phenomenon into a smaller number of latent dimensions (factors). Each factor includes several variables (Zebardast, 2017).

RESULTS

The factor analysis method was performed using SPSS software. First, to control the suitability of the data, the data distribution of each of the indicators and the degree of their compliance with the normal distribution was examined. Then the amount of KMO and Bartlett test were calculated to control the suitability of the data for factor analysis. The results of the Bartlett test and the value of the KMO showed the overall fitness of the samples for factor analysis. Table 2 shows the results of the tests.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.896
Bartlett's Test of Sphericity	Approx. Chi-Square	5276.423
	df	300
	Sig.	0.000

Table 2: Results of the KMO and Bartlett test

Finally, the factor analysis of the indicators led to the extraction of 5 factors, including safety and security, responsiveness, vitality, legibility, and accessibility.

Security and safety explain 27.57% of the total variance and play the most important role. This factor relates to the questions about enclosure ratio, sexual harassment, feeling secure, feeling relaxed, park monitoring, insecure edges, feeling of belonging and attachment to urban space, families presence at different hours, and the lighting.

Responsiveness accounts for 9.96% of the variance. It relates to the questions about the educational facilities, the entertainment facilities, the service facilities, the women's participation in the activities in the park, the amount of attention to the needs of women, and the desired sports facilities.

Vitality accounts for 595.5% of the variance and relates to green space, cleanliness, beauty, and quality and comfort of furniture.

Legibility accounts for 4.75% of the variance and relates to the quality of flooring and warning signs.

Accessibility accounts for 4.349% of the variance and relates to the suitable facilities for children, accessing different land uses, and suitable facilities to access the park.

The scores of the factors were converted to a minimum-maximum scale to compare the scores of the different factors,. At this scale, the minimum score of each factor was reduced to zero, and the maximum score was converted to one, and then averaging was performed in Excel software. Table 3 shows the average factor scores and the total scores of each park; Besat Park has a score of 2.44, Jannat Park has a score of 2.47, and Azadi Park has a score of 2.48. Thus, Azadi park has a higher score than other parks, which has been considered a more suitable park by the respondents.

Park	Safety	Responsiveness	Vitality	Legibility	Accessibility	Total
Besat	0.455	0.455	0.554	0.403	0.523	2.44
Azadi	0.623	0.518	0.568	0.406	0.358	2.48
Janat	0.533	0.501	0.521	0.422	0.488	2.47

Table 3: Total factor scores

CONCLUSION

In this study, the three urban parks of Azadi, Besat, and Jannat were compared based on the criteria of a women-friendly urban space. For this purpose, questionnaires were distributed among women over 15 year's old living in Shiraz. The data obtained from the questionnaire were analyzed using exploratory factor analysis. The factor analysis led to the extraction of 5 factors, including security and safety, responsiveness, vitality, legibility, and accessibility. In table 4, strategies have been proposed to improve the conditions of these three parks based on the criteria of women-friendly urban spaces.

Table 4: Design strategies	
Criteria	
Security and safety	Creating safe environments for women's activities Creating restrooms to help the women with small children and older women Establishment of child care centers such as playrooms Removing obstacles for baby strollers
Responsiveness	Holding a variety of weekly programs, including educational and cultural programs to engage the woman. Holding different activities during the different times of the day Holding fun activities for children in the playground Providing sports facilities for women Considering free or low-cost counseling centers in the parks Considering book cafés to encourage women to read books Considering clean, adequate, safe, and visible toilets for women
Vitality	Beautifying the parks using different elements Holding various exhibitions and live concerts Planning and designing green spaces that are suitable for shiraz climate Preparing the comprehensive green space plan of Shiraz according to sustainable urban development Using the support of non-governmental organizations to improve the condition of the parks and create and maintain the existing green space. Use of vibrant colors for the furniture
Legibility	Considering bike lanes Improving access to public transport at different times of the day Considering playing facilities for the children
Accessibility	Improving the sidewalk flooring around the park Improving access to children's facilities Providing different services for women building pedestrian bridges for safe access to the parks

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Investigating the impact of cafés on public spaces, case study Somaye and Iranshahr Street

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ABSTRACT

Public space has always been at the core of urban research, but in recent decades the development of new public space forms such as semi-public or quasi-public spaces with characteristics different from the definitions of classical public spaces has provoked criticisms. One of the most popular semi-public spaces in Tehran are cafes, which are increasing in number and popularity day by day, and today a considerable amount of people's leisure time is spent in cafes, especially for the young. This makes it necessary to study cafes and the time spent in them. This qualitative and exploratory research seeks to investigate the impact of how and intensity of use of cafes on public spaces. This study examines this effect in the unique conditions that the high density of cafes in the southern part of Tehran's Sixth District has created. This goal was followed by arranging semi-structured interviews with users of cafes on Somayeh and Iranshahr streets, which were selected through purposive sampling. The interviews continued until the theoretical saturation was reached, and finally, 24 people were interviewed. In the next step, the transcript of the interviews was qualitatively analyzed using MAXQDA software. The results show that cafes have been formed in response to the lack of diverse and responsive public spaces in urban areas and have gained considerable popularity among users. A significant part of people's leisure time has been transferred from public spaces to cafes, and people do a variety of social, personal, and occupational activities in cafes. The effects of several cafes on these two streets are an increase in people's presence during long hours of the day and an increase in the sense of security. However, due to the introversion of cafes in Tehran, their impact on the vitality of the street has diminished.

LITERATURE REVIEW

Contemporary public space

Due to the broadness of the concept of public space, various influential factors, and diverse existing perspectives, there are various definitions and theories on the concept of public space. Many critics define public space with different factors that have always characterized the typical forms of public spaces. The most prominent factors are accessibility (Madanipour, 2003, p. 112; Cohen, 2004, p. 11), inclusiveness, public ownership and management (Cohen, 2004, p. 11; Németh and Schmidt, 2007; Schmidt and Németh, 2010). From another point of view, public spaces are where different individuals and social groups participate; these spaces are the venue for exchanging ideas and information and forming social networks (Douglas, 2003).

From the 1980s onwards, particular types of public spaces emerged in the spatial structure of cities, called privatized public spaces or semi-public spaces. These spaces are created, owned, and managed by private institutions, and due to limitations in their purpose and use, they are accessed only by a group of people (Tonekaboni and Shahabian, 2019, p. 4). Semi-public spaces, in definition, are accessible by the public (Cowan, 2005, p. 346) but are controlled by the private sector.

Subsequent to these changes and the emergence of new forms of public spaces, most of the critiques in urban literature focused on these transformations and their consequences. The main trends are the commercialization and the growing tendency of "privatized" public spaces, or in Banerjee's (2001) term, "publicized" private spaces. The growing involvement of the private sector in the design and management of urban public space has led some critical scholars to predict the "end of public space." (De Magalhães, 2010). Nan Ellin argues that this privatization is both the cause of the decline of public space and, at the same time, the consequence of increased desire to control private space (Ellin, 1999, pp. 167–168).

The proliferation of consumer spaces such as cafes (Kayden, 2000, p. 59), the prevalence of safety policies (Raco, 2003; Samara, 2010), the complete management of space, and thus weakening its public dimensions (Madanipour, 2003, p. 217) have been criticized. In Western literature covert and overt measures of private ownership and management of spaces aim to ensure security, monitoring, and controlling activities, restriction and conditioned access (Minton, 2006, p. 10), plus keeping some social groups away from public spaces was interpreted as the end of accessible public space (Mitchell, 2017, p. 504).

However, with the adoption of private sector approaches by public authorities and partnerships with private developers, the distinction between the private and public spheres is narrowing. Publicity has become a relative concept, even if the space is created and managed by public officials (Madanipour, 2019). These days, public activities often occur in private spaces, controlled by private sector rules and regulations (Southworth, 2014). In fact, the publicity of public spaces is also questioned in terms of access and fair distribution in urban areas (Lynch, 1972).

In sum, according to Banerjee, these trends represent fundamental changes in the conceptualization of public life and public space and the values associated with them; thus, the future plans for public space should be based on understanding the causes and consequences of these trends changing the nature of public life (Banerjee, 2001, pp. 9–10).

In fact, the interaction and relationship between the notion of public space and the concept of urban life is an important and serious issue among urban theorists. In Goodsell's view, "the central idea of public space is its potential contribution to the quality of urban life. "Plazas, parks, and public squares are places where the inhabitants of any crowded city can survive, relieve stress, come together in close interaction, enjoy an aesthetic experience and focus on the symbolic and true essence of the city." (Goodsell, 2003, p. 368). Public spaces play a dual role in relation to the concept of urban life. On the one hand, as a platform for flourishing social interactions and socialization, they have an undeniable role in improving the quality of urban life, public solidarity and social cohesion, and a sense of sociability and togetherness. On the other hand, they provide an opportunity for people to be alone, a chance to escape from the stress of family life and lose oneself as a stranger in the heart of the crowd, and an opportunity to find peace and silence (Cattell, Dines, Gesler, Lofland, 1998, & Curtis, 2008; Thompson, 2002). In this regard, Cattell et al. note that the positive aspect of what Simmel saw as indifference in the city is that aliens in urban public spaces are less able to limit our behavior; In fact, for many people, a sense of freedom from judgment is the most crucial pleasure in urban public space (Lofland, 1998).

Cafés

Cafes are one of the prominent examples of shared spaces in the city concerning the concept of urban life and are hangouts that provide a platform for socialization and, at the same time, solitude. Although cafes are referred to as a space of consumption for serving food and drink, they are not purely materialistic because of the interactions and public social life that takes place in them (Montgomery, 1997, pp. 89–99). Despite criticisms on public-private spaces, cafes' norms do not indicate the necessity

of consumption for attendance, as in restaurants. In fact, cafes' social and cultural function, especially in the central region of Tehran, prevails over consumption. These spaces are widely used as communal hangouts, and their function goes far beyond eating or drinking. The primary purpose of entering cafes is to spend time, establish social relationships, or attend individually and do studies and daily activities. Functions that can in no way be attributed to seemingly similar places such as restaurants. Although planners have traditionally linked public life to public spaces, the environment of such public life does not necessarily conform to classical definitions of public spaces. According to Benarji (2001), public life is increasingly flourishing in private places, not only in corporate theme parks but also in small businesses such as coffee shops, bookstores, and other third places.

Many of the features listed for third places can also be detected in Tehran cafes. For Oldenburg, home is the first place, workplace the second one, and third place is called the "central place of informal public life." He also states that third places are neutral and serve to level their guests in a state of social equality. In third places, conversation is the main activity, and the appearance of the space is plain, low profile, and unpretentious. Presence in third places is considered an individual right; they are usually open and accessible during the holidays as well as other times, and the character of these places is determined more than anything by its regular customers. With a playful and lively atmosphere, despite being a very different environment from home, in terms of mental comfort, third place is very similar to a good home and the support it provides (Oldenburg, 1999).

However, the idea and representatives of the third place can not be applied precisely in other national, cultural, and ethnic contexts. Although cafes are generally in line with the concept of third place, they differ in some features. For example, in contrast to the plainness feature that Oldenburg enumerates for the third place; Today's cafes in Tehran have each appeared in various and outstanding facets and designs; in fact, one of the decisive factors for cafe-sitters is the decoration, ornaments, diversity, beauty, and cleanliness of the cafe. Also, in today's context of Tehran, people do not necessarily go to their regular hangout cafe without a prior appointment and after their daily activities. The selected cafe is not necessarily close to work and home; Instead, on many occasions, people may choose a new and different place to go every time; appoint a meeting, dress appropriately, move across the city and try a new cafe they saw in social media.

A concept of public life stems from our desire for relaxation, socializing, entertainment, leisure, or simply having a good time. Individual authority of this public life is shaped by the consumer culture and the opportunities offered by the "experience economy" (Pine, Pine and Gilmore, 1999). A primary feature of an experienced city is its attractive atmosphere, which results from location-based activities, events and services, attractive places, and diverse social spaces (Bell and Jayne, 2006). The various approaches and functions of the City of Experience invite citizens to enjoy plays and galleries, identify with a historical past displayed in museums and monuments, eat typical foods in cafes and restaurants at different times of the day, and buy conventional products. Each of these shows different aspects of the place-based consumption of pure experiences (Evans, 2002). In addition to associating with the creation of individual experiences, another feature of the experience economy is the high rate of mobility in the city. People are willing to travel within the city to consume experience products, such as festivals, theme parks, or various cafes. This shows the importance of advertising to compete over consumers (Lorentzen, 2009). The connection between the current public life in cafes and the economy of experience is discernible; Tehran cafes are generally advertised on Instagram. Their design, social and cultural leisure events, and creative modern or traditional menus are shown to invite cafe-sitters from different regions.

Different characteristics and definitions are attributed to cafes in different places. However, it is undeniable that the nature of public space differentiates based on the political, social, cultural, and economic contexts in which it is produced, and given the different nature of civilizations and

determinants, public space will vary in each civilization, society, and geography. On this basis, and regarding such fundamental differences, the necessity of selecting unique and explanatory views and characteristics in each place and space becomes meaningful.

Although Tehran's cafes welcome a wide range of age groups, and, especially in Tehran's city center cafes, nostalgic signs of past architecture and culture can be seen; Fazeli (2011) in "Coffee Shop and Urban Life" describes cafes, often as a modern space, specific to the city and urban youth who are influenced by global culture. Azad Armaki and Shalchi (2005, p. 176) state that "the quiet place of coffee shops and the darkness of their glass is a departure from the dominant culture that is foreign to them." Cafesitters show their social and cultural resistance (Azadarmaki, 2011). by hanging out in cafes; But the separatism of this culture from society is not to escape from it, but to provide an atmosphere in which it freed itself from the dominance of the official discourse (Azadarmaki and Shalchi, 2005, p. 176). Cafes are part of the "university culture" (Fazeli, 2011) and are global. Finally, as an ultimate feature, through the voluntary presence with a certain etiquette, in tandem with aesthetic, cultural, artistic, and romantic experiences that do not usually take place in other public spaces, as well as the social experience and even "being with oneself" in public, Fazeli sees the cafes as associated with everyday life (Fazeli, 2011).

RESEARCH METHODOLOGY

With an inductive approach and qualitative analysis method, this study seeks to investigate the impact of cafes on public space and how and to what extent cafes are used compared to public spaces. For this study, several cafes on Somayeh and Iranshahr streets in the sixth district of Tehran, which is one of the most densely populated areas in terms of the number of cafes, were selected. Cafe-sitters were selected by purposive sampling method to arrange semi-structured interviews, based on their comments on Instagram accounts of the selected area's cafes. Also, several cafe-sitters living in the study area who, due to the impossibility of face-to-face access to them during the research, were selected using snowball sampling, were asked about their perception of the impact of multiple cafes on their living area. Because the research was conducted during the coronavirus pandemic lockdown, the interviews were conducted online on Instagram and WhatsApp messengers. In this study, data collection and analysis were performed simultaneously, and the process of analysis and categorization proceeded to the stage of theoretical saturation. Finally, 24 people were interviewed, and during the interview rewriting, using the thematic analysis method and MAXQDA software, semantic units, coding, categorization and thematicization were extracted.

The outline of the interview and the main questions were adjusted according to the objectives of the research. Cafesitters were asked how and how much they used cafes and other public spaces, including the Honarmandan park adjacent to the study area. Residents were also asked to compare the condition of the streets before and after the proliferation of the cafes and when the cafes were closed due to quarantine, also to express their perception of the cafes' effect on the area.

Row	Gender	Age Group	Group	Row	Gender	Age Group	Group
Café sitters				Café sitters			
1	Female	20-30	Café sitters	14	10-20	Café sitters	Female
2	Male	20-30	Café sitters	15	30-40	Café sitters	Female
3	Female	20-30	Café sitters	16	20-30	Café sitters	Female
4	Female	20-30	Café sitters	Café sitters living in the area			
5	Female	40-50	Café sitters				
6	Female	30-40	Café sitters	17	20-30	Resident -3 years	Male
7	Male	20-30	Café sitters	18	40-50	Resident -14 years	Female

8	Female	30-40	Café sitters	19	30-40	Resident -14 years	Female
9	Female	30-40	Café sitters	20	20-30	Resident -1 years	Female
10	Female	20-30	Café sitters	21	30-40	Resident -7 years	Female
11	Male	20-30	Café sitters	22	50-60	Resident -38 years	Male
12	Male	30-40	Café sitters	23	30-40	Resident -4 years	Female
13	Male	30-40	Café sitters	24	30-40	Resident -11 years	Female

Table 1: Interviewees data

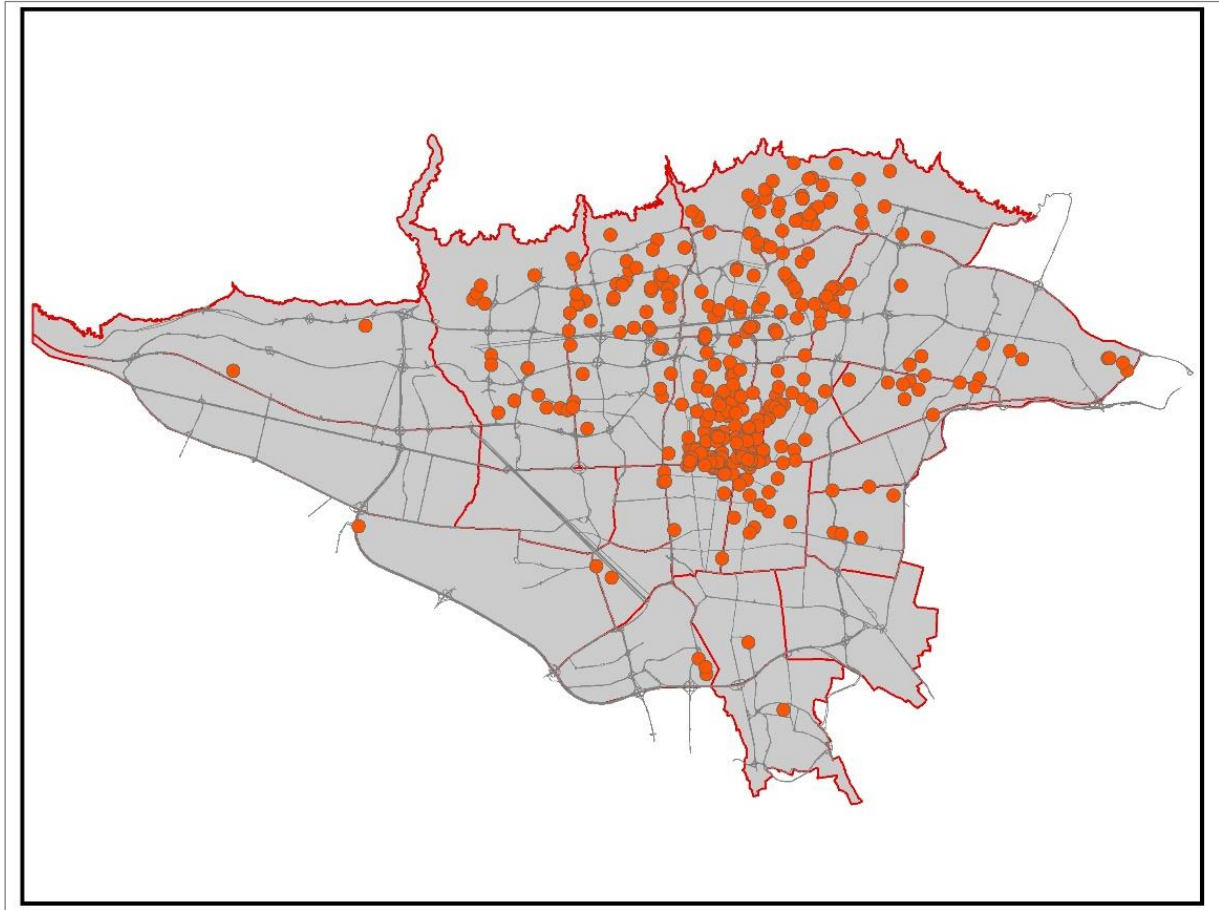


Fig. 1: Distribution of cafes in Tehran by extracting data from Open Street Map

The reason for choosing Somayeh and Iranshahr streets was their historical background and their long connection with cafes; As in the past to today, these two streets are associated with restaurants, cafes, and such uses. Moreover, in recent years, the number of cafes in this area has grown significantly; The proliferation of cafes in recent years, possibly in tandem with other reasons, has strengthened this street's subjective and objective scape towards a cultural-recreational area. Among these reasons is the Honarmandan park's existence, which has developed culturally and artistically in recent years and has affected the group of users of this area. Of course, it can be stated that the influence of the Honarmandan park and the cafes are probably two-sided and have strengthened each other. In total, about 30 cafes with an acceptable variety were found in these two streets and their dead-ends.

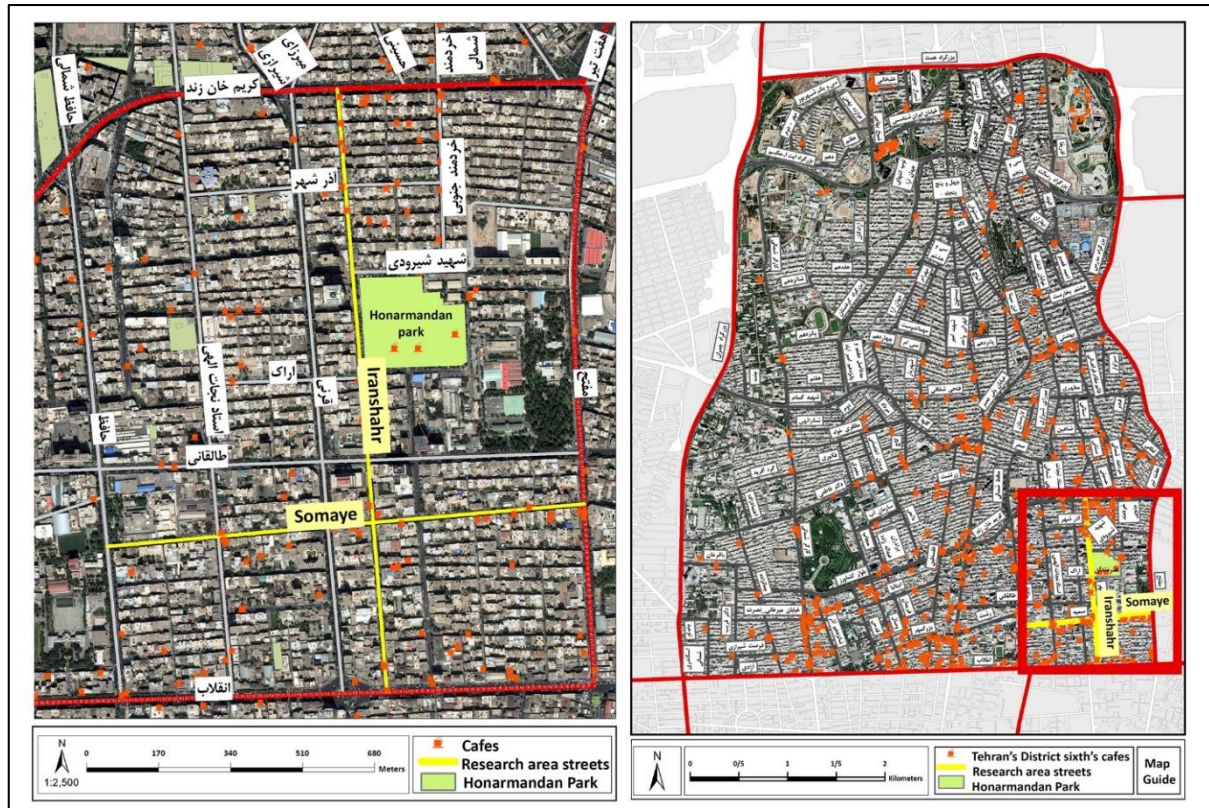


Fig. 2: Map of the study area

FINDINGS

Tables indicating themes, categories, and codes along with the analysis are discussed next. In general, the three extracted themes are Responsiveness, Preference, and Increase in presence; these and their corresponding codes and categories will be explained one by one.

The following two tables show the categories extracted by analyzing the cafe sitters' answers to questions about their presence in cafes and urban public spaces. The results indicate the priority of using cafes compared to other public spaces because cafes meet a wide range of desired functions and expectations.

By providing a private, comfortable, intimate, and relaxing atmosphere, cafes allow their users to "spend time alone" and become an invisible element. Besides that, cafes are "places of escape" that provide the opportunity for cafe sitters to escape from the daily pressures while allowing them to interact, talk, and socialize in the crowd.

Among the interviewees' statements, concepts emerged that reflect the inclination of this generation of cafe sitters in Iran. For them, having local or international meals, and drinking traditional or modern drinks in their leisure time, during meetings and while working in cafes, is very important. Another preference is the "desire for explore and diversity." Going to various cafes to get acquainted with new styles, designs, and decors, diverse and attractive atmosphere provided by various events, live music, and different themes are examples of this tendency. In contrast, referring to other public spaces using traits such as monotonous and dull is a sign of the importance of diversity, which has caused a noticeable group of people to spend their free time, on holidays or weekdays after work, college, and classes in cafes.

Therefore, the existence of universities, cultural, and administrative centers have boosted the high density of cafes in this area and have caused a high demand for cafes by people, especially the young. In this regard, in addition to resting after work, cafes have become a safe and comfortable shelter for people in the middle of the day when needed.

"When I needed to spend time, for example, waiting for a place to open, I went to a cafe. The fact that you can go to it at any time makes you feel very safe."

In general, cafes meet a wide range of users' needs, and this has led to people not only in their spare time, to relax between the day, play and even spend time outdoors (cafes with courtyards and flower beds); They go to cafes, but also to show socio-cultural resistance, do work and studying, and appoint social and work meetings.

Theme	Category	Sub-Category
Responsiveness	Places of escape	Peace, privacy, comfort, open and green space, music, spend time alone
	Interaction and socialization	Gatherings and meetings, communication, intimacy, among others
	inclination	Eat and drink, explore and diversity
	Visiting	After work or university, leisure, off-days, shelter
	Function	Working or studying, scheduling appointments
	Socio-cultural resistance	Rather freedom, resistance, art

Table 2: Categories and sub-categories of "Responsiveness" theme

For people's lifestyle, especially of the young generation, which is in conflict with the official discourse of public spaces, cafes provide a more appropriate and safe space. Therefore, this relative freedom in the cafe makes it possible to "departure from the dominant culture". People with their different and global lifestyles, disobeying restrictive laws, social discourse, and artistic expression communicate their social and cultural resistance.

"We have to start from ourselves to confront the laws that are not right; In fact, by not following them, we are protesting."

"I often went to cafes to draw illustrations; I wanted to bring art into society by that."

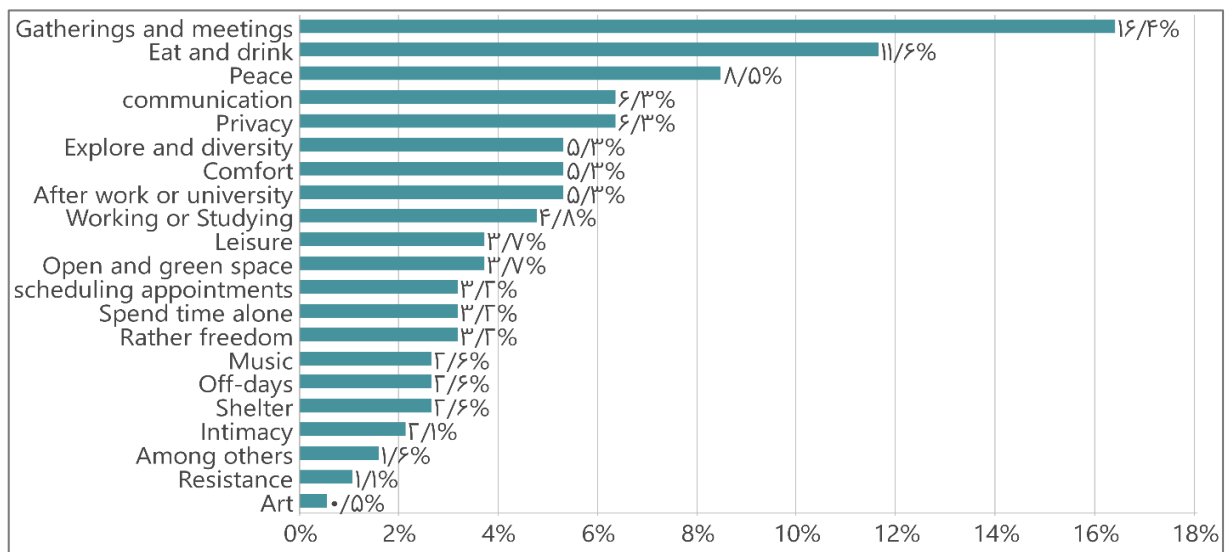


Fig. 3: The percentage of corresponding codes of the sub-categories mentioned in interviews

The theme "preference" means the preferring to choose the cafe among urban public spaces; Despite the occasional presence in other public spaces, cafe sitters often choose the café as a "hangout." Apart from some degree of compulsion to prefer a café in adverse weather conditions and the greater suitability of the café for women, at other times, presence in other public spaces is often accompanied by spending some hours in the café before or after visiting other places.

"Café is my first choice; other spaces are not routine for me; "From a spatial point of view, I would prefer a café with a yard over going to parks."

"When we go sightseeing around the city, we go to the cafe again at the end; Well, after Mellat Park, for example, I go to a cafe again after."

Theme	Category
Preference	Priority, Other spaces, Complementary, Hangout, Weather conditions, Women

Table 3: Categories of "Preference" theme

"I go for the cafes, and then I say, 'Well, now let's take a walk around here.'"

"Parks are not very safe; "Especially for us as ladies, if we sit in the cafe till late at night, there will be no problem."

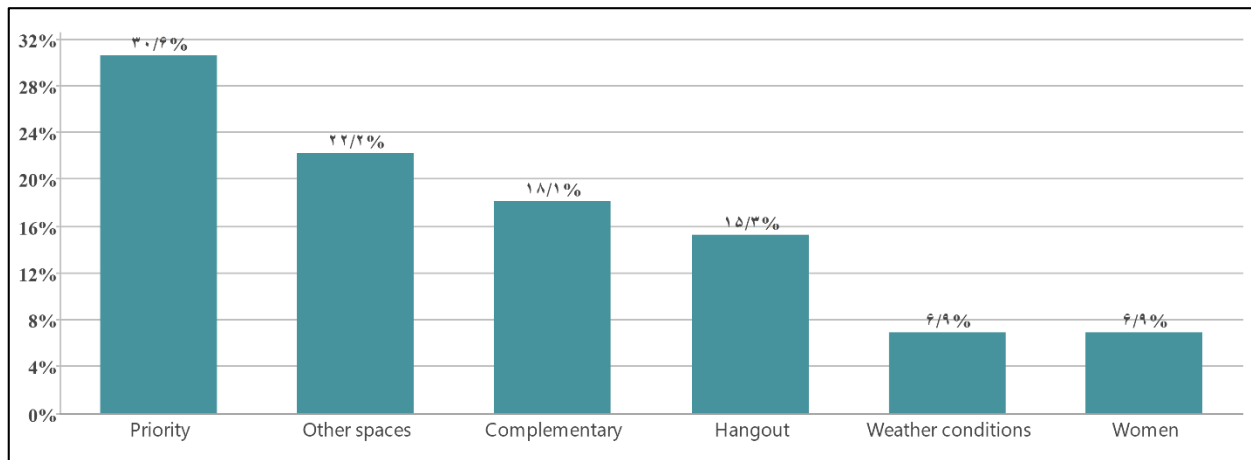


Fig. 4: The percentage of corresponding codes of the sub-categories mentioned in interviews

By asking the cafes living in the area about their perception of the existence of several cafes in their area, the analysis of the interviews generally showed the residents' satisfaction. Many of them usually spend their free time in the same area of their residence, in cafes, Honarmandan park, and other cultural and artistic spaces, and were satisfied with the facilities that cafes have provided for them when needed.

"All in all, It is pleasant for me, and I felt safe and comfortable. On the other hand, for example, because our house is small and cramped, this option that when meeting someone, you can go to a cafe instead of the house is truly life-saving for me."

In order to allow comparison, the interviewees were asked to compare their previous neighborhood with the current one; Reminding the normal situation and when cafes were closed due to quarantine, but other businesses were allowed to operate also provided a good way for comparison. Older residents

were also able to compare the past and present of the neighborhood. They attributed the sudden growth of cafes in the area to three to four years ago. The interviewees stated that the existence of several cafes in the neighborhood, which used to be primarily an administrative and residential area, has made the street active for longer hours of the day by adding new people and their commute, which has created a greater sense of security, especially for women.

"When I come home from work at night, I feel much safer when, for example, near my house, some cafes have their lights on, with some people in them."

Despite the traffic jam and the crowd, the presence of these people, mostly students and artists, is generally considered positive, and this is due to the cultural, cheerful, and friendly atmosphere that they bring to the area.

"When the cafes are filled with people coming and going, this gives me a feeling that this city is alive, a sense of life has been created in this street."

"Other areas seemed strange and unfriendly to me compared to here."

Theme	Category	Sub-Category
Increase in presence	Positive perception	Satisfaction, using cafes
	Being active for long hours during the day	Busy, Sense of security
	Friendly and cultural-artistic atmosphere	Friendly and cultural atmosphere, aesthetical effect, introversion, the artists and café sitters
	crowdedness	Traffic jam

Table 4: Categories and sub-categories of "Presence" theme

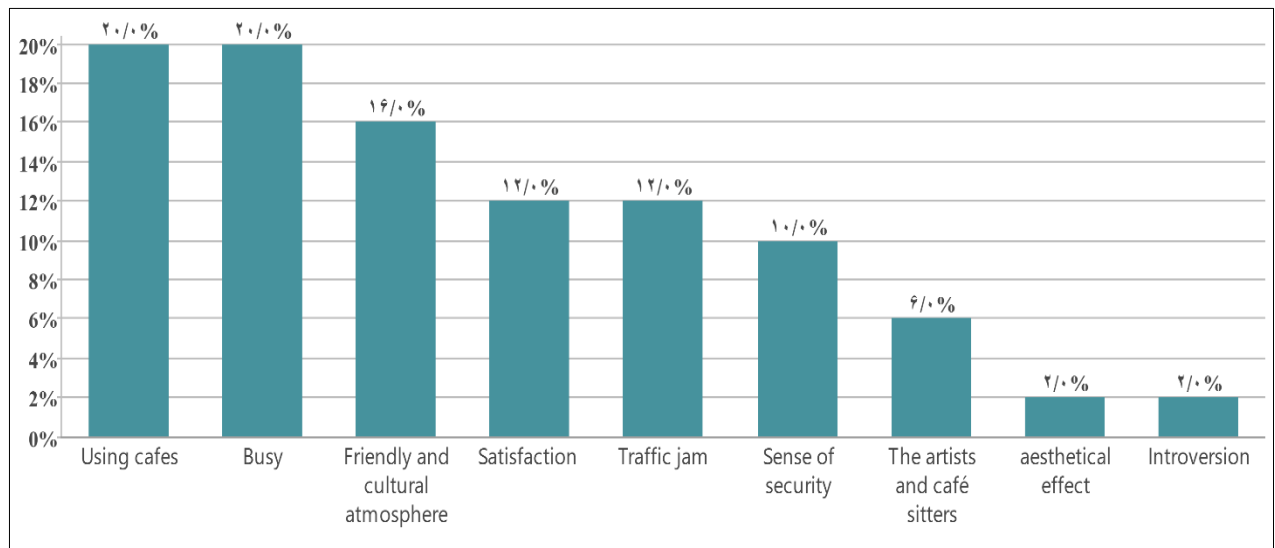


Fig. 5: The percentage of corresponding codes of the sub-categories mentioned in interviews

It should be noted that the state created in this area is exceptional in terms of the unusually great number of cafes. Because of being introverted, cafes' impact on the street is reduced. However, the high number of this area's cafes has increased the presence and the entry of a new population. The cultural and artistic atmosphere of the area is the result of cafes and café sitters in tandem with many other cultural, artistic, and academic centers.

CONCLUSION

This study aimed to compare the use of cafes and other public spaces and the impact of numerous cafes on Somayeh and Iranshahr streets.

In the literature review section, discussions and criticisms on cafes and contemporary public spaces were examined. In recent years, privatization and the end of public space are among the most critical views and debates about public spaces. Critiques such as private ownership and consumerism compulsion have limited the free public access to such spaces. In fact, public spaces used by people have deviated from their classic principles. Apart from the global literature, social, political, and cultural context is essential factors in this kind of analysis that should not be ignored. In other words, despite what has been suggested in the global literature indicating control, monitoring, and restriction in privately-owned spaces as opposed to publicly owned urban spaces, some findings of this study reveal that in some ways, the opposite is true in Iran. In many cases, people take shelter in cafes from the dominance of the official discourse governing urban public spaces and escape from control and intrusion into their privacy. In Tehran, people with different lifestyles from what the government inspires are somehow engaging in symbolic protest. Due to cultural differences, this urban class, primarily young people influenced by global culture, attend cafes in groups or alone. It has been said that this tendency towards cafes is due to lack of other urban spaces, Failure to meet all the needs of this group, and less supervision in cafes. In fact, it can be said that in Iran, people's freedom is more respected in semi-public spaces with private ownership than in public urban spaces.

Although the lack of responsiveness and desirability of other urban spaces has been a significant factor in pushing users to cafes, these places have become a primary option for cafe sitters that they even use cafes as a complementary even when visiting other spaces. People said that depending on their mood, they might choose any public spaces, but they are not as routine and perfect as cafes. As third places, cafes are the central place of public life, which offer an intimate and neutral atmosphere to socialize and be among others. At the same time, these "places of escape" provide a private and relaxing space for people to spend some quality time with themselves and relieve themselves from anxieties. Cafés respond to a wide range of needs, enabling cafe sitters to perform various daily work and social activities in cafes. Cafes are also referred to connect with consumer culture and the experience economy, which draw people from different regions by creating an attractive atmosphere through planning engaging activities, events, and diverse social spaces. Tehran's sixth district Cafes invite people from different regions to this area by designing attractive, diverse places and planning several events such as watching competitions and movies, live music, group games, and various other activities. On the one hand, Cafes have increased the vitality of the research area by activating the street during long hours of the day, providing security and entering new population, and on the other hand, influenced the atmosphere and strengthened the cultural and artistic character of the area. Residents have become users of these spaces when they need to, and despite the traffic congestion issues, they are generally satisfied with the cafes. However, it should be noted that due to restrictive laws that prevent the cafes from expanding to streets, most of these spaces are introverted; while sidewalk cafes have more potential to affect the vitality of the street.

Finally, it can be said that today cafes in Tehran have expanded as an alternative to the lack of free, pluralistic, flexible, diverse, and responsive public spaces and have taken on various cultural and social roles according to the circumstances and over time. Although they do not fully compensate for the lack of other forms of public space, in terms of characteristics, related to the socio-political context and in connection with the experience economy, they develop a new form of public life, which is dominant in socio-cultural productions.

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Chapter 4

Public Space and Urban Transformation

Characteristic Transformation of Public Space Using Photos as a Research Tool

Case study of Sabzeh Meidan Square in Zanjan

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ABSTRACT

For various social, political, environmental, and historical reasons, Iran's city and urban spaces are constantly undergoing many structural and functional changes over time. Among the urban spaces, Historical squares located in the center of the old cities are of particular importance, and over time, they inevitably undergo many changes. Sabzeh Meidan (green square) is the name of the central core of Zanjan, and its surrounding is the old fabric of Zanjan city. This square has witnessed many trades, political disputes, camps, and widespread protests, wars of executions and celebrations, and so forth through time. In recent years, even though the name of Sabzeh Meidan has remained on this space, its character has undergone changes over time, to the point that a specific physical boundary cannot be set for Sabzeh Meidan, and people sabzeh meidan based on their definitions. At present, this historical square of the city of Zanjan is in the hands of an unknown project to build a square similar to the concept of Isfahan's naghsh-e Jahan, and it has lost its form in an unknown direction. The purpose of this study is to investigate the changes of sabzeh meidan's character through time using a descriptive-analytical method, and the data are obtained using photography as one of the most essential tools for the visual expression of the city along with the narrations of local and old residents. The photographs used in this research include the archival collection of Meidan's past pictures from the library and human resources. Next to the photos, using accurate historical maps and descriptions and narrations, the course of changing the character of this significant urban space in Zanjan will be described. With the help of this research, the position and value of the visual expression and image analysis in urban studies will be illustrated.

Keywords: Public space, urban design, urban transformation, visual expression, visual tools, photography.

INTRODUCTION

According to Evers (Evers, 1984), access to urban land is one of the basic human needs in urban areas. It is the basis for the production of living space and the reproduction of the workforce. In this sense, access to urban space determines patterns of living and working in the city. In the context of the ongoing global urbanization, in particular, regard has to be paid to the transformation of public space.

The article is based on a photo-analyzed urban space transformation research project which, using the example of Sabzeh Meidan in Zanjan, Iran, asked in what ways the core urban space of the city changed from public discourses has and in what way has it, transformed based on photos and narratives of the public. Political, economic, and cultural changes have given a new significance to cities; urban space is being reshaped to accommodate the new urban conditions. In the broadest terms, urban design is the tool of this reshaping, hence its structural significance. (Maadanipour, 2006)

There are not many written historical studies of changes in public space and what has happened to them in Iran. Urban designers must be aware of the history of physical, social, political, and economic events

in urban spaces. One of the most essential sources that provide this information to urban designers is first-hand materials collected through qualitative analysis. With the rise of various governments in Iran over the years, urban spaces, especially in the center of cities, are constantly undergoing multiple physical, social, and characteristic changes. Sometimes these changes are limited to structural changes, and the character of the space remains constant, and sometimes the form, role, and character of the space change completely.

This article focuses on the use of photographs in interpreting the metamorphosis of public space. Photography is one of the most important tools of visual expression, and a visual expression is an important tool in urban design that can be used to discover and depict the order and disorder of the environment. In this article, the focus has been on photography, and alongside that, materials such as the habitats' narrations, Zanjan historians, local people, and written historical texts are used to study the transformation of space from a character-driven approach with the help of photography as the most important means of visual expression. First, I will review the theoretical literature related to the subject, and then based on the collected images and narrations of different people, a category of the character transformation of Sabzeh Meidan will be reached.

The main questions of this research for the visual study of urban space changes are as follows: What information does the visual data content, and how can they be used to interpret the reality of public spaces?

Visual Expression in Urban Design

Understanding the connection between the natural environment and the built one can be possible through the visual expression of the city. The visual expression can be used in the analysis of site studies in urban design. Enhancing visual capabilities and using the visual expression in urban studies increases the perception and knowledge of the environment and facilitates the discovery of the mechanisms of the built environment. The purpose of using visualization tools is to make judgments based on visual evidence. Humans constantly receive visual communication to understand concepts and subsequently cognition without the use of words. (Monari, 1394 as in hadad & farkis, 1398)

Capes argued that "Visual communication is a global and international communication: it does not have the limitations imposed by language, dictionary and grammar, and an illiterate person can understand it like an educated person" (kepec, 1388 as in hadad & farkis, 1398) Identification, understanding and interpretation of the hidden mechanisms of the city and its public spaces are possible by visual expression tools and due to its generality and comprehensibility for the majority of society, it is an excellent way to analyze spaces that the general user is them. As one of the branches of visual expression, photography gives us the power to record and judge public space based on visual evidence. Photography and photographs are used to record the reality of the city as it is, and the photos can be read as text in different ways. The photographs show the current state of the spaces and the people inside.

Visual Research Methods

Visual research and analysis tools and methods are essential for understanding the context and character of the urban environment. They identify the qualities that make a place unique and enlighten transformation development and decision-making. The broad scope of urban research encompasses, among other things, the history, physical form and characteristics of cities, and behavior of the citizens who inhabit them. These tools can be used in various ways to inform successful design, transformation, and management actions in urban contexts, and finally, we have found that they are often used in various combinations. (Buile, et al, 2021)

Around conventional approaches and resources for research about territories and urban transformations, according to Lidia Decandia, the tools and methods of urban planning analysis to produce an objective

representation of spaces are based on observing the territory from the top of the panoptic vision, taking into consideration only what is in front of us and what can be looked and described. (Decandia, 2000 as in Builes, et al, 2021)

Photography in Urban Design

The unique nature of photography—in contrast to language—is its depicting of visual characteristics of objects. Phenomenologically speaking, photography is a visual system of representation, by way of which the visibility of an object not being present is produced. Thus, we may state the relationship between the photography, that is, the representing part of the one hand and the depicted object on the one hand, and the depicted object, represented part of the other hand. (Christmann, 2008)

In using photography in public areas, from the local scale to large public spaces, various impressions can be achieved, including how the public uses space and their relationship. Photography of the city and in-city is not separate from the critical view, and the urban photographer describes, interprets, and criticizes the reality of the city. Photography stimulates the senses and increases visual power, promoting social awareness by increasing visual capacity. By increasing the visual capacity of urban spaces and social awareness, behavioral patterns in public areas, the performance and nature of space, and finally, the impact of public space on the behaviors and activities of people together and with the space can be obtained. Therefore, photography can be a tool to record and evaluate the current situation and provide a basis for their improvement.

On the other hand, urban design is the art of creating urban spaces, and its purpose is to create spaces where activities take place, security is felt, and where it is beautiful and easy to move. Photography as one of the main tools of visual expression of the city can be effective in criticism of urban design sites by visual-based judgment in urban design techniques and methods. Photography is a tool for seeing and analyzing the environment that urban design shapes.

Applications of Photography in City Studies

In some researches, photos of “then and after” of urban spaces have been used to revive the sense of nostalgia and to reconstruct the present. In his study of the city of Dresden, for example, Gabriel used serial-iconographic analysis to compare pre-war photographs of the spaces and buildings with the same situation to assess the extent of the damage. In this method, the image has three layers of meanings. The first layer contains the appearance details and the general description of the photo (description), the second layer is the primary meaning of the photo (first meaning), and the third layer is the leading and secondary meaning that the photo ultimately conveys to the audience (outside the image) (Gabriel B. Christmann, 2008). In general, it can be said that seeing a photo includes the steps of looking through, looking at, and looking behind (Collier & Collier, 1986; Wright, 2016). The result of the research was stopping the destruction of bombed and destroyed buildings with the resistance of the people who saw those photos, and eventually, many of the destroyed buildings destroyed during were rebuilt. (Gabriel B. Christmann, 2008)

Photography as a Research Tool

In this sense, and as some scholars have pointed out, visual methods enhance the richness of data by discovering additional layers of meaning, adding validity and depth, and creating knowledge. They add to traditional methods by capturing more detail and a different kind of data than verbal and written methods. (Xantle, 2017 as in Builes, et al, 2021) Photography, on the contrary, has been adopted by a wide range of approaches within social and human sciences that focus on the peculiarity of the visual and its specific symbolic structure and has been used as a method for multiple disciplinary analysis. (Builes, et al. 2021). It is essential to acknowledge that any photograph may have ethnographic interest, significance, or meanings at a particular time or for a specific reason. The meanings of photographs are

arbitrary and subjective; they depend on who is looking. The same photographic image may have a variety of (perhaps conflicting) meanings invested in it at different stages of ethnographic research and representation, as it is viewed by different eyes and audiences in diverse temporal, historical, spatial, and cultural contexts. (Pink, 2001 as in Builes, et al, 2021) This visual appropriation is a starting point for developing collective visions of the city and how it connects to the social purpose behind macro projects or urban interventions. (Builes, et al, 2021) This article documents the confluence between urban analysis, photography, and visual studies, which is now becoming apparent.

The focus and basis of the article have been on photography, alongside materials such as the residents' narrations, Zanjan historians, and written historical texts which have examined the transformation of space based on characteristic changes. Photos can easily show the passage of time and be understood by both professionals and the general public. Personality changes in space throughout history are determined by the subject of the photograph in each period, and it can be analyzed what issues the photographers project into public space and what they consider subjects of space in each historical period, and what changes have taken place in the photos of the later periods. The iconographic-iconological image analysis method has been used to achieve these analyses, which will be discussed in more detail in the next part. Knowing the metamorphosis of the role and character of urban spaces and the reasons for this transformation will help the urban designers to anticipate, manage and plan for future changes.

METHODOLOGY

This research is based on the study and analysis of changes in urban spaces over time using photography tools and people's narratives. In this research, a case study, Sabzeh Meidan square from Zanjan, has been used to describe the research approach. In the case study, firstly, archives of old photographs were collected from personal archives, networks related to urban history, and old studios related to Sabzeh Meidan. After collecting the photos, along with the local people's narrations about the history of the square, the changes in the character of the space were analyzed by the selected method of image analysis. Finally, the necessity of using photographic tools as an important part of visual expression in urban studies in urban design in similar studies has been discussed.

My analysis—among others—is based on the well-developed method of Erwin Panofsky's (Erwin, 1932, 1939, 1957 as in Christmann 2008) iconographic-iconological image analysis, particularly on Max IMDAHL's development of the analysis (see for example: Imdahl, 1994, 1996 as in Christmann 2008). This method happens in three steps. In the first step, the pre-iconographic description, all image details are systematically described (composition). In the second step, the iconographic analysis, the meaning of the image is concluded by employing knowledge from outside the image; among this, there is knowledge coming from other, comparable images, but also knowledge of production and publication context of the image, use. Finally, in the third and last step, the iconological interpretation, by local people interpreting synthetically both the structure of the image and the contextual knowledge, the "real meaning" of the image is worked out. This method takes the specific conditions of production, distribution, and usage of photographs into consideration. In the context of iconographic interpretation, the photographer's intention is supposed to be worked out, whereas by iconological interpretation, unintended meanings are supposed to be reconstructed by including historical, political, social, and cultural backgrounds.

In the next section, first, the article's case study will be reviewed, and then I will go to the findings, and according to the mentioned methods, the metamorphic analysis of the character of Sabzeh Meidan will be done based on the photo analysis.

CASE STUDY: SABZEH MEIDAN, THE SQUARE OF ZANJAN

Sabzeh Meidan is the name of a place that is considered the center of Zanjan, and its surrounding is the old texture of Zanjan. The basic structure of Sabzeh Meidan is back to the Safavi period. At the time of Shah Abbas, it was a period of stabilization and economic growth of the Safavi. At that time, the center

of the city, which has become an urban space today, was the place of fruit and vegetable markets called Sabzeh Meidan. Sabzeh Meidan's concept was also present in other cities such as Tabriz, Isfahan, and Tehran. The Government House, the Grand Mosque, and the Cheisari Bazaar were formed around this space in the city center. The architecture of Sabzeh Meidan and the surrounding buildings were fixed until Qajar. During the reign of Abdullah Mirza (simultaneously with the reign of Fath-Ali Shah) in Zanzan, the urban structure of Zanzan was formed based on the modernity of that time. Until the reign of Fath-Ali Shah, the central square of Zanzan was a square inside the Bazaar in front of the Mirzaei Mosque. Sabzeh Meidan was in the role of fruit and vegetable market. Apart from the Grand Mosque and Bazaar (public section) to the south of Meidan and Dar al-Hakumah (political section) and the Finance Department (government section) to the north, it was empty around Sabzeh Meidan. At that time, the traditional fabric of the city grew symmetrically. Rows of blacksmiths up and down, knives up and down. The entrance to Sabzeh Meidan was limited to the entrance of Bazaar. Later, during the Pahlavi era, 1313, Pahlavi Street was stretched between Sabzeh Meidan and Bazaar. After the revolution, it was changed to Imam Street. In 1397, it became Imam Sidewalk, and some of the street façades have also been rebuilt, and we see the uncoordinated view today.

In the Pahlavi period, the surrounding buildings and the Qajar front began to crumble and peel. Italian architecture based on western architecture stretched Pahlavi Street between Sabzeh Meidan and the entrance of Qaisari Bazaar in the south of Sabzeh Meidan, and the wall of the square was changed following the new wall of Pahlavi Street. Modern western uses such as cinemas, photography studios, bookstores, and café formed the wall of Pahlavi Street. The environment around Sabzeh Meidan was filled with schools demolished one after another to widen the streets in the following years. The Dar al-Hokuma became Shahr bani (police office), behind which was the prison. After the Iranian Revolution in 1357, Shahr bani retained their role as a police station, and the prison moved to another location, replacing it with an ample vacant space that had been a public parking lot for many years. In 1375, the Sabzeh Meidan expansion project was undertaken by Zangan Gostaresh Company to build a vast square in Sabzeh Meidan, imitating Naghshe Jahan in Esfahan, and continued to Zolfaghari Street in the north of it. In line with this plan, many mansions, such as the Vaziri mansion, were destroyed in about 1378. The project started from Sabzeh Meidan and extended to the famous Zolfaghari building behind Dar al-Hokuma. Finally, the approval and start of construction took place in 1399, and now the excavation and construction of the square wall are underway, and only a tiny green space with the presence of a pond and two lion statues remain of Sabzeh Meidan, which is the hangout place for retired old men and vendors. The role of Sabzeh Meidan has changed over time—the green space that was a gathering place for different groups of people nowadays is surrounded by certain groups, and the rest of the general public uses the sidewalk more. (Hassan Hussein Ali)

SABZEH MEIDAN AS A POLYSEMY SPACE

In the history and oral literature of Zanzan, it is stated that this space, in the course of its ups and downs, has always been a witness and observer and the prominent place of political disputes, camps, political sidings, protestations, wars, and outbreaks. There have been executions, celebrations, speeches, cries, shouts, and so on. Sabzeh Meidan carries many aspects, and the city's people each have a different impression of it. Examining the photographs collected from various sources, I concluded that I would analyze the metamorphosis of the space not chronologically but based on the thematic categorization of the photographs taken over time. In general, no image of the original core of Sabzeh Meidan in the Safavi period is available, and from the Qajar era, there is only one image that is not distinguishable if it is a photograph or a painting due to its poor quality. Most of the photographs taken from Sabzeh Meidan are from the time of modernity and management of the Pahlavi era. The character changes of the space are divided into three categories: the social aspect of the photographer (Sabzeh Meidan as a promenade), the political aspect of the photo (Sabzeh Meidan, the place of political gatherings), and the physical aspect of the photo (Sabzeh Meidan, the option for the large projects). Based on the method

of analyzing the images presented in the methodology section, I will analyze the transformation of space.

Social Aspect of the Photographer (Sabzeh Meidan as a Promenade)

Changes in the urban structure of Zanjan during the Pahlavi era were significant. Street construction to enter cars into the urban fabric, imitating Western management, and European uses were formed during the Pahlavi era. During this period, the greenery around the square began to shift, and the streets changed the skeleton of the city. From the '30s to the '50s, we see photos that focus on people inside the green space of the square.

In the following the analysis is inspired by the above-mentioned approaches and synthesizes them. The three analysis levels are image composition, production or publication context, and ways of reception.

Image Composition

The content of photo 1 is square-shaped and was taken in the '50s. Sabzeh Meidan forms the background of the photo. In the picture, three young men are seen sitting on the green benches in the square, and behind them, grass and trees can be seen. The photo frame is slightly tilted to the left, and apart from these three men, no one else is seen in the image. The design of the image is simple, and the photo is from the category of souvenir photos in portrait format and is a bit blurry. Thus it seems that the photo was taken from a personal album. Considering the technology of cameras in the '50s, the image is a color photograph and received from it. The predominant color is green. My research shows that people and social matters, in general, were more valuable in the '30s and '50s than the physical body of Sabzeh Meidan. The fashion style of young men and their pose can be inferred from this picture since they had put on their most up-to-date clothes and got there. The photographers of these pictures do not seem to be famous people, and these photos belong to personal archives.



Photo 1. By Mohammad Karimian, 1356

Photo 2 is also square and was taken in the late '30s. In this photo, we see more space from Sabzeh Meidan in the background. A man stands in the center of the photo on the edge of the park's famous pond. The pond is full of water, and simple stone bounties and trees and buildings can be seen behind the man. Due to sunlight and photography, some parts of the image are over-exposed. The design of the image is simple, and this photo is a bit blurry from the category of souvenir photos. It seems the original photo had been taken pictures of several times, so its quality has decreased. Considering the technology of cameras in the '30s, the image is black and white. The combination of other photos in this interval also shows the importance of the person as a subject.



Photo 2. By Amirhossein Esrafil, 1339

Production and Publication Context

The immediate context of publication: Things become interesting when we look at the immediate publication context of our image, for there is a counterpart to it.

As the role of social media in people's daily lives becomes more prominent, access to information becomes much more possible. First, I went to the library resources and old photography studio of the city to collect the photos. The oldest photographer in Zanjan, whom I had heard had many photos of old spaces, including Sabzeh Meidan, indirectly refused to cooperate, and library resources had very few photos of the whole space. By surfing the internet, I gained a large amount of old information about the city of Zanjan from all the Instagram and Telegram channels. Many pages on Instagram collect personal photos of different people living in the city with their historical descriptions, and helpful information can be obtained by searching. Photos 1 and 2 were collected from Instagram pages.

Putting photos of that period together, I realized that the role of individuals in the photography of that time was prominent, and the locals have confirmed this issue. The green space inside the square was formed during the Pahlavi era, and around it, various shops and stores were formed near the police station and the bazaar on the other side of the street, which also turned it into a commercial center. (Bazaar shopkeeper) Many mentioned that it was a hangout of intellectuals at that time, taking many souvenir photos in that space.

Reception (Interpretations)

The ways of reception and the further communicative processing of these photographs in the context of the public space transformation in that time were analyzed ethnographically. My observations concluded that the locals' comments linguistically express the "meanings" one connects to the images. The impressions that people had of Sabzeh Meidan at that time are consistent with the category of photos taken:

"The green space inside the square was formed during the Pahlavi era and was called a park where trees, plants, and benches were placed, and it was probably one of the few parks and perhaps the first park where intellectuals gathered in Zanjan." (Quoted from Zanjan, the words of Farajullah Davoodi)

"In the Pahlavi era, Sabzeh Meidan had a different value. Modern and high-class people used to come around, and youngsters with up-to-date styles were always in the park. Everyone who came for shopping also tried to show themselves off in the park."

"Now Sabzeh Meidan is half full, it used to be bigger and had benches and trees. We were excited to see shops and cool people; I was in elementary school at that time." (A woman from the city)

According to the photos and sayings of the city's people, the physical changes of Sabzeh Meidan have not been as noticeable as the change in the users of the space. Despite introducing the concept of the street to the city, the architectural changes of buildings, and their modernization, the thing that reminds people of Sabzeh Meidan at that time and remains in their minds is the overall atmosphere of its people. New uses such as cinemas, fashionable clothing shops, cafes, and confectioneries had drawn many young people to Sabzeh Meidan.

Political Aspect of the Photo (Sabzeh Meidan as a Place of Political Gatherings)

Image Composition

The photo frame is rectangular. It shows the gathering of people in the first Muharram ceremony after the revolution in 1357. The picture is full of men, and not a woman is seen in the picture. Some young people have been dressed in white clothes, called shrouds, and carry a cloth with the slogan "Muharram, the month of the victory of blood over the sword." Most of the men in the photo are chest-beating (a

religious ritual). In the background, there are shops with closed shutters on the left, and on the right, we see the green trees of Sabzeh Meidan. The Muharram march must have started on Imam Street in front of Sabzeh Meidan and had undoubtedly extended to Enghelab Square. Considering the technology of that time, the image is a color photograph, and the white color in the image attracts more attention. The clothing and the leafless trees indicate the cold season. This photo can be categorized as documentary and news photography and has relatively better quality but is still a bit blurry.



Photo 3. Asilzanganilar Telegram channel, 1357

The image frame is rectangular, and at first glance, the rhythm in the image attracts attention. This photo is related to the first IRGC parade in 1359 of Sabzeh Meidan to Enghelab Square. We see soldiers standing in a line, leaning on the ground with their weapons in the picture. Their similar appearance is a sign of the young revolutionary style. Among them is an older adult on the left of the image, which appears to be an Akhund. The design of the image is simple, and although there were color photographs at the time, it was taken black-and-white. From the top right corner of the photo, you can easily see that this photo was taken from the original photo with a smartphone. This image can also be considered as documentary and news, which also has an acceptable quality.



Photo 4. Golpasandam, 1359

Production and Publication Context

The field of publication and production of these photos is similar to the photos of the previous period: personal archives that have been collected by individuals in virtual networks and made available to the public.

Reception

People's impression in the early years after the revolution was a mixture of pre-revolutionary memories and post-revolutionary events. The true meaning of the photographs of this period is an indicator of a change in the character of Sabzeh Meidan and its immersion in a political role. Sabzeh Meidan, as an important core alongside Enghelab Square, was the place of important political gatherings of that time. "With the Islamic Revolution, Sabzeh Meidan changed its character, there weren't no as many intellectual youngsters as before, it was no longer a fashion center, and Sabzeh Meidan Park, which was now halved, had become a gathering place for old retired men. Its cinemas were closed and only one of them continued to work. The young lovers who used to buy sweets from the pastry shop after the cinema and go to the park were not there anymore. Imam Street was occupied by cars and there was smoke everywhere." (Old bazaar seller)

"Zanjan shone during the revolution. I am proud to say: The brave-hearted and revolutionary women of Zanjan did their first independent march in the country during the tyranny and oppression of the monarchy. In a breathtaking struggle against the royal guards, they stood and even sometimes marched in front of the protesters, with men behind them." (Farah Moradian)



Examining the sources and documents of the Islamic Revolution, it can be inferred that religious groups in Zanjan were among the first ones to join and accompany the struggle after the beginning of Imam Khomeini's call to action. In early October 1357, the people of Zanjan participated in a large demonstration and destroyed the statues of Reza Khan and Mohammad Reza Pahlavi in the city (Navid Weekly Report). The political atmosphere prevailing in Sabzeh Meidan in the early decades of the Islamic Revolution formed its character. Sabzeh Meidan and Imam Square had become the site of political and religious gatherings. The role of the Grand Mosque had become more prominent, and due to the large presence of cars on Imam Street, the recreational and leisure atmosphere of Sabzeh Meidan was no more. Even at the beginning of the Iran-Iraq war, a shelter was built at the entrance of Sabzeh Meidan, which later became an aquarium, a public health service, and is now closed and sealed.

Photo 5. Masoud Babazadeh, 1357

Physical Aspect of the Photo (Sabzeh Meidan as the Option for Large Projects)

Considering the increasing popularity of photography in recent years, it can be argued that the subjects of photography are more diverse than in the past when the use of photography was more limited and unique. Undoubtedly, many personal and non-personal photos with different positions and subjects have been taken from Sabzeh Meidan, but those photos that show the character changes of the space and are more visible than other topics in social resources and networks, are related to large urban projects that have targeted Sabzeh Meidan in recent years. The Imam Sidewalk project from Sabzeh Meidan to Enghelab Square and the huge Sabzeh Meidan project similar to the concept of Naghshe Jahan in Isfahan are among the biggest projects of recent years.



Photo 6. Imam sidewalk. 1397
<https://www.kojaro.com/attraction/23415>



Photo 7. New project of Sabzeh Meidan,
Sana Avar. 1400



Photo 8. Sabzeh Meidan
<http://old.mojerasa.ir/>

Reception

Moving from the revolutionary atmosphere and the tension of the Iran-Iraq war, Sabzeh Meidan has become a crowded and irregular urban center that has created a staggering atmosphere. Older adults

became regular members, either coming to chat or to sell antiques. It cannot be denied that, unlike in the past, there is no such thing as the culture of the kids of Sabzeh Meidan (Farahullah Davoodi).

In the small remaining space of Sabzeh Meidan, the presence of women and families has been greatly diminished. The desire for people to be present in Sanzeh meidan (Imam) sidewalk has increased. However, there are various interpretations about the sidewalk and its impact on Sabzeh Meidan

"Unfortunately, this part of the city is similar to anything but a sidewalk! If we survive the cars, we will not be safe from various motorcycles or silent bicycles... from left and right and up and down... most likely, the sidewalk will be closed in Sabzeh Meidan and transferred to Darvazeh Arg." (Citizen)

"I was relentlessly against this so-called plan from the very beginning, and I still am. A sidewalk with thousands of problems for citizens and businessmen, which was just a blind imitation of other cities such as Tabriz and Hamedan, so forth. From traffic problems to the presence of motorcycles and cars. This ridiculous, useless, and, of course, troublesome design is also one of the masterpieces of geniuses that will embarrass the people of Zanzan in the future!" (Citizen)

In Siran news site, this sidewalk is mentioned as Sabzeh Meidan sidewalk:

"The Sabzeh Meidan sidewalk is one of the best parts of the city to walk, enjoy the space and buy souvenirs for friends and acquaintances. Besides visiting the natural and historical sights of Zanzan province, if you want to walk around Zanzan, one of the best options is Sabzeh Meidan. The street is completely paved, and no car is allowed to enter, so you can walk safely and go from one side of the street to the other whenever you want. It is very convenient. On both sides, you see a lot of stores offering different products to their customers."



Photo 9. Sabzehmeydan Telegram Channel

After the sidewalk project, city managers were not satisfied; this time, they executed a proposed plan in 1375: The huge Sabzeh Meidan project, known as the Sabzeh Meidan hole. In less than a year, the project progressed at high speed, and it seems that the real identity of Sabzeh Meidan is being destroyed, and we will be faced with an unfamiliar and new concept. "Sabzeh Meidan project calendar (you say Sabzeh Meidan hole market!) shows one day until the end of the project, and this is while until the completion of this characterless and troublesome project for the city! You have to wait a long time! This situation is the pitiful urban management in Zanzan!"

The faculty member of Zanzan University pointed out: "This alienation from identity and culture is such that today even the people of Zanzan do not feel any belonging to this city, but are faced with an alien being, a concept completely foreign to the culture of the people of Zanzan." The professor of Zanzan University referred to the Sabzeh Meidan and Seyed Al-Shohada Bridge project and stated: "These projects have no compatibility with the concepts of capital, assets and wealth, and have become almost faceless assets only by spending billions of money."

In the old part of the city, many buildings and monuments were destroyed by new structures and mismanagement, with the idea of revival and renewal of the central crust of the city and not its destruction! Nothing has been done and the city's reputation, civilization, and historical past have been ignored. The gradual adaptation of the car network has had adverse effects on the old fabric of this space and massive bland projects.

CONCLUSION

Sabzeh Meidan as a core of old Zanjan is commonplace in Zanjan's urban discourse and is rooted deeply into the collective memory. In creating this view, photos from different times play an important role in reminding people of Sabzeh Meidan. Photos can show spatial changes from different aspects. Of course, photos should not be discussed separately. A collection of categorized photos discusses spatial variation, communication, and meanings. This collection of photos, in addition to the aesthetic nature, influences the creation of a mental image of the city. Understanding urban spatial metamorphosis will affect future developments. Sometimes the impact of photos and mental images of the city can prevent destructive projects to preserve the spatial identity. The use of visual tools, in addition to discovering quantitative and qualitative information, contributes to the advancement of researcher-centered research. Photography is useful for exposing social practices and expressions of life and can greatly contribute to urban development and construction. The advantage of this group of tools in urban studies is that they allow the analysis of their social complexity processes; a research tool that is flexible about data, people, and their communications and experiences.

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Privatizing public space: the neoliberal urban product “mixed-use developments”

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ABSTRACT

This research aims to analyze a recent trend seen in the 2014 Fifa World Cup host-city Porto Alegre, Brazil, a new type of urban development proliferating throughout this metropolis: mixed-use spaces, which condense multiple functions, such as home, work, leisure, health, education etc. As the neoliberalization processes continue, the urban space becomes increasingly privatized, with these private developments seeking to simulate a public space for those who can socially afford it. This type of development can deepen the upper and middle classes self-segregation process, which occurs mainly through gated communities, by allowing a greater level of detachment from the rest of the city. Our methods consists on: collecting terms and references in foreign languages used in advertisements, as well as new technological elements; organize these developments by functions and categorize them in a map between new, reformed and false; interview actors of these developments, utilizing a semi-structured questionnaire; financial information of the companies involved in these developments' construction; mitigating and compensatory measures demanded by the city; and photographic registrations. Our results confirm this type of development as a major trend in the current urbanization process, with this feature being sought so much one can propose there is a “false” – and financially unsuccessful – type. This kind of development is being (re)produced in different parts of the city by different companies, with this repetition of lucrative models leading to an increasingly homogenized, fragmented and hierarchical urban space (LEFEBVRE,2008), in which not only the public space is degraded due to the weakening of the public realm as is transformed into a private commodity to be commercially consumed (CARLOS,2013). The city is increasingly being treated as a financial commodity, acquiring features of this form, including ones contradictory with the nature of space as a right and as a necessary public structure of the city.

INTRODUCTION

In the beginning of the third decade of the 21st century, the metropolis of Porto Alegre, the southernmost host city of the 2014 FIFA World Cup, continues to undergo profound changes, as well as several metropolises under the aegis of financial capitalism in the current ultraliberal inflection. In fact, the current moment is one of a more advanced phase of the urbanization process, defined as metropolization, which is "a historical determination of contemporary society associated with capitalist restructuring (...) because it stands as a fundamental condition, means and product for contemporary social reproduction." (Lencioni, 2008, p.81).

The planetary urbanization process through - but not only - the implosion-explosion that Lefebvre foresaw still in the 70s, continues to develop and deepen, even, and perhaps mainly, after being directly related, in different ways, to some of the biggest crises of capitalism – the most recent example being the case of Chinese company Evergrande. This implosion-explosion process (Lefebvre, 1970) materializes as the production of the metropolis implodes the city, changing its content, concentrating activities of management and consumption of space and not just in space, and explodes as the urban fabric extends to the peripheries and the urban becomes generalized. There is a real metamorphosis insofar as it affects the structure, form and function of urban spaces (Lencioni, 2017[2011]) and "provokes a rupture and restructuring of the entity previously identified as 'city'" (De Mattos, 2016, p. 26). This is directly related to the development of capitalism after the fall of the Keynesian-Fordist

accumulation regime, as economic globalization strategies based on neoliberal policies, technological revolution and financialization, designed to overcome this and subsequent crises, increasingly focus on enabling the expansion of capital to the urban space. The urban space, already condition and means for the reproduction of capital, increasingly financialized, ends up also becoming a product: "from condition and means for the reproduction of the production of goods, now the space gains the condition to be itself productive" (CARLOS, 2013, p.47). In this way, urban space is increasingly being transformed into a commodity, acquiring characteristics of this form, even those directly contradictory in relation to the city as a right and space as realization of life. Urban planning passes from public managerialism to private entrepreneurship (HARVEY, 1989) and the city to act as a company being managed as a business, competing in a global market of cities seeking to attract investments, said to be necessary for development, with all the consequences that this brings – a simple example seen in everyday life is the nomenclature of urban public spaces based on the names and images of commercial brands.

As a commodity, then (re)produced to be profitable, the space tends to homogenize, both internally on a small scale, with the self-segregation of the middle and upper classes, and externally on a large scale, with the repetition of true urban resorts in different metropolitans spaces; the fragmentation due to the subdivision of the land in several lots with access determined by the purchasing and symbolic power, being then for few compared to the rest of the city; and hierarchization due to the growing socio-spatial inequality between consumers, in the form of customers or investors, and non-consumers. Even master plans tend to homogenize and reproduce so-called successful international models, indicating the commodification of even this planning instrument (FERREIRA et al, 2013) historically associated with public power.

Planetary urbanization happens not only with the expansion of the urban fabric, but also with the urban space itself becoming more and more internationalized, through both economic and financial as well as cultural and political flows. Thus, there is foreign capital present in the production process of urban space, both in the form of investment, driven by the fluidity of financialization, and ownership itself, even creating the figure of the global corporate landlord (BESWICK et al, 2016). If the urbanization process was already taking place in a multi-scale way, this characteristic is even more amplified with the advance of globalization in the current stage of capitalism development. The international influence on culture, something already latent in our society, takes place in the urban space through the names of the developments, the nomenclature of their spaces and the reference to places with a global image, from cities and architecture to design studios, as elements of valuation. In politics, this appreciation turns into validation, with the government seeking partnerships with projects and/or models of international reference, also implementing the so-called "Best Practices" advertised as the solution - external - to - internal - problems, expanding the "Soft Influence" of foreign actors (Peck, 2013), in what could perhaps be considered part of a neocolonialism (VAINER, 2014).

Information and communication technologies, through "space-time compression", are what allow and drive capitalist development in its current form. Although there were already previous processes, the Covid-19 pandemic accelerates this scenario, serving as a catalyst, which is not surprising considering that the pandemic itself is the result of the capitalist system. Processes that were still incipient or that still faced objection began to be quickly and mandatorily adopted, such as Home Office and Distance Learning, anticipating the consequences they would bring and even creating new ones due to the way they were implemented.

This research focuses on a new type of real estate product that summarizes the characteristics of the current moment of urbanization, mixed-use developments. They are private spaces with controlled access being reproduced in different areas of the metropolis, condensing various functions, from housing and work to health and education, also sold as investment and linked to images and international companies, in addition to seeking to simulate spaces of public sociability. Specifically, we focus on the main ones located in the metropolitan core, between the central area and the influence area of the third beltway, which, created at the beginning of the century, is also related to this moment of the urbanization process, including creating conditions for such.

It is almost a consensus that planetary urbanization is in a new phase and, therefore, there is a great theoretical effort on the part of several authors in order to understand the characteristics of this new moment in the world urbanization process (SOARES; FEDOZZI, 2016). This effort is necessary because “it is impossible to properly understand this formation through traditional concepts” (BRENNER, 2014, p. 10), as the paradigms and theories used to explain the previous phases do not serve to understand this one. In the words of Soja (2013, p. 151), “the era of the modern metropolis may be ending, creating a growing need for new structures for the understanding and study of cities and urban geographies”.

As urbanization becomes increasingly global, surpassing urban boundaries (BRENNER, 2018) and remaking the very idea of the city (DE MATTOS, 2016), the analytical study of metropolises becomes increasingly relevant to development of society. The basis for any intervention, proposing changes or solving problems in the metropolises is the prior understanding of the characteristics and processes present in the urban space, under the risk that, if we do not understand the city we are studying, we may incur errors in the analysis, responses and even policies: “Thus, we must not separate the dimension of social action from the dimension of science. And in this sense, we must not forget that it is important to interpret the world, but with the objective of contributing to transform it” (FERREIRA, 2019, p. 36). It is not possible, for example, to change the processes of segregation and fragmentation without first understanding them as best as possible, including the most recent characteristics. So, the initial step for any future action on urban space is the understanding of its production and reproduction processes. And, if we take into account the arguments of several authors and accept that we are in a new phase of planetary urbanization in which even the very concept of the city has changed and needs to be re-theorized, research on the processes and changes taking place in the latin-american metropolis become even more relevant.

Following Roy (2015), for whom current urban theory must think relationally about cities and must be generated in the South, extending beyond the financial enclaves of world cities because the study of a single city can emanate generalizable models of analysis and Pradilla Cobos (2018), who argues that Latin America has, as already shown, full capacity to develop an extremely qualified urban analysis of its own, this research aims to analyze, based on mixed-use projects, the current transformations in the metropolis of Porto Alegre, Brazil, under the influence of globalization, focusing on multi-scale processes that drive the commodification of the city and private social actors that relate to, benefit from and promote this cycle of capitalist reproduction through the exploration of urban space.

For this, we surveyed the main developments of the selected type in the delimited area, collecting, through websites and advertising materials, which include social networks, information such as international terms and references, new technologies, financial elements, among others. We carry out field trips, according to the pandemic scenario at the time, for photographic recording.

Discussions of the results focus on international references, such as names and images, on a typology between new, renovated and “false” developments, on glass facades, on the occupation of urban voids/discontinuities, on open spaces of circulation, seeking to simulate the public space, in the network organization of companies, in the presentation of enterprises as investments through advertisements on social networks, in what we are proposing as passive data collection. We can point out that, transformed into a commodity, space acquires the characteristics of this form of capital, including those contradictory to its own essence necessary for the realization of life.

RESULTS AND DISCUSSIONS

The partial results of this research, which is still under development, demonstrate the constant appeal on the part of entrepreneurs to associate themselves with global symbols. This is seen both in the names of the projects and their internal spaces, always in a foreign language, and in the reference to mixed use itself as a global trend sought by customers. The videos and images projecting the developments, as well as these when in fact built, have stores with foreign names, as well as phrases or words in English in various spaces, such as “laundry”, “playground” and, of course, “gourmet” (used to try to add value to several cases) and even phrases, often motivational - which help to reinforce the neoliberal ideology

of meritocracy. Attention has to be drawn to the misspelling of the word laundry in some cases (lOundry);, they use words in a foreign language as an element of value without even knowing in the slightest how to correctly use them. It is also worth highlighting the presence of people in the projected videos, mostly white, revealing once again the unquestionable racial element of Brazilian society, as well as others that are not even considered to appear, because they are so socially invisible.

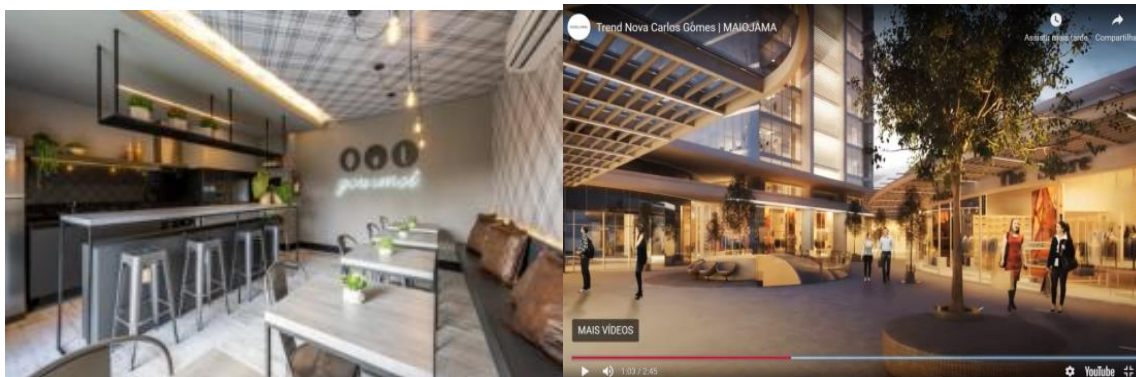


Fig. 1&2: Gourmet on the wall/projection stores and people.

The transformation of space into a commodity brings homogenization (not to be confused with equality), as successful products are reproduced to exhaustion (and why wouldn't they be, if they are profitable?), to the point where innovation becomes necessary and then looked for. In Porto Alegre's real estate market, this process can be seen through the repetition of real estate products, creating real series, in different parts of the metropolis. This is the case, for example, of the Grand Park and HOM (Home-Office-Mall) developments, or even of officially different developments, but with enormous similarities, even marking some urban landscapes of the metropolis by their repetition.

Here, we are talking about both appearance, which should not be neglected, and content, with the “mixed use” function being sought after by many enterprises. In this sense, many releases are already designed with this feature, existing ones (generally shoppings) are renovated to acquire it and others still create spaces that, although selling this same idea, perform it in a very different way, and may even be classified, as in our typology, which also includes new and renovated ones, as fakes. The so-called Mall is characterized by its open spaces, with stores in circulation corridors without roofs, providing a certain contact with nature, reducing the typical artificiality of closed shoppings. Several developments that claim to have, sometimes even in their own name, this space called Mall actually only has store galleries (or, in one case, just one store!) on the ground floor, not creating a new space for circulation, which occurs on the already existing public sidewalk. We are not defending either type, on the contrary, we criticize both relating to the privatization of public space, but it is undeniable that there is a difference between them, even though they sell the same product. There is even a company that has a network of so-called Malls, the “Spot Living Mall”, which despite being present in 13 developments has only 6 tenants in total, demonstrating the commercial failure of this format.

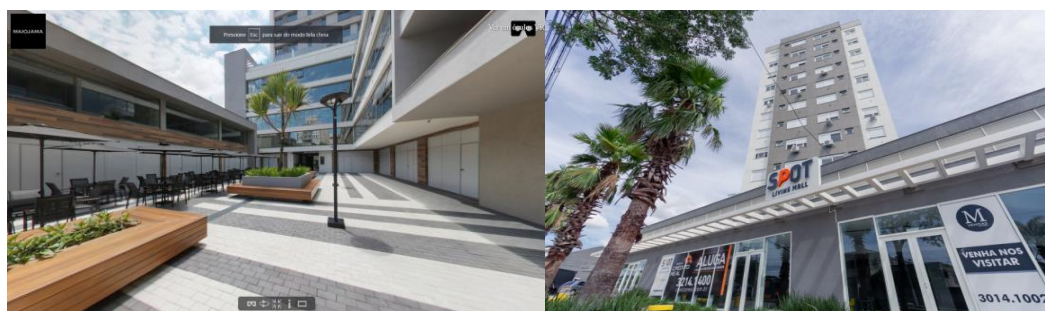


Fig. 3&4: Mall/Gallery

The importance of open spaces for circulation is directly related to one of the Malls' intentions, which is the attempt to recreate a type of urban life associated with the “neighborhood” scale, being even advertisement for some developments. In this sense, we find establishments and services that are not typical of shopping centers, more associated with everyday life, such as bars, small markets, butcher shop, etc. in an open space and apparently of free access. Obviously, these are not public spaces *per se*, as property is private, but simulacrum of them, as they are important and even essential spaces for urban life, but which have been gradually abandoned by the middle and upper classes, creating then a movement that feeds back the contradictory privatization of public space. Being simulacrum, it is not unexpected, quite the contrary, that they have distinct and their own characteristics, such as establishments that, although try to recreate small neighborhood stores, take on more refined airs, with concepts and names in English, such as Six Dry Age for a butcher shop and cultural references like “NYC Pizza Style” [in which, ironically, the manager is apparently not fluent in English], even serving as a photo shoot for a football team (*sic*).



Fig. 5&6: Fancy Meatshop / “NY Pizza” Store

The developments reformed to become mixed use, generally the already consolidated shopping centers, also start to concentrate different daily activities within their spaces, but more functional, such as hospitals, gyms, federal police and electoral justice, etc., without the attempt to an allusion to the scale of the neighborhood or to open spaces – on the contrary, the closure made by internal and external walls is an element of appreciation here, isolating itself from the rest of the city and its ills. Therefore, the trend to increasingly incorporate more functions, such as even schools and universities - which, contrary to what we thought, is not in the corporate building, but above the food court, with the classrooms being on the floor immediately superior to restaurants such as Burger King.



Fig. 7: University above Porto Alegre's Iguatemi food court

The fragmentation brought by increasingly complex fortified enclaves seems to be reaching new levels of depth, with essential functions for our society, such as health and education, being so transformed into commodities they are now offered in the maximum spaces of capitalist consumption, being the Mall just another process of commodification of rights, like public space. Here, it is necessary to observe that there is a relationship between the emptying of *de facto* public spaces and the crisis of modern democracy, since it is based on the idea of citizenship and debate.

Trend of corporate buildings in general (so much so that photo 9 is from RJ), the facades with glass skin appear in several mixed-use projects because they have the functions sheltered in this type of building. The environmental consequences must be considered, from birds crashing into the glass because they cannot distinguish them from the sky, to the possible increase in albedo, as one of the main advertisements is precisely the decrease in the internal temperature - which would be an extra component for the growing environmental inequality



Fig.8&9: Facades with glass skin in Porto Alegre and Rio de Janeiro

Hypothesis initially thought for some of the cases in our objects, the construction of these projects often takes place on devalued and/or degraded land, featuring perhaps empty spaces or urban discontinuities. Even in consolidated and even valued areas, the existence of potentially profitable land, which was still underutilized, from a capital point of view, such as empty parking lots or old houses, becomes a target for new real estate constructions in this capitalist cycle – including as a way to overcome these areas that sometimes serve as “barriers” for the expansion of capital on urban land. Many of these places have remarkable stories in the city, such as old street movie theaters, old football stadiums and even

abandoned buildings that were occupied by the needy population and that today become symbols and content of this phase of capitalist urbanization.



Fig. 10&11: Locations of current mixed-use developments in 2009

Although we are focused on developments, it is also important to look at the companies responsible for them, after all they are the actors, with intentions, policies and projects, responsible for the process in the urban space studied here. We are then entering the phase of subconstruction itself, analyzing what "is behind", which explains those aspects initially captured by their perceptible character, and also new, "invisible" aspects, equally, or even more, important than those visible .

The organization through networks is essential to this moment of capitalism, and this can be seen in the urban space through the interrelationship between companies in the developments, even if apparently competitors. This is facilitated by the financialized form that capital has assumed with the advent of technology, which in turn also exacerbates the presence of foreign capital, in a more volatile form, in the territory. Networks, not only material, but also immaterial and even social, which guarantee the integration of the metropolis as a unit not only because they are the unity in fragmentation, but also the continuity in discontinuity and dominance in the hierarchy (LENCIONI, 2017 [2011]). In this sense, the case of the developer and construction company Melnick Even is interesting because it is a local company (Melnick) absorbing one from São Paulo (Even) (SOARES; AITA, 2019). It also has in its ownership structure Ruane, Cunniff & Goldfarb Ltd, an investment firm based in New York, but no longer has Wishbone Managment LP, also an investment firm based in the US, but in Chicago. Here, it is worth noting that the second information, on the total sale of the second's shareholding, reached this survey through the email list for investors, was sent by the company to us, in what we are proposing to call passive data collection – as well as the most recent email stating the dates for the third quarter earnings release.

It is with another passive collection platform, in this case, social networks, that we move to the next point, facebook advertisements. Digitization was already part of everyday life, but the Covid-19 pandemic and the necessary quarantines and isolation meant that this process, which was already at a strong pace but still faced resistance, was, along with others, rushed. Thus, A7 Soluções, a wealth management company that performs the entire process of acquiring real estate digitally, already existed before 2020, but this year does the real estate business, and society as a whole, began to focus more on virtual dimension. This also allows for new, more flexible and accessible forms of investment, such as shares in real estate, sold as a safe and increasingly possible investment for larger sections of the population – a constant functioning of the financial system, to expand through recruiting sold as opportunities, the more necessary the greater the crisis. The virtual dimension also provides for the exacerbation of City Marketing, which can also come in its private form, often corroborating or aligning itself with the political project of the public sphere; It is in this sense that advertisements linking the projects to international images and concepts (Wall Street, Triple A) are part of the project for the metropolis of Porto Alegre.

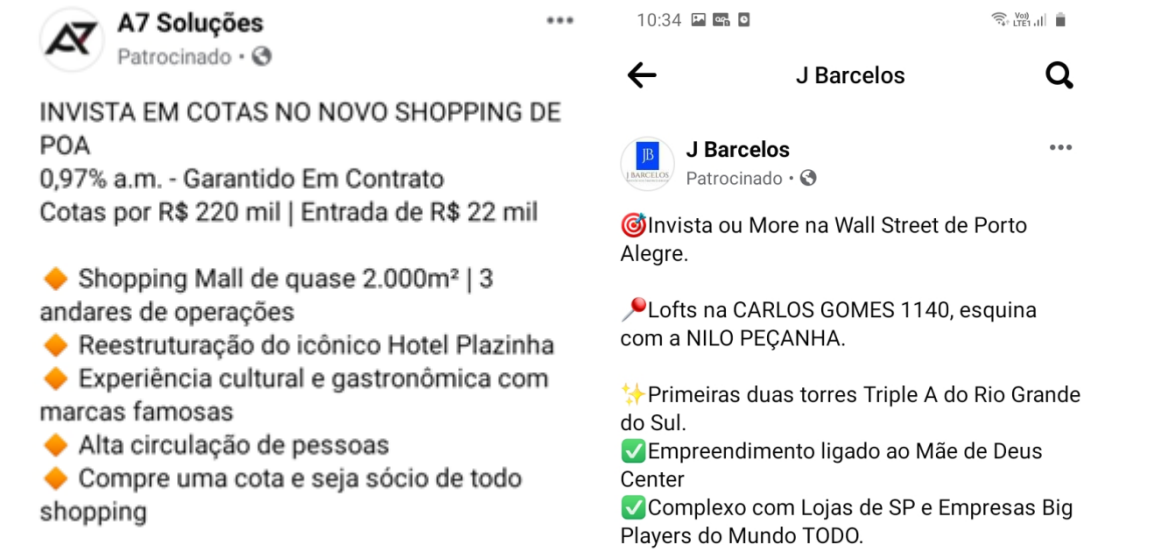


Fig. 12&13: Sponsored posts from social networks

Technology, increasingly advanced and present in post(?) Covid-19 society, also allows for new means of product dissemination seeking to contribute to the circulation of capital, such as virtual visits, digital rulers for measuring spaces. But in addition to these practical aspects, there is also the growth of scale as it becomes increasingly possible for more people to own properties in distant places. In this way, we can formulate that the urban also “explodes” digitally, with offers from places like Fortaleza and São Paulo to people from Porto Alegre. The ways of offering are also updated, such as the rental management company Housi or the crowdfunding company Urbe.me present in several cities, always focusing on the profitability of the property, increasingly transformed into investment rather than housing.



Fig. 14&15: Sponsored posts from ventures in other cities.

CONCLUSION

Mixed-use developments are a trend being reproduced in several areas of the metropolis, from the urban core, even in the central areas, to the metropolitan peripheries, creating and feeding back new centralities, characterizing Porto Alegre as a multicentric and also polycentric metropolis, since Avenida Carlos Gomes, part of the Terceira Perimetral, is increasingly becoming a centrality with the

function of managing capital – so much so that there are debates about removing the city hall from the historic center. Although polycentrality has great importance due to its political aspect, multicentrality must also be considered with great importance, as it is also in the interest of real estate business to create new areas of centrality to satisfy the interests of capital rather than the population. Obviously, the process can bring benefits to the city's peripheral areas, as it allows for a certain independence from the central nucleus, enabling shorter distances to carry out activities that were previously restricted and are now more distributed throughout the urban and even metropolitan areas. Which is not to say that there are no artificially created centralities, serving more to the reproduction of capital than actually a social need; on the contrary, this is perhaps the majority of cases, because, as Lencioni (2017[2013], p. 53) explains, “multicentrality is not a product of urban functions, but of real estate investments”.

The characteristic of offering mixed uses is advertised on the projects' websites through testimonials from residents, always focusing on how this is a modern and global trend, highlighting benefits such as no commuting time between home and work. It is undeniable that the automobile society brings the burden of precarious displacement, and that initiatives that try some form of solution are often linked to the reduction of distances, but we question whether mixed-use projects are a contribution in this regard or a deepening of the control of capital over workers, who can become much more watched in their moments outside the workplace – the control of bodies is not an anomaly of the system, it is part of its functioning.

Many of the developments have, among their uses, areas for commerce, services and open-air leisure, which can be considered “shopping without roofs”. There is an apparent contradiction between some of the uses, such as bars on the ground floor of your building, making it obligatory to pass through a bohemian space on the way home, a space that will continue to function very close to your home. It should also be noted that these so-called Malls can be considered simulacrum of public space, seeking to reproduce elements commonly associated with the public dimension, in the sense of everyday life activities, within their private areas. This seems to be the market's “response” to the emptying of the public sphere, simulating this dimension of life in a commodified way, for those who can afford it. Public space is necessary for urban life - no wonder we have organized ourselves in cities for millennia - something that was opened wide by the Covid-19 pandemic, which forced our confinement to private spaces and reminded us of the importance of the collective. This is something that neoliberalism has been trying to convince us otherwise for half a century, even when it is one of the main reasons for the current democratic collapse, as the functioning of the capitalist system not only does not oppose the escalation of fascism, it can even actively encourage it if necessary for the survival of the capital.

There is an enormous amount of money seeking profitable opportunities for its reproduction, what Aalbers and Fernandez (2017) call Wall of Money, and one of the main destinations has been the financialized urban space. In this sense, the metropolis of Porto Alegre is included in the idea of “the planet as a construction site”, with several and constant real estate launches. As innovation is an increasingly crucial item in capitalist competition, new types of products, or at least with new names, need to be constantly created. Thus, the Porto Alegre metropolis has a diversity of new types of developments, not only for mixed uses, but also themed hotels, luxury residences for the elderly, private “neighborhoods”, including those in the health area, which is part of the project to transform the city into a national reference through tax exemption, ranging from medical office towers to the “health hub”; all of course always with names in English and references to international references.

This (neo)colonialism is expressed not only in language, but also in sales (and here sales is the correct word) of the so-called Best Practices as solutions for cities in the South, implemented both by the public authorities and by the private sector, serving many times to increase the exchange value of space other than anything else, being another capitalist product implemented using the spaces of life realization as a commodity. Thus, the real estate boom concomitant with the situation of housing precariousness is explained, because with the urban space being a product and not a right, what matters is the realization of the capital reproduction cycle, building new ventures with the sole purpose of commercializing them (here, the market would not be wrong, as the function of thinking about the needs of the population belongs to the State, were it not for the manipulation of the latter by the former). And, transformed into

an investment, sold as insurance and with good profitability, urban space is underutilized, with many properties being purchased as financial and speculative assets. This operation, reminiscent of one so recent, obviously raises the question of what can happen if the real estate market is dominated by investors, and then there is a shortage of customers. This concern is reinforced by the concept of Demographic Housing Demand (DHDE), used for example by Caixa Econômica Federal (2012), which is more related to potential demand than to the housing deficit, as what matters is whether there are buyers for the new products, regardless of their use.

The expansion of capital, transforming everything possible in commodity, has serious consequences depending on what is being marketed. We see this, for example, in education, currently used more to generate capital than to train citizens, with the formation of university debts and lack of professional insertion in an increasingly exploitative market. In the case of space, this worrying equation is added to the fact that nothing exists outside of it, being a necessity that is more than essential for life itself, which has been increasingly taken up by capital. It is necessary to think about whether the models considered successful in urban administration, the classic case being that of the city of Barcelona, are really a direction that our cities should follow. Because there is a risk that we will try to turn into Barcelona around and not succeed, but there is also a risk that we will try and succeed.

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Chapter 5

Public Space and Urban Regeneration

Application of Urban Acupuncture to Identification and Prioritization of Public Spaces in Deteriorated Urban Neighborhoods: The Case of Pamenar Neighborhood in Tehran, Iran

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ABSTRACT

In recent decades, urban development experts have expressed concerns about the negligence of public spaces due to the dominance of capitalist and utilitarian states and the widespread disregard of citizens' needs which have led to changes in their lifestyle. Therefore, scholars and practitioners have again focused on public spaces as places for resting as well as for forming and enhancing social relationships. Due to the effect of public activities on public life and urban environments, development and improvement of public spaces could improve economic, social, and environmental conditions, particularly in deteriorated districts.

In spite of widespread attempts at developing public spaces in Iran, there are wide gaps between the proposal of projects and their implementation in practice. Therefore, it is necessary to identify public spaces based on real needs and prioritize them in the implementation phase because of financial limitations. The aim of this study is to propose a method for identifying potential urban spaces in deteriorated urban neighborhoods via participatory processes as well as the reduction of costs, shortening the implementation time of projects, and increasing their efficiency through an urban acupuncture approach. The case of our study is Pamenar neighborhood in Tehran, Iran. The findings suggest that in all phases of the study, identification and prioritization of public spaces are possible through analyzing motion flows and designing and implementing participatory processes in the framework of urban acupuncture. The data collection and analysis methods used in this study include semi-structured interviews, focus group discussions, examination of the development documents of the neighborhood, analysis of space syntax in Depth Map software package, prioritization of the indicators using the AHP questionnaire and analyzing them in Expert Choice software, and analysis and overlap of the data using ArcGIS.

Keywords: urban acupuncture, public spaces, deteriorated urban neighborhoods, Pamenar neighborhood of Tehran

INTRODUCTION

Cities are among the most important political, social, artistic, cultural, and even economic achievements of mankind and urban spaces are the heart of any city. These spaces play a crucial role in improving the quality of life, welfare, and mental health of citizens. The Strategic Document of Urban Space Management in Tehran (2016) recognizes the use of public spaces as a means of progress towards a sustainable society and enumerates some of the problems in this regard:

- In Iran, and particularly in Tehran, urban spaces have not been integrated into the urban planning, design, and management agenda.
- Urban decision-makers are not sufficiently aware of the characteristics of urban spaces, the extent to which they are used, people's perception of these spaces, and the necessity of improving their quality as well as boosting their social and cultural functions, and they have not adopted appropriate expert measures in this regard.

- Current urban spaces have been functionally transformed and the adopted measures for this transformation have been mainly quantitative.
- Tehran's urban management prefers to create functional spaces including highways, high-speed public transportation lines, bridges, and underpasses rather than spaces such as squares or pedestrian streets that contribute to social interaction and vitality.

Therefore, it seems necessary to pay more attention to urban spaces as well as their meanings and characteristics, encourage people's participation (especially on a local level) with the aim of identifying real needs, identify potential public spaces to improve their quality, change the status of existing spaces from functional and quantitatively-oriented spaces to high-quality local ones that increase social interaction, and finally decrease citizens' psychological tensions.

Various methods have been proposed in the literature to identify and improve public urban spaces, but the majority of them are not practically feasible due to a wide range of problems in management and implementation structures. Factors that hinder the implementation of many of these projects include financial limitations, multiplicity of decision-makers with conflicting interests, and a lack of knowledge of real needs among the decision-makers. This is why we urgently need a method based on the principle of participation that could facilitate the design and implementation of measures in a rapid, efficient, and cost-effective manner. In line with this purpose, the present study is aimed at explaining and discussing the urban acupuncture approach.

THEORETICAL BACKGROUND

If we define the main role of urban regeneration as discovering the forces that have led to urban deterioration and providing a positive and sustainable response for permanent improvement of the quality of urban life (Izadi et al., 2017), we will be able to compare the science of urban development with the field of medical acupuncture. Here, the term metabolism is a common notion in both fields. Urban metabolism refers to the process of dynamic social and environmental transformations that combine various social and natural factors to produce specific urban environments (Heynen et al., 2006). "The urban acupuncture approach is a social-environmental approach that integrates contemporary urban design with the tradition of Chinese acupuncture" (Haddad, 2015). Urban acupuncture intervention initially begins at a single spot. A slight change in this spot results in a major change in the total development of the system, occurs in a very short timespan, and spreads quickly throughout the system (Gladwell, 2006).

Urban Acupuncture

Urban acupuncture is a notion that is directly related to Asian culture. It conceives the city as a balanced nexus of flows, coordinates urban software and hardware, and provides a complementary activating framework (Aban, 2016; Shidan et al., 2011; Sadaba et al., 2016). It differs from, but does not contradict, the strategy of macro-scale urban renovation and development; rather, it complements this strategy and acts as a catalyst in the process of traditional planning. The main theorists of this approach, i.e. Jaime Lerner, Manuel de Sola-Morals, and Marco Casagrande, regard urban fabric as a skin consisting of overlapping layers of energy. The energy meridians in these layers determine the manner and direction of urban development. By sticking needles into specific points on the meridians (the so-called points of energy blockage), we can stimulate a response in the city. Subsequently, a chain of positive responses will improve the spots around the point where the needle was inserted (Hoogduyn, 2014; Lerner, 2014; Casagrande, 2014).

Characteristic of urban acupuncture is the necessity of participative processes, micro-scale interventions, a comprehensive view, network activation through point-by-point activation (progressive wave-like development), rapid and efficient impact, use of development catalysts, contextualism, flexibility, widespread use of digital technology and mobile media, easy implementation without any need for expensive technologies, and a relatively low amount of investment (Beyk, 2018; Santos, 2018; Margono et al., 2020; Zhang et al., 2021).

Acupuncture and Urban Development

In human body there is a vital energy which is referred to as Qi energy (pronounced chee) in Chinese. This energy flows in throughout the body via channels called meridians. Any inconvenience in a meridian may lead to a state of disease. By stimulating certain points on the meridian, the qi is balanced and the disease is healed (Rezvani, 2011). Similar to human body, the city is also an organism which is sensitive to a multi-dimensional network of energy. In fact, the qi energy in a city is the very pattern of the activity and movement of citizens throughout the city. Therefore, the physical structures or routes in which people perform activities or move, i.e. public spaces and streets, are regarded as the city's meridians (Tang , 2016).

In medical acupuncture, a disease is defined as any blockage or harmful energy flow in meridians. In the same vein, lack of activity or movement in public spaces and streets or existence of motion flows that act against the goals of urban life is considered as a state of illness because it impairs a part of the city. Thus, whatever affects the motion pattern negatively might be a pathogen which is referred to as an 'urban problem' in the present study. The citizens' movements in public spaces and streets which correspond to energy flows in medical acupuncture are referred to here as 'motion flows' which indeed underlie our analysis and decision-making.

In an acupuncture session, the therapist treats the patient by sticking needles into certain points on the body according to their specific disease. In a city, too, the needles that help to remove the pathogens are actually 'development opportunities'. In acupuncture, medical examination, therapist-patient relationship, and disease type are considered together to determine needle points that bear the maximum effect on the healing of the disease. In urban acupuncture, development opportunities are applied to points that have the highest impact on the surrounding urban fabric according to the urban developer's investigations, the relationship between residents and decision-makers, and the type of urban problems. These specific points are called 'intervention points' in this study. Urban acupuncture is aimed at solving the most acute 'urban problems' by using the most favorable 'development opportunities' in 'intervention points'. The intervention points and intervention types are selected in a

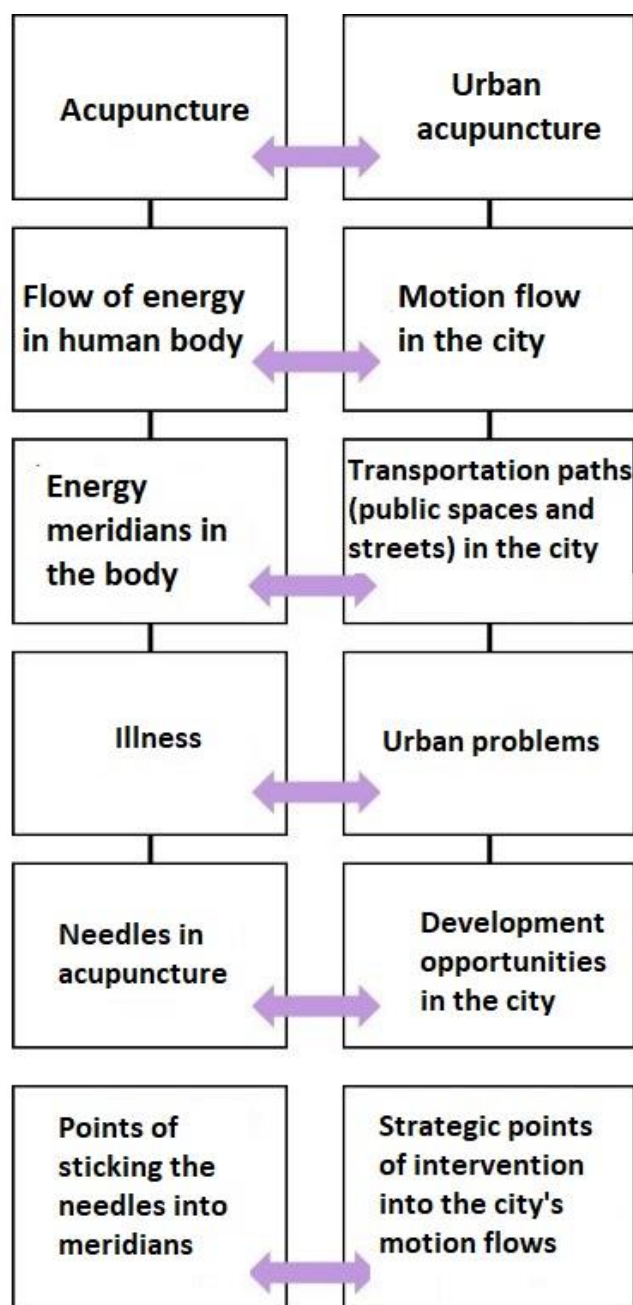


Figure 1: Explanation of the practical concepts of urban acupuncture in terms of the medical acupuncture framework (source: authors)

way that they fulfill the main aims of urban acupuncture including rapid impact, quick and easy implementation, and reduction in economic costs.

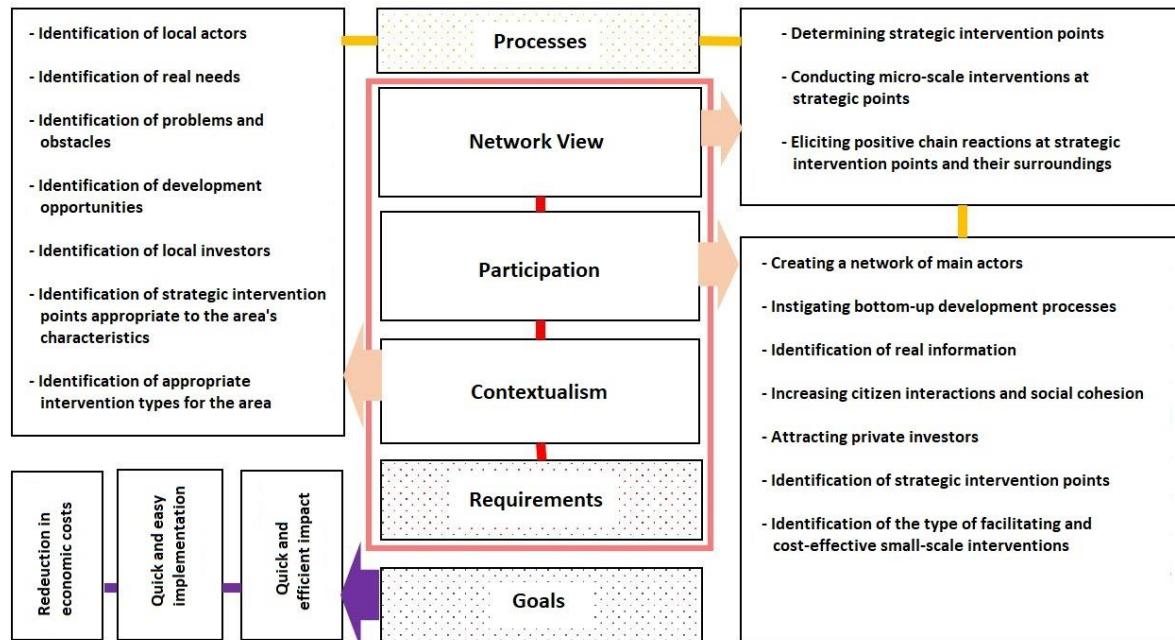


Figure 2: The conceptual model of urban acupuncture (source: authors)

Public Space and Urban Acupuncture

Public space is one of the three components of urban morphology and its essence is directly dependent on the complex political, social, economic, and cultural context in which it is produced. Therefore, a public urban space provides people with a place for interaction and resting and can directly impact on public life, urban environment, and renovation of urban structure as well. (Shidan et al., 2011; Zhang et al., 2021)

Terms such as social relationships, communication and interaction, intermingling with outsiders, public discourse, human interactions and contacts, meaning and public functions, and mutual human processes have been used by scholars like Brown, Kohen, Zukin, Low, Madanipour, and Carmona to explain the concept of a space being public (Ashrafi et al., 2014). In this way, the index of 'sociability' is a necessary feature for understanding and presenting a public space. The main characteristics of a sociable space include vitality, night life, diversity and mix of land uses and activities, human scale, social security, all-inclusiveness, pleasantness, and accessibility (Shojaei et al., 2015).

Marchal has described urban acupuncture as a set of strategic urban interventions which are essentially supported by the design of public spaces because it serves the achievement of the aims of public spaces. As the meridians of a city are in fact its physical structures, the acupuncture points located on these structures can be regarded as the public spaces as well as the urban life because public buildings and spaces serve a large number of people and can be thus more effective than private buildings and spaces (Chen, 2015; Al-Hinkawi, 2020; Tang, 2016).

Generation or renovation of public spaces using small interventions can create new meanings for a place or revive its forgotten meanings. This can be done by the least amount of investment possible as well as creative ideas, purposeful and minimal interventions, and the residents' needs and visions for improving their quality of life. Thus, in addition to enhancing the city's visual beauty, public spaces will act as a magnetic field. It is therefore not wrong to conceive of public spaces as catalysts and also as acupuncture points. These points can extend development to surrounding areas and improve the conditions of a larger area.

EXPERIENCES FROM AROUND THE WORLD

There are several impressive examples of urban acupuncture in the world. One instance is the design of the commercial pedestrian street in the center of Curitiba by its mayor Jaime Lerner which was implemented in the last three days of the week and revitalized the city center. In addition, the project of urban parks in Curitiba which improved the quality of life of citizens and decreased the risk of floods is counted as an urban acupuncture intervention. Development of urban parks in places which were at a high risk of flooding in this project created a natural drainage system which was more cost-effective than artificial drainage, significantly increased per capita green space, and produced beautiful urban landscapes (Mang, 2009; Suzuki et al., 2010; Lerner, 2014).

Another well-known project was performed by de Sola-Morales in Winschoterkade, Netherlands. Using simple interventions such as placing wooden benches and a concrete window frame from the materials used in ship construction, he turned a canal bank into an urban public space in form of a resting station. He also redesigned an eight-lane ring road in Barcelona, returning the priority to the realm of public space. By developing an elevated section above the road, the traffic was decreased and a proper place was created for restaurants and cafés (Hoogduyn, 2014).

In the city of Taipei in Taiwan, Casagrande revitalized an informal settlement area inhabited by rural immigrants through reviving the farms. He did this by a number of simple interventions such as making the area more accessible through bridges, cleaning the environment, and promoting urban farming (Casagrande, 2006).

Another example of urban acupuncture is Kobe Church in Japan which was initially built as a temporary building from paper tubes but had to fulfill the conditions of a building for frequent use. The building was at its site for 10 years and then relocated to the earthquake-stricken society of Taiwan (Wesolowski, 2021).

Finally, the Pavement-to-Parks Initiative began in San Francisco in 2009. In this initiative, concrete objects, several tables, trees, and vases are arranged to make a public space. Every year many similar parklets are built throughout San Francisco and this is also becoming a trend all across the United States (Wesolowski, 2021)

METHODOLOGY AND THE STUDY AREA

The present study follows an interpretative research paradigm which combines quantitative and qualitative data. The research question has arisen from the concerns related to the regeneration of deteriorated fabrics. The urban acupuncture approach and the principle of contextualism entail that the study area be specified as the first step. In this step, we decided to study Pamenar neighborhood in Tehran, Iran. After a initial investigation of the neighborhood, the parameter of ‘motion flows’ was analyzed based on the theoretical basis of urban acupuncture in order to identify problems and development opportunities (indicators). The indicators were spatialized using the two variables ‘intensity of problems’ and ‘degree of development opportunities’. That is, the intensity of every problem and the degree of every development opportunity were determined for each place in the neighborhood. The information was quantified and entered into GIS software for analysis. Next, the status of each indicator in the neighborhood was determined by considering its significance coefficient. Finally, after superimposing information layers, the different parts of the neighborhood were divided into 5 levels of priority. In the next step, in the most critical parts (with the highest priority), public spaces were identified as intervention points and prioritized according to the features of each place.

Pamenar is located within the macro-neighborhood Oodlajan in Zone 2 of District 12 of Tehran’s municipality. With an area of 150 hectares and a population of 16943, Oodlajan is one of the five historical neighborhoods of Tehran (Bavand Consultant Engineers, 2014). Our study of the development documents of the neighborhood in different years as well as our field observations indicates the following:

- Pamenar was one of the first neighborhoods of Tehran and many of its buildings are of great historical significance.

- The edges of the neighborhood are mostly surrounded by commercial uses beyond urban districts. Due to the penetration of commercial storage uses into the neighborhood and migration of its residents, it faces serious problems such as severe depopulation, deterioration of fabrics and buildings, diminishing cachet of activities, shortage of urban services, declining environmental sanitation, stagnation in the real estate market, and increase in crime rates and is becoming inferior to its prestigious past.
- Storage spaces, mixed commercial uses, commercial uses, mixed commercial/storage/residential uses, workshops, and industrial uses are the dominant uses in the neighborhood.
- In recent years, the number of derelict, abandoned, or vacant plots has been increasing.
- In Pamenar, the majority of religious, educational, cultural, storage, workshop, and commercial uses are active on the scale of urban zone or district, and local activities have been deteriorating.
- The majority of buildings have one or two stories, have a mud structure without any metal skeleton, and are between 30 and 80 years old.
- In terms of accessibility, many of the streets surrounding or inside the neighborhood suffer from a lack of balance between their capacity and the type of activities (Bavand Consultant Engineers, 2004, 2014; Report of the District Health Office, 2013).

METHODOLOGY AND THE STUDY AREA

In this section, we shall describe how the different parts of the neighborhood were prioritized and the public spaces in the neighborhood were identified based on the theory of urban acupuncture.

Identification of Motion Flows in the Neighborhood

According to the urban acupuncture principles, motion flows are the basis of identifying problems and development opportunities in a neighborhood. In this method, participatory processes are designed and implemented from the beginning throughout all the steps.

Identification of Problems and Development Opportunities (Indicators)

For this purpose, we used trained and well-informed people, experts, and the development documents of the neighborhood. The researchers' field observations, semi-structured interviews, focus group discussions, and studying and coding the development plans were the methods of identifying and analyzing the indicators. In the end, the obtained results were coded and classified. The interviews were conducted with 28 trained residents (selected through Snowball sampling) over a timespan of six months. First, the questions were modified through a pilot experiment and then the data collection continued until theoretical saturation was achieved. Each focus group consisted of five experts which were guided by the researchers towards an open discussion of the topic. In the beginning, several questions were posed but later on the participants openly changed the direction of the discussion. The duration of the discussion in each group ranged between 45 and 80 minutes. The obtained information were then coded and classified into five categories (social, economic, physical-environmental, and managerial). Thus, the problems and development opportunities (indicators) were identified (Table 1) and their functional definitions were prepared.

Categories	Problems
Social	Decline in the sense of place, lack of social security during the day and at night, lack of social cohesion, lack of vitality (both day and night), and the social space not being all-inclusive
Economic	Reduction in the economic value of real estate, penetration of the uses supporting the bazaar into the residential fabric, lack of welfare services that support living, lack of night activities, dramatic increase in activities and uses that do not belong to a specific urban district, and poverty

	Physical-environmental	Derelict buildings and vacant plots, damaged urban landscape, inappropriate conditions of pavement, lack of suitable urban furniture, environmental pollutions, problems with access and transportation, and being isolated
	Managerial-legal	People's lack of connection with decision-making institutions, people's lack of awareness of administrative decisions, people's distrust of decision-making institutions, the weak effect of NGOs on fabric renovation, and the inflexible regulations of the Cultural Heritage Organization
	Categories	Development Opportunities
	Social	Strong sense of place, social security in the day and at night, all-inclusiveness of social space, social cohesion, high vitality (day and night), the residents' growing willingness to renovate the neighborhood
	Economic	Low price of real estate, lack of incompatible uses that support the bazaar, high level of welfare services that support living, night activities, lack of uses and activities that go beyond the district scale, economic empowerment of residents, and high level of non-private ownership
	Physical-environmental	Existence of derelict buildings and vacant plots, pleasant urban landscape, high-quality pavements, appropriate urban furniture, high level of environmental sanitation, lack of problems with access and transportation, invaluable historical buildings and landmarks, minimum distance from the non-isolated streets of the fabric, high connectivity of the streets, large number of buildings with less than three stories, and small number of coarse-grained buildings
	Managerial-legal	Close connection between people and decision-makers, people's awareness of administrative decisions, people's trust in decision-making institutions, and existence of local NGOs

Table 1; Problems and development opportunities (indicators) (source: authors)

Spatialization of Indicators and Quantification of Information

To prioritize the intervention type, we studied the indicators in different places. The methods of data collection in this section consisted of semi-structured interviews with residents of different parts of the neighborhood, focus group discussions with experts, the researchers' field observations, analysis of the available documents, space syntax analysis (physical-spatial) using Depth Map software package, and superimposing the obtained information using GIS software.

Categories	Indicators	Instruments of studying the indicator in a place
Social	Diminishing sense of place	Studying development documents; semi-structured interview with residents; focus group discussions
	Lack of social security during the day and at night	Semi-structured interview with residents; focus group discussions; the researchers' field observations

Table 2: An example of how the instruments for studying each indicator was selected (source: authors)

To quantify the obtained data, the status of each indicator in each part of the neighborhood was scored from 1 to 5. A score of 1 would indicate the lowest intensity of the indicator in a place while 5 would mean the highest intensity. In the next step, the quantitative data were entered into ArcGIS for analysis.

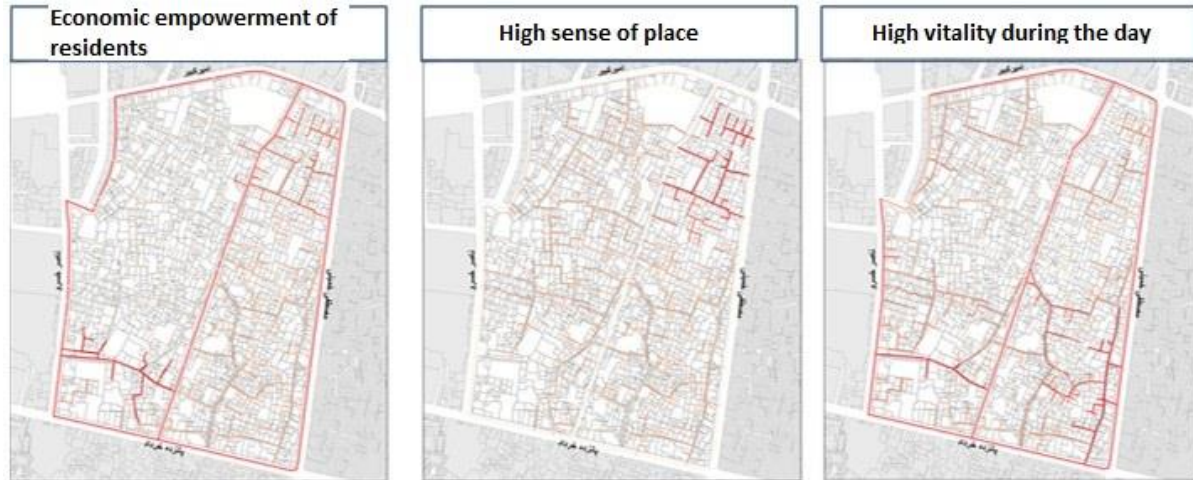


Figure 3: An example of the spatialization of indicators (darker lines show a higher intensity of the indicator; source: authors)

Determining the Significance Coefficient of Indicators

The significance of the indicator in the regeneration of the neighborhood is not equal, and this is why we decided to determine their significance coefficient. To this end, eight experts who were familiar with the conditions of the neighborhood were asked to complete the AHP questionnaire. Next, we determined the significance coefficients via pairwise comparison of the indicators and analysis of the results in Expert Choice software package.

Categories	Significance coefficient of categories	Indicators	Significance coefficient of indicators	Significance coefficient of the indicator in the category
Social	Social indicators			
Economic	The data obtained from the AHP questionnaire and Expert Choice software	Economic indicators	The data obtained from the AHP questionnaire and Expert Choice software	The product of values in the third and fourth columns
Spatial-physical		Spatial-physical indicators		
Managerial-legal		Managerial-legal indicators		

Table 3: The method of determining the significance coefficient for each indicator (source: authors)

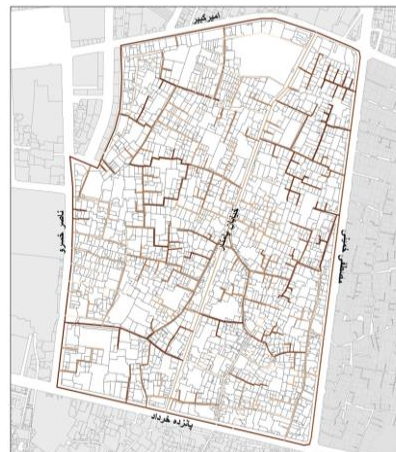
Intensity of Problems and Degree of Development Opportunities in the Neighborhood

By superimposing the information layers of the intensity of the problems that remove, reduce, or change motion flows and also the layers of the degree of development opportunities which create, increase, or modify motion flow patterns in GIS software, we investigated the status of the neighborhood in terms of these two parameters (Figure 4 and 5).

Figure 5:
Superimposition of
the information
layers of the
intensity of problems
in different parts of
the neighborhood
(darker lines show a
higher degree of
development
opportunities;
source: authors)



Figure 4:
Superimposition of
the information
layers of
development
opportunities in
different parts of the
neighborhood
(darker lines show a
higher degree of
development
opportunities;
source: authors)



Prioritization of Intervention Zones

Figure 6:
Superimposition
of the obtained
information and
prioritization of
the intervention
zones (source:
authors)

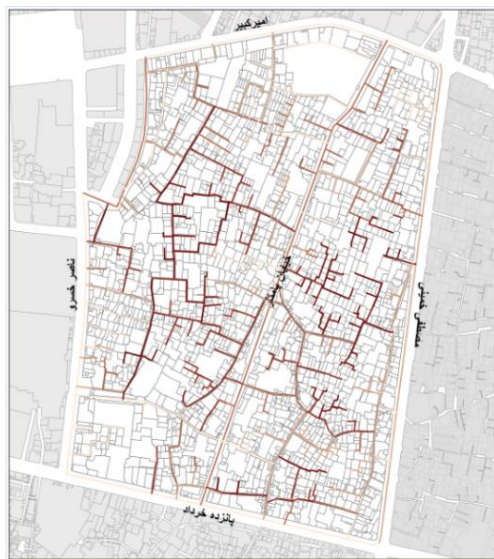


Figure 7: The
most critical
parts of the
neighborhood
for conducting
interventions
(source:
authors)



By superimposing the information layers of the intensity of problems and the layers of development opportunities (maps in Figure 4 and 5), we established the priority of each part of the neighborhood. The highest priority (the darkest color in Figure 6 and the zones marked in Figure 7) shows parts of the neighborhood that have the most problems and the most favorable development opportunities or means. The lowest priority (the lightest lines in Figure 6) indicates parts of the neighborhood with the least problems and the weakest means of development. As the goal of urban acupuncture is to overcome the maximum number of problems possible by using the most powerful means of development with the aim of increasing the efficiency of interventions as well as easy and cost-effective implementation of the measures, development in Pamenar neighborhood should develop from inside (Figure 7). Due to the network view of urban acupuncture, improving those parts of the neighborhood with the highest priority by use of progressive wave-like interventions will also result in the improvement of the other parts.

Determining Intervention Points

In this step, the parts with the highest priority are determined (Figure 7). As the indicators of the research have been classified as managerial, economic, social, and physical-environmental, the intervention points can also fall within these categories. Given the theoretical background and the aims of this study, the intervention points will be selected from among the public spaces. Creating new public spaces or developing and improving the existing public spaces can strongly affect the social, economic, physical-environmental, and even the cultural and identity-related dimensions of the neighborhood. Therefore, public spaces are among the most influential intervention points.

Identification of Public Spaces as Intervention Points in the Neighborhood

To identify public spaces as intervention points in those parts of the neighborhood with the highest priority (the most critical parts), we first examine the 'sociability' index in each place. According to the literature on sociability and the features of the study area, the indicators of sociability in the public spaces of this neighborhood include mix of land uses and activities, human scale, social security during the day and at night, all-inclusiveness, social cohesion, sense of place, vitality (both day and night), night-time activities, pleasant urban landscape, suitable conditions of pavements, appropriate urban furniture, accessibility, and valuable historical buildings.

Sociability Indicators in Parts with the Highest Priority

The intensity of each of these indicators was evaluated via semi-structured interviews with the residents in these parts, field of observations, the study of development documents, and focus group discussions. Next, the obtained information were quantified in a way that the highest intensity of an indicator in a place would be scored 5 and the lowest intensity of an indicator would receive 1.

Determining the Significance Coefficient of Sociability Indicators

As all the indicators are not equivalent in creating or improving a public space, the significance coefficient of each of them was examined by eight experts in urban development. For this purpose, the indicators underwent pairwise comparison via an AHP questionnaire and the results were analyzed in Expert Choice software package.

Identification and Prioritization of Sociable Places as Public Spaces

In this step, the entire information was entered into ArcGIS in order to superimpose the layers and make a final decision concerning the identification and prioritization of sociable places in the neighborhood.

Therefore, the degree or intensity of each of the indicators of sociability in different places as well as their significance coefficient would determine the location of public spaces and their priority. As can be seen in Figure 8, all the public spaces identified are inside the neighborhood, showing that development occurs internally. The public space with the highest priority is located in the eastern half of the neighborhood. The obvious features that determine the high priority of this place as a public space include better accessibility, higher vitality, higher social security, greater diversity of uses and activities, all-inclusiveness,



Figure 8: Identification and prioritization of sociable places as public spaces (source: authors)

pleasant urban landscape, and suitable pavements. Thus, places with lower priority are weaker in terms of these features. As these spaces are located in the most critical parts of the neighborhood in terms of the intensity of problems, they can also solve the most problems and bear the most widespread effects, thereby resulting in catalyzing effects and improving a larger part of the neighborhood more rapidly. In general, 13 public spaces were identified in the most critical parts of the neighborhood and classified between the first to the fifth priority. By conducting interventions and creating suitable public spaces in places with higher priorities, the situation of the neighborhood will certainly improve as a result of wave-like progressive effects as well as the potential responses of residents and stakeholders and there will be no need to develop all of the 13 public spaces.

CONCLUSION

Selecting public spaces in those parts of the neighborhood with the least problems and the most development instruments (the most critical parts of the neighborhood) and prioritizing the identified public spaces is a major step to reduce the duration and costs of project implementation, which is one of the main aims of urban acupuncture. Therefore, prioritization and preparation of preference tables are among the basic principles of urban acupuncture. Despite the importance of this principle and the necessity of anticipating and depicting the underlying scenario in urban acupuncture, the principle of contextualism and attention to local needs as well as actual conditions demonstrate the practicality of this approach. To this end, after each interventional step and the implementation of the predicted projects, the changes and the new conditions should be re-assessed. In this way, we can observe a wave-like, progressive improvement over which the urban management and executive units could not exert full-fledged control. Therefore, a step-by-step evaluation and inspection of the responses of the environment and people is necessary for further progression. This is much the same as an acupuncturist who, after sticking every needle into the patient's body, should wait and watch for the body's reaction before deciding on the following measures, although he or she may already have a general picture of the treatment plan in mind. Accounting for the individual differences depending on the context in question and the changes due to the adopted measures requires a local micro-scale management that functions outside the time-consuming administrative processes.

The network image that prevails in the urban acupuncture approach is highly effective in creating low-cost catalyzing processes. The network approach is manifested in the type of interventions (not addressed in this study) in each space. What intervention should be implemented in each space depends on the existing tools as well as the conditions and opportunities in that space.

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A Landscape Approach to Infrastructure in Urban Regeneration Projects (A Case Study: The Role of Qanat in the Historic District of Tehran)

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ABSTRACT

The heritage and cultural values of the historic urban core and the significance of conservating historic districts have led to the development of various conservation approaches evolving from the 1990s to the present. Meanwhile, the transformation from a one-dimensional and physical perspective to a holistic and objective-subjective perspective along with social, cultural, and economic issues have been taken considering sustainable development field. One of the main challenges in this area is the confrontation with the conservating historic district during urban development and the provision of the infrastructure of contemporary life. Since the lack of adequate civil, cultural, and economic infrastructure is currently considered an integral part of urban life, it leads to the inefficiency of the urban context in historical cores. Several approaches have been proposed in designing and planning urban infrastructure since the early 20th century, so this research was conducted to examine the appropriate approach in infrastructure planing in regeneration projects. In this paper, the literature related to the problem was reviewed, and a descriptive-analytical research method was implemented. Afterward, the evolution of conservation and regeneration, as well as approaches in the field of urban infrastructure, were taken into account. Furthermore, by considering deductive reasoning and establishing a deductive relationship between the two concepts of a “landscape approach” and “urban infrastructure”, it introduced a holistic and objective-subjective perspective of the problem as the most appropriate approach in urban regeneration projects.

It study the role of Qanat in the historic district of Tehran by considering the different intrinsic, functional, and existential layers of the qanat, then introduce landscape approach as the best approach to regenerate the qanat network in the context of Tehran.

Keywords: Infrastructure, Landscape Approach to Infrastructure, Urban Regeneration, Qanat, Historic district of Tehran

INTRODUCTION

Historic districts, with myriad and complex layers of tangible and intangible cultural and social values, connect contemporary urban life with its historical identity and have been regarded as the precious heritage of the present cities. Therefore, conservation and preservation of the valuable districts, the revival of intangible heritage, re-reading the quality of the relationship between the old cities and their natural beds, as well as identification of the foundational roots of the original urbane core are effective measures to preserve the cultural identity of the cities.

Since the early 1990s, under the influence of modern architecture and urban planning, urban restoration and conservation movements have been formed. Historic district conservation, along with the desire to develop and meet the physical and service needs of contemporary life, has created many challenges in this area, leading to the emergence of different approaches from the outset.

Thus, the provision of urban infrastructures according to each era guarantees the survival of a city, while the contemporary city is inconceivable without a network of infrastructures.

Regarding the significance of infrastructure in urban conservation and regeneration, few independent and significant studies have been conducted on this issue. However, there are various approaches in organizing and planning urban infrastructure, and it is necessary to adopt a proportionate approach to strengthen and synergize urban conservation and regeneration policies.

Therefore, the present paper examined the following question: "In regeneration projects, how the urban infrastructure should be viewed? It aimed to examine the evolution of both urban regeneration and infrastructure regarding the commonalities between both fields. Moreover, regarding deductive reasoning, it has been presented as an effective integrated model for choosing the appropriate approach to infrastructure planning in urban regeneration projects. Then, the study of the qanat as a water (blue) infrastructure in the historic district of Tehran refers to other semantic and cultural layers of the qanat in the urban context, and finally, it examines the appropriate approach to regenerate and rehabilitate the qanat in the study area.

BACKGROUND OF THE STUDY

Postmodernism was a broad movement that developed in the mid-to-late 20th century across various fields, including architecture and urban planning marking a departure from modernism. In the two areas of urban infrastructure and urban conservation and development, new movements and approaches have emerged that criticize technocratic perspectives, leading to the disappearance of cultural and natural heritage, as well as numerous and complex environmental and identity crises in modern cities. The following are the works that have played a significant role in the literature of this study:

- 1- Benedict and McMahon studied about problems and damaging environmental impacts of industrial infrastructure from different perspectives on the explanation of "green infrastructure" in urban design and planning, as their theories and writings are the gateways to infrastructure studies in the new century (Benedict & McMahon, 2002)
2. Hillary Brown took the same view as Benedict and McMahon, but she deals with the issue of urban infrastructure more holistically and proposes the theory of "ecological infrastructure" in her book called "Next Generation Infrastructure" and explained this theory. (Brown, 2014)
3. Pierre Bélanger, Associate Professor of Landscape Architecture at the Harvard Graduate School of Design, has introduced the term "landscape infrastructure" into the landscape architecture literature and his articles are one of the main sources of research in this field. (Bélanger, 2009)
- 4- Regarding the researchers inside Iran, Seyed Amir Mansouri and Aida Al-Hashemi have introduced and compiled "landscape infrastructure" in the field of the urban landscape. (Mansoury & Al-Hashemi, 2017)
5. In the field of urban regeneration, Peter Roberts, in his book, "Urban Regeneration," has studied the evolution of conservation and urban regeneration, which is one of the main sources in the field of urban regeneration. (Roberts & Sykes, 2000)
6. Regarding the researchers inside Iran, Ahmad PourAhmad has taken an in-depth and meticulous look at the subject in the article "The evolution of the concept of urban regeneration as a new approach in worn-out urban texture." (PourAhmad et al., 2010)
- 7- Pirouz Hanachi's article entitled "Development of a conceptual framework for integrated conservation and regeneration in cultural-historic districts" while reviewing the literature on new approaches to regeneration. (Hanachi et al., 2011)

RESEARCH METHODS

In this paper, the literature related to the problem was reviewed, and a descriptive-analytical research method was implemented. Afterward, the evolution of conservation and regeneration, as well as approaches in the field of urban infrastructure, were taken into account. Furthermore, by considering deductive reasoning and establishing a deductive relationship between the two concepts of a "landscape approach" and "urban infrastructure", it introduced a holistic and objective-subjective view of the problem as the most appropriate approach in urban regeneration projects. And then examine the hypothesis in historic zone of Tehran as a case study.

FROM RECONSTRUCTION TO URBAN REGENERATION

Growing industries and urbanization has affected the contexts of historic cities. Plenty of historical and central contexts of cities were neglected and ruined due to unplanned and speedy transformation and development of contemporary cities. These parts of the cities are not able to respond to citizens' needs because of numerous physical, social, and economic problems and worn-out textures. To respond to such problems, various movements have initiated since the mid-nineteenth century. Conservation approaches started from the restoration of single buildings and gradually embraced spaces between buildings, complexes, historic cities, and recently cultural landscapes (Jokilehto, 2007). The evolution of urban improvement and modernization policies show that certain approaches were dominant in each era for the intervention in historical contexts correspondent to the economic, political, and social forces and status in cities

Urban renovation stream, after a long process, has reached a stage of its presence, called regeneration. (Roberts, 2000). The relationship between sustainable city theories and a regeneration approach causes a quiet sense of harmony between the definition of regeneration and sustainability. The Recent definition of regeneration considered all three pillars of sustainability: environmental. Economic, and social. Chart one demonstrates the evolution of urban protection strategies. (Tabale 1)

1990s Regeneration	1980s Redevelopment	1970s Renovation	1960s Revitalization	1950s Reconstruction	The type of policy of each period
Moving to a more comprehensive form of policymaking and focusing on integrated solutions	Implementing numerous large-scale projects for the development and redevelopment of costly large-scale projects outside the city	Focusing on renovation in its original location and neighborhood unit plans; Continued development on the outskirts of the city	Continuing 1950s strategies, suburban and marginal growth; Some initial empowerment efforts	Reconstructing and developing older areas of cities and towns, often based on a comprehensive plan, suburban growth	The main strategy and orientation
Following partnership as the dominant approach	Focusing on the role of the private sector and specific agents to increase partnership	Having a growing role of the private sector and decentralizing and transferring of more power to the local government	Moving towards a greater balance between the public and private sectors	National and local government, contractors, and private land and property developers	Influential stakeholders and interest groups
Making greater balances between public, private, and voluntary funding	Dominating the private sector with selective funding by the public sector	Having imitation in public sector resources and growth of private sector investment	Continuing the of the 1950s trend with increasing effect of private sector investment	Investing public sector with relative private sector intervention	Economic Center

Focusing on the role of social groups	Working of self-help social groups with very selective government support	Doing more community-oriented actions and having higher authorities	Social improvement and welfare	Improving living standards and housing construction	Social content
More moderate than the 1980s, paying attention to heritage and building conservation	Making large new replacement and development plans, costly large-scale plans	Renovating extensively in older urban areas	Continuing some approaches of the 1950s in parallel with the empowerment of the regions	Replacing internal area and marginal development	Physical emphasis
Introducing the broader idea of environmental sustainability	Increasing attention to a broader approach to the environment	Environmental improvement with some initiatives	Selective improvements	Landscaping and, to some extent expanding the green space	Environmental approach

Transition from physical approach to considering environmental, social and economy indicators (affected by sustainable development studies)

Table 1: The evolution of conservation and development, from the middle of the twentieth century until now. (Source: Lotfi et al., 2018 and authors' revision)

"Regeneration" means revitalization, rehabilitation, and regrowth. In urban studies, regeneration is creating new spaces and new properties to respond to contemporary needs based on historic and original values of urban textures. Regeneration and modernization projects revive urban textures, economic-social and ecological frameworks, which have been deteriorated, through improving the environment. (couch et al., 2003) Regeneration practices are sustainable practices which consider tangible values, such as historic buildings, and intangible values, such as tradition and local customs, which reflect the interaction of people and their living environment, simultaneously. (Zhai & Kam Ng, 2013)

Also, in practical terms urban regeneration is defined as "comprehensive and integrated vision and action which seeks to bring about a lasting improvement in the economic, physical, social and environmental condition of an area that has been subject to change" (Roberts, 2000)

Hence, the evolution of urban conservation approaches and urban regeneration definition indicate that without a holistic vision, moving towards sustainability and sustainable development in the regeneration of historical context is impossible. The main strategies in this domain are reflected in instructions provided by related institutions. The latest instructions and recommendations regard both tangible and intangible urban heritage. Therefore, a comprehensive cognizant of intangible heritage, social and cultural aspects, infrastructures, and frameworks look required as a prelude for feasible and eligible plans in historic cities. Since the historic core of primary cities has been formed based on interaction with natural environment, we can consider them as cultural landscape.

A LANDSCAPE APPROACH TO URBAN INFRASTRUCTURE

Nowadays, the existence of a city without infrastructure networks is inconceivable. Today, infrastructure is a set of independent and humanizing systems and currents that is responsible for the

production and distribution of continuous flow of goods and services, and without them, contemporary especially urban societies, will not be able to survive. (Alhashemi, 2015)

Before the modern era and industrialization, infrastructure played a key role in the formation and sustainability of human habitats; however, in the traditional age, the consideration of infrastructure encompassed a different view with a holistic nature. Although according to Western knowledge, culture and nature have long been considered two separate fields, in the past and before the advent of modern science, humans had a holistic view, in which different fields of philosophy, geography, biology, culture, and spirituality had been integrated and interconnected. (Buggey & Mitchell, 2003)

From the beginning of history, human communities had formed in protectable and accessible places that were close to water and food sources. The early settlements were formed with interaction and coordination with their natural infrastructure and geographical context. Some sites show specific way of using land and natural resources, which can ensure and sustain biodiversity that is associated in the minds of communities with strong beliefs and artistic and traditional customs. They also reflect people's relationship with nature. However, since modernization and in the post-Cartesian world, a fundamental change in infrastructure has occurred, like in other phenomena. The atomistic and technocratic approach to infrastructure has become the dominant approach in this period. With the development of modern tendencies, the relationship between man and the natural environment altered, as a result the interactive relationship between man and the environment gave way to the domination on nature and natural resources. Progress in science and industry has complicated a series of changes, such as the development of settlements, the emergence of cities, and the needs of human communities. The view towards infrastructure has also changed. The appearance of modern times was accompanied by the addition of various infrastructures such as water networks and canals, railways, sewerage systems, electricity transmission lines, telephone and telegraph networks, and cyber networks to urban complexes. During this period, the design of infrastructure, the facilities, and services necessary for communities, was done separately and with a view of engineering and technocrats. Infrastructure is usually divided into two general categories: hard and soft. Transportation (roads, mass transportation, etc.), facilities (water, sewage, etc.), and other such networks (physical), are often called hard infrastructure, and soft infrastructure includes institutional systems (education, health, government, etc.). These infrastructures meet the economic, social, and other needs of society (C.Rouse, 2013). From the postmodern to the present day, this type of perception and division is common in the field of urban infrastructure.

In the second half of the twentieth century, and since 1960, various events have revealed the limited capacity of industrial and technocratic infrastructure to meet the complex challenges of urbanization, such as falling bridges, canal failure, submerged beaches, power outages, water shortages, Sewage decay and so on (Blanger, 2009 & Rouse & Bunster, 2013). Factors such as the occurrence of environmental problems, land and water pollution, deficiency of resources and the emergence of ecology discipline, and the coincidence of the publication of the book "Design with Nature" by Ian McHarg in 1969, and then his activities in television and academic area, led to deeper long-term effects of industrialization and urbanization on biophysical systems among the community and professionals, led to the emergence of a renaissance in urban development approaches. Besides, in the early 21st century, the appearance of the term "Green Infrastructure" in the literature of architecture and urban planning by Benedict and McMahon (Wright, 2011) was the starting point for the formation of new approaches in the field of urban infrastructure. It also brought about changes in the relationship between man and the natural environment, resulting in the protection of nature instead of dominating, it as its main approach. The ecological approach is one of the main approaches in the postmodern era. The term ecological infrastructure was first originated from Ming Xu (Xu et al., 2010) in 2010 and later expanded by Hillary Brown. In ecological infrastructure, urban infrastructure systems are considered as an integrated ecological system, in which there are symbiotic and synergistic relationships between its main streams, and provide a holistic view of urban infrastructure. In this approach, urban infrastructure is a system with complexity and flexibility, whose stability and resilience are associated with complex interactions and changes in the engineering, environmental and economic infrastructure of a city over

time and space (Pandit, 2015& Brown, 2014). Since different urban infrastructures have a wide and multi-layered relationship with each other, if they are designed and planned separately, there will be an increase in costs and negative environmental consequences. Therefore, in the ecological infrastructure approach, the gray and green infrastructure system and socio-economic flows (considering the stimuli of decision-making and investment as well as the flow of wealth and welfare in society) are viewed in a unified manner in urban planning. Landscape approach was introduced contemporary with the acceleration of environmental hazards and the inability of technocratic infrastructures, as well as the introduction of phenomenology in philosophy and cognition. In its evolution process, in addition to the physical protection desired in ecological infrastructure, it also deals with the semantic and intrinsic values of a city's infrastructure. The idea of landscape infrastructure was first used by Gary Strong in 1996(X & L,2016). In 2009, a comprehensive definition and overview of landscape infrastructure were provided by Pierre Belanger. This view gave a large-scale perspective that could provide effects, such as service to a city, diversion of resources and energy flows, as well as dynamic and flexible changes for the expansion of a city, that are very important for the support and development of a city (Belanger,2009). According to Pierre Blanger's definition of landscape infrastructure, the environmental and social problems of the post-industrial era and its impact on lifestyles, business, and the economy are considered together in an integrated framework called the city landscape. Landscape infrastructure studies the possibility and method of combining landscape and infrastructure. In this area, various ideas have been proposed, each of which has emphasized one aspect of the issue, for example, landscape as infrastructure, infrastructure landscape, landscape infrastructure, and infrastructural landscape (X & L,2016).

One of the major issues in the field of landscape infrastructure is the importance of social values and the use of natural systems and lands, such as the value of gray infrastructure. Another basic idea in this field is to strengthen the aesthetic values of gray infrastructure by combining landscape and infrastructure. Also, this combination has positive effects such as multipurpose gray infrastructure and environmental friendliness. Such an approach connects physical form and aesthetics with performance and benefits, as well as green infrastructure with gray infrastructure. It is also a factor in linking landscape management with natural habitats to achieve specific human goals (Rouse & Bunster,2013). Such a manifestation of natural infrastructure is like a three-dimensional package that surrounds and connects buildings, streets, utilities, and so on. Hence, the landscape infrastructure is not separate from the gray infrastructure and provides its formation. By removing the boundary between green and gray infrastructure, we can achieve a comprehensive and collaborative approach to infrastructure management (X & L,2016). Mansouri and Al-Hashemi, emphasizing the unification of nature and social, cultural, and identity issues, consider the landscape infrastructure as a natural infrastructure within a city, which is linked to the landscape approach in objective (physical) and mental (social and cultural) aspects in city structures, and meets three functional, aesthetic, and landscape identity goals simultaneously. Landscape infrastructure is an infrastructure that goes beyond the level of mere service and is intertwined with the urban life and citizens in various aspects. The stability and durability of this infrastructure in the city and the city structure are among the important issues in the quality of city landscapes (Alehashemi,2015). They also introduce the landscape approach (as a holistic and multidimensional approach) as an approach that can be a solution in overcoming the rigidity and one-dimensionality of infrastructure related to the era of industry and pave the way for the multidimensional presence of infrastructure in the city as a whole (Mansoury & Alehashemi,2017). The definition of landscape infrastructure has expanded over time with the clarification of landscape definition and the promotion of landscape concept to an objective-subjective phenomenon under the influence of phenomenological philosophy in the field of perception in the twentieth century, as well as the evolution of sustainable development issues. The later definition of landscape infrastructure, with its characteristics such as holistic and multifaceted view, can consider all environmental, social, and economic dimensions of urban infrastructure and pays attention to the importance of infrastructure in interaction with human beings and considers the identity, cultural, aesthetic and intrinsic aspects that result from this interaction, and considers these process in mutual relation with each other and

introduces them in the form of an intertwined and dynamic whole called the infrastructure of landscapes, which has objective and subjective aspects, for this reason, it has a greater impact than other approaches to solving complex and confusing problems of contemporary city infrastructure. Table 2.

approach	date	presenter	definition
Natural infrastructure	Before the modernism		Natural water resources as the infrastructure for primitive settlements
Technocrat infrastructure	From the beginning of the modernism		Gray infrastructure which has made possible the formation and development of the modern city, such as water networks, railways, sewage systems and etc.
Green infrastructure	1994	Florida conservation Strategies report	Equality of natural network's value (green infrastructure) and civil service networks (gray infrastructure)
	2002	Edward McMahon Mark Benedict	It is an interconnected network of green spaces that preserves the natural functions and values of the ecosystem and provides benefits to human communities. Green infrastructure is an ecological network that is essential for environmental, social and economic and sustainability
Ecological infrastructure	2010	Ming Xu	He first coined the term
	2012	Hillary brown	Urban infrastructure systems are considered as an integrated ecological system that has coexistence and synergy between its main streams and provides a holistic view of urban infrastructure.
Landscape infrastructure	1996	Gary Strong	He first coined the term
	2009	Pierre Bélanger	He explained the word and presented a large-scale picture from the landscape, Which can serve the city, direct the flow of resources and energy And demonstrate the development of a dynamic and flexible city.
	2013	David C Rouse	One of the main ideas in the field of landscape infrastructure is to value social values and the use of natural systems and lands as much as the value of gray infrastructure. Another key idea in this area is to enhance the aesthetic value of gray infrastructure by combining landscape and infrastructure. In addition, this combination makes gray infrastructure versatile and environmentally friendly. Such an approach links physical form and aesthetics to performance and benefits, and links green infrastructure to gray infrastructure. Also, landscape management is linked to natural habitats in order to achieve specific human goals.
	2015	Mansoury & Alehashemi	Landscape infrastructure is the natural infrastructure within the city that connects with the structures of the city in the objective (physical) and mental (social and cultural) aspects with the landscape approach and meets the three functional, aesthetic and identity goals of the landscape simultaneously.

			Landscape infrastructure is an infrastructure that has been upgraded from a mere service level and is linked to the life of the city and its citizens in various ways. In fact, an important part of the quality of city landscapes depends on the consistency and durability of this infrastructure in the city and its structure.
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Table 2: Different approaches in infrastructure. Transition from mere attention to the physical aspects to the consideration of environmental, economic, social, cultural values (in line with the trend of sustainable development issues). Source: (Mansoury & Alhashemi, 2017) and author's revision.

FINDINGS: LANDSCAPE APPROACH TO INFRASTRUCTURE IN URBAN REGENERATION

Urban regeneration, as a complete and integrated narrative of urban restoration, is a process that, on the one hand, take all aspects and boundaries of development in the heart of the city into account, and on the other hand, take advantage of every opportunity to turn it into a tool or a way to achieve development (Lotfi, 2011: 48). In urban regeneration, the identification and revival of the intangible heritage of the historic district and the cultural and social heritage in the lower and forgotten layers play a special role in the urban development process. As can be seen in the definition of regeneration and subsequent approaches in this area, it is necessary to take a holistic perspective that considers all aspects of spatial stability in historic district interventions. Urban regeneration, while aiming at reviving the cultural and historical heritage in the historical centers of the city, also deals with contemporary life and its social and economic problems and considers mere and physical restoration in a perspective that goes against the principles of Sustainable Development. Lack of attention to the needs of today's population and economic flows will lead to a loss of dynamism and urban life and, consequently, social and economic damage to the historic district. Therefore, paying attention to urban infrastructure and considering the contemporary needs of citizens are the main parts of regeneration projects.

As already mentioned, there are different approaches to planning and implementing urban infrastructure. Among the proposed approaches, the characteristics of the urban infrastructure landscape vision are closer to the main characteristics of the urban regeneration approach. According to Figure 1, both the infrastructure vision and the conservation and development of historic districts have gone through a process from a detailed vision to a holistic vision. Gradually, with the emergence of a phenomenological perspective in the field of perception and interaction between humans and the environment, it went beyond mere attention to physical and objective aspects, and also mental aspects were taken into account. In the landscape approach to infrastructure and the approach to regeneration, environmental, social, and economic aspects, as well as performance and body, are taken into account step by step and simultaneously with the evolution of sustainable development in an integrated whole in which different views interact and communicate with each other. For this reason, the landscape vision of infrastructure based on existing urban infrastructure approaches is more in line with the goals of the restoration of commonalities and is the most suitable option for infrastructure planning in conservation and regeneration projects of historic cities (Figure 1).

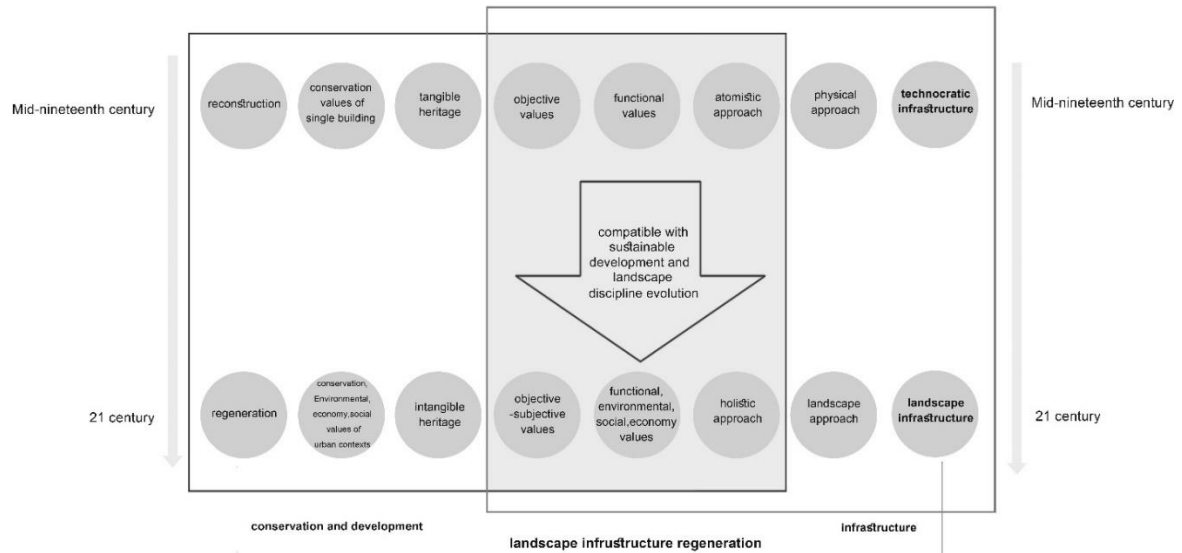


Figure 1: Deductive relationship between urban conservation and urban infrastructure. Source: Authors

TANGIBLE AND INTANGIBLE VALUES OF QANATS IN THE HISTORIC DISTRICT OF TEHRAN, (A CASE STUDY)

Qanat (Aqueduct) is a smart and ecologically sustainable method of extracting groundwater using gravity, and it has been considered as an Iranian invention and listed on the UNESCO World Heritage List in 2008. Iranians have long been able to use qanat to transform the arid and semi-arid land of the Iranian plateau into a habitable zone. Thus, qanat has shaped the water infrastructure of many cities and villages in this region.

Tehran, the capital of Iran, is no exception to this rule, and qanats have been used as the main water infrastructure to supply drinking water to residential areas, gardens, and agricultural lands until the first Pahlavi period and the beginning of modernization along with using new technologies in designing and planning of urban infrastructure. In 1931, Tehran's population was about 30,000, and with an area of 15 square kilometers, it was irrigated with 26 qanats. Figure 2 shows the Tehran qanat route and its adaptation to the location of gardens and agricultural lands.

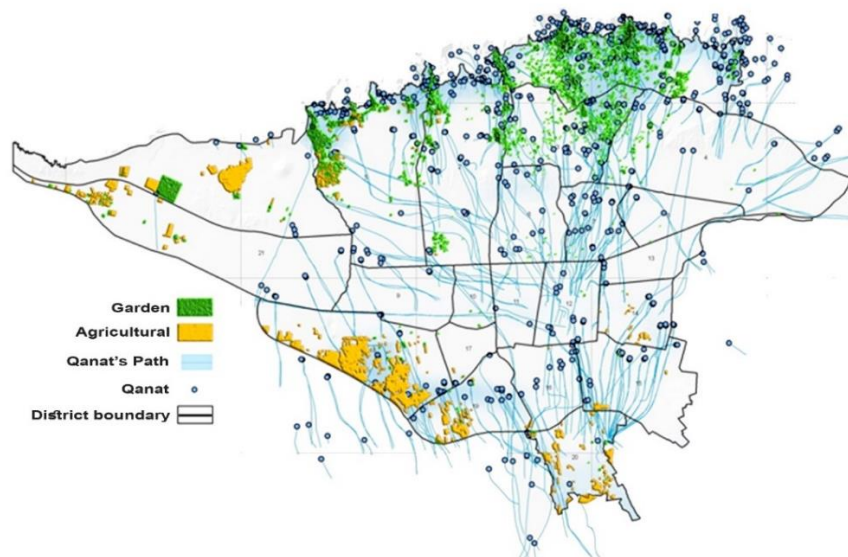


Figure 2: Location of qanats and their route in agricultural and horticultural uses, Tehran, 2009. (Source: Tehran City Development Plans Management and Planning Institution, 2009)

There is also a significant relationship between the qanat route and the formation of the access route and the urban passage network in Tehran districts. When the water of qanat appears and flows to the surface of the ground in the streams, it continues its route on the ground following the natural slope of the passage and has various uses along the way. For this paper, the Tehran Bazaar neighborhood was chosen as a case study due to its width. However, this model can be generalized in other neighborhoods of Tehran as well as all cities and villages that benefit from the qanat water infrastructure. Figure 3 shows the harmony of the qanat route and urban passages in the Bazaar area of Tehran.

In addition to qanat's functional role as water infrastructure, it values culturally and socially. A detailed look at the land use map of Tehran's Bazaar area shows the compatibility and location of cultural and religious land uses of urban landmarks such as mosques and Tekyeh (religious centers to hold rituals), schools, Imamzadehs (shrines), and Saqakhanehs (public drinking place) with the qanat route. Figure four



Figure4: Conformity of passage routes, localizing the elements of the urban index with qanat route - Source: Authors

In addition to the impact of the qanat on the urban body and elements of the cultural body, the qanat also has an impact on the social and cultural systems of the citizens because, without a cohesive social system and the cultural and mental beliefs of the citizens, qanats fail to play the main role of the water supply system (Fadakar Davarani, 2009)

Many principles and social roles have been defined, from the construction to the use of water in the qanat, and the observance by all citizens of the laws governing this social system guarantees the survival of the qanat. The different social roles associated with the qanat and the responsibilities and hierarchies that come with it are illustrated in figure 5.

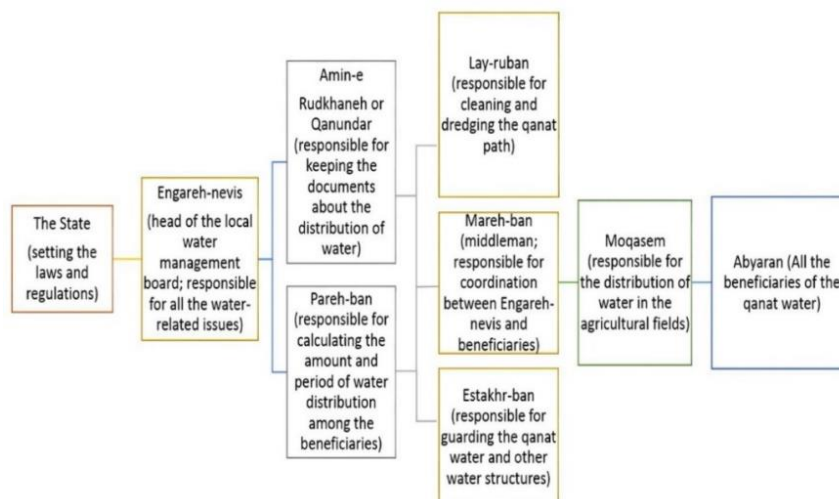


Figure5: Hierarchies of social roles in the construction of the qanat. Source: (khaleghi: 2019)

Different cultural and religious beliefs are also effective in the formation and survival of the qanat network. One of the most important of these beliefs is the culture of “Waqf.” Waqf and documents under the title “Waqf Nameh” is one of the positive and constructive themes in Islamic society that has led to fruitful results regarding qanats in several cases (Yazdani & Semsareyazdi: 2012). Many qanats in Tehran have been dedicated to the public, and the general public can benefit from qanat. In addition water, as a sacred element that symbolizes purity and cleanliness, has always been respected in the religious and cultural beliefs of the Iranians. This belief and respect for water have led to the protection and conservation of water as a cultural value among the general public. Such belief among the residents has led to saving on water consumption and keeping the water clean along the qanat line so that even houses located at the end of the qanat line can benefit from sufficient and safe water. Considering the different cultural, social, environmental, and functional roles of the qanat network in the life of Tehran city, it can be concluded that qanat in Tehran was not just a water supply system, but it had also been valuable objectively and subjectively.

CONCLUSION: LANDSCAPE APPROACH IN REGENERATING AND REVIVING TEHRAN QANAT NETWORK

The study of the evolution of urban conservation confirms the transition from a purely physical view to an objective-subjective view over time (from the mid-nineteenth to the present), indicating the interval at which restoration of a single building begins and regeneration as a holistic approach follows. The evolution of infrastructure view from the beginning of the industrial era to the present is similar to the evolution of urban conservation issues. Regarding the technocratic and civil infrastructure to landscape infrastructure, the transition from an objective to an objective-subjective view cannot be ignored. Thus, the deductive relationship between both areas, holistic perspective, objective and subjective values, all functional, ecological, social, economic, and cultural aspects as their common features confirm that the synthesis between both disciplines in the field of architecture and urban planning can contribute significantly to achieve the urban regeneration goals. When the landscape approach is applied to urban infrastructure planning in the historic district, regarding other approaches in this area, it aligns more closely with the goals of urban regeneration. Regeneration deals with a holistic perspective of urban problems and considers the multi-layered relationships of effectiveness in a community called the urban landscape. Besides, it takes an effective step towards achieving sustainable development in the economic, social, physical, and environmental areas of the region. “Landscape Infrastructure in Urban Regeneration” offers a potential strategy for integrating urban regeneration ideas and landscape infrastructure to create new boundaries and territories that reflect natural and cultural processes.

Considering the role of qanat in the historic district of Tehran, it can be concluded that qanat was not just a water supply network, but it has played an effective role in the formation of the urban body as well as the cultural and social life of Tehran. According to the results obtained from two areas of regeneration and infrastructure, it is revealed that to achieve regeneration and comprehensive revival of the qanat, a landscape approach should be adopted to consider all existential, functional, and intrinsic layers to revive all qanat aspects in the historic districts and especially the historic district of Tehran.

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Chapter 6

Public Space and Health

“Enhancing People’s Health in Public Spaces through Landscape Architecture, Case Study: Shiraz City”

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ABSTRACT

There has been a lot of debate about public spaces since ancient times that with the formation of private space, public space has also been formed. People would prefer to have a social relationship and communication, so as soon as they step out of the private space into the public space, the presence of urban public design in their life begins. Thus, the concept of urban space faces many complexities and ambiguities.

In the last decades, population growth in the cities brings some environmental, socio-cultural, and also mental and physical health issues for people. The scarcity of the appropriate public spaces and recreational facilities encourage us to research in the field of public spaces with an approach to environmental healing through landscape architecture. This research could connect the community with the built environment and enhance the sense of place. It is crucial to pay attention to urban resilience and community development in urban planning.

The goal of the research is to recognize the components affecting the promotion of people's health through urban landscape design. Also, the main research question is, what are the components affecting the improvement of people's health through architecture?

To do this research, the data about recognizing the subject and theoretical foundations are collected at the library using written sources in the form of articles, books, and historical records. In the next step, the obtained information and findings on the topic are analysed with diagrams and tables. In this stage, it is crucial using the results of basic research to improve the structure and pattern. The analysis of the obtained information is done to match the objectives with the main research question.

Therefore, in the public spaces, it is essential to consider services and leisure facilities in order to provide a healthier community and sustainable environment, especially for the adults in Shiraz city. These interests in the problems of urban developments, landscape architecture, and also built environments fostered the desire to pursue research about improving people's health in public spaces. As a result, urban regeneration and manipulation of cities for future urban public spaces are essential to enhancing the mental and physical health of people.

Key words: Public Spaces, Mental and Physical Health, Landscape Architecture, Environmental Healing, Shiraz City

INTRODUCTION

Today public spaces are facing changes and evolutions and experiencing new essence, types, interactions and communications, under the several micro and macro socio-cultural and economic situation factors happening.

In recent years, the urban public spaces have changed significantly, the importance of place has been decreased and this has happened because of the direct influence of complicated social and cultural context. The speed of globalization and similar evolutions have been increased and obtained progresses

regarding electronic connections have made the human's physical movements unnecessary. Moreover, studying and reviewing the changes and evolutions which have happened in contemporary urban public spaces and also analyzing the criticisms that theorists of this field are essential.

Thus, it can be said that urban public spaces are one of the main and important components of cities such as Shiraz besides the great importance they have in appearing new types of public spheres. Cities that improve the quality of life for their citizens experience higher levels of prosperity; they are likely to find themselves more advanced in terms of sustainability. Such cities strive towards social equity and gender equality by increasing access to the urban commons and public good, preventing private appropriation and expanding the scope for improved quality of life for all residents. So, Shiraz city needs a strong notion of the public demonstrate a commitment to an improved quality of life for their citizens by providing adequate street space, green areas, parks, recreation facilities and other public spaces.

REVIEW OF THE RELATED LITERATURE

Tavares et al, 2020, Public health and wellbeing in public open spaces through climate responsive urban planning and design:

The article indicates that planning and design of urban spaces, on the other hand, largely define the way we live affecting our health as it can, for instance, promote or hinder active lifestyles, social cohesion and access to healthy food choices. Climate responsive planning and design are, therefore, key to secure a healthy urban lifestyle.

Namdarian et al, 2018, The Investigation of urban landscape regarding different traditions of science philosophy, the production of space theory and influential forces on the scape:

investigating urban landscape includes 1) Urban landscape is an inherent character of physic of city, and it is independent of human as observer; 2) Urban landscape is a subjective matter created by observers, and it is not related to the structure of physical environment; 3) Urban landscape is a phenomenon or event being produced during commuting between physical properties of environment on the one hand, and cultural symbols and mental capabilities of observers on the other hand.

Bishop et al, 2017, Social Interactions and the Quality of Urban Public Space:

The article illustrates that historical and contemporary links between public life and public space in cities. A discussion of social interaction and high-quality public space, provides the basis for the discussion of their mutual influence on each other. Planners and designers need to understand the economic, political, sociocultural, and now technological forces that shape the public realm in order to create and provide socially supportive public spaces. Urban populations are increasingly demanding high-quality public spaces in support of a desired vibrant public life. Cities are being challenged to provide them.

Villanueva. Karen and Badland. Hannah and Hooper. Paula and Koohsari. Mohammad Javad and Mavoa. Suzanne and Davern. Melanie and Roberts. Rebecca and Goldfeld. Sharon and Giles-Corti, 2015, developing indicators of public open space to promote health and wellbeing in communities:

Public open space contributes to the liveability of a region, and the health and wellbeing of individuals. There is interest in creating built environment indicators to achieve policy outcomes, including health and wellbeing. We have proposed a process to develop evidence-based, quantifiable, and measurable public open space indicators.

Gehl, 2015, Städte für Menschen. Berlin: Jovis Verlag GmbH:

The investigation focuses on public green and recreational areas. Moreover, to streets, squares, and also public buildings, they are essential parts of the city's public spaces. Depending on their position in the urban fabric and on their spatial quality, they are places of transit as well as places of necessary and voluntary activities. As a result, quality and usage are closely related. Better quality enhances leisure activities, and more social contacts take place.

Zhao and Siu, 2014, Freedom and control: a state of balance in public space. Facilities:

The concept of public space lays back to ancient Greece. It was considered as a democratic space where

people could vote on governmental issues, meet and have conversation. As a consequence of changing communities, public spaces have also changed, thus commercial and other activities came to happen more actively in such spaces in medieval period.

Lynch, 1981, a theory of good city form:

Kevin Lynch, in his 1981 book *The Theory of Good City form*, examines the place of public space on a large scale and argues that vitality, along with other factors of meaning, proportionality, accessibility, oversight and authority, efficiency and justice, are the functional axes of good shape. They make up the city. According to Lynch, the building blocks of a good city image and the desired quality of successful cities are vitality (healthy environment), perception (sense of place and identity), appropriateness (spatial adaptation), accessibility (access to people, activities, and information) and control.

URBAN PUBLIC SPACES DURING THE TIME

Some theorists believe that may be the best type of public space during the history has been Agora in ancient Greece, the main public plaza which was the place for the meetings in city, was used as the place of communicating people as well and also a place of holding celebrations and shows; this space was also used as a layer of the city social life. Agora –which actually means the place of association–, has been formed as the spatial focal point of social life in ancient Greece for holding political, religious and commercial activities from the 6th century BC (Lopes and Camanho, 2013, 755). In fact, Agora as a public space is quite limited from the concept of “Public” point of view and has been practically opened just for a small part of population (Ashrafi and Poorahmad, 2015, 1394, 149).

The Roman cities have used the planned approach for producing public space in city more often, so that by creating a central area and also social spaces, shopping centers and spiritual spaces, they are very similar to contemporary western cities (Carmona et al, 2008). It can be said that the tension between public and private space has been occurred in medieval cities more than anywhere and these cities were places for trade and exchange of goods as well, so that the trade was influencing the place of cities and the way of organizing the streets and markets in cities (Platt, 1976).

Although public spaces have been perceptible in different historical periods in all cities but its true meaning was popular in England and the United States in the late nineteenth century (Jayakody et al, 2018) and the twentieth century grew behind theories (White, 1991). Death and living in major American cities, Jane Jacobs, who considers public spaces to be everyday spaces, streets and sidewalks for urban living, and states that urban areas should be designed to encourage the use of such spaces, And William White, who considered public spaces as social places in the cities (Jayakody et al, 2018), are among the theories suggested.

URBAN PUBLIC SPACES

Public space refers to the owned and maintained by local government on behalf of the general public according to its traditional notion. Publicness is a concept which is appropriated to be understood. The focus is on the main rights of users in relation with a space, which is admitted as public: right of access, right of use, right of control (Magalhães et al, 2017).

Rapid urbanization has dramatically changed the way people live over the past several decades. It has also reduced the possibility of urban residents coming into contact with green spaces. As a result, many studies have explored the negative effect of reduced contact with green space upon public health and the health effects of exposure to green spaces. In general, exposure to green spaces can have a positive effect on public health, including overall health (Zhang et al, 2020, 1-17).

In this situation, the quality of city spaces will have a significant role in the nations' economic and social conditions, in terms of attracting capital and tourist as well as environmental protection and also the citizens' life quality improvement (Madanipour, 2008, 1387, 7).

Also, cultural connections are globally spreading by immigration, quick propagating of news, thoughts, fashions, journeys, mass media, global food brands, movies, music, food and clothing, regardless of national borders and social traditions and cultural identities (Golshani and Gholami, 2008, 1387, 15,

16). In the general sense, vitality is related to self-sufficiency, stability, adaptability, flexibility, capacity for change, self-improvement, responsibility, and security. If we imagine the city as a living being, it needs vitality and vitality to survive. Vitality is a feature of public spaces (Sci, 2014, 361-374).

The notion and the approach to public space requires a profound clarification for urban planners and architects, as it deals with contemporary culture, and demands or desires of the new generation of users. Desires of the community is much more related to social sustainability rather than the design process. A general reflection of particular cultural activities is necessary to open eyes and see an urban public space with a conscious mind (Bravo, 2013).

These changes have had consequences such as increasing attention to the urban public spaces, creating new types of public spaces (semi-public spaces) and changes in the role and characteristics of public spaces (Akkarercan, 2007).

All consider, the public spaces include concrete fields and public parks and streets, each of which has its own role, and spaces that bind the city together, as the basis of social interactions, environmental quality and mental well-being Which causes different events and daily activities of people in a city like Shiraz.

Public spaces in Shiraz city are considered to be environmental transparency, and their characteristics are shaped by social and psychological conditions. Public spaces include spaces that are 1-comfortable 2-accessible 3-attract people to engage in their activities.

PUBLIC SPACES AND CITIZENS' HEALTH

Impacts of social interaction on human's health

As the context of place plays a powerful role in health and well-being, understanding the interplay between urban green space and social cohesion can inform strategic interventions to address health challenges (Dadvand et al, 2019, 171-177; Berkman and Glass, 2000, 137-173). Social interactions in urban green spaces can provide opportunities to bond with others, develop their sense of community, and regroup from the demands of daily life (Cattell et al, 2008, 544-561).

Given the multiple encounters of urban spaces, their expectations and real experiences can realize to Because the environment is an integral part of human life and its quality plays an important role in the health of citizens (CABE, 2009). The relationship between the quality of urban spaces and health (Bency et al, 2003). Health is the full meaning of physical, psychological and social well-being, and not merely the absence of illness or disaster.

Human health is very close to the quality of the environment because the cause of human illness is related to the condition of its environment. In Shiraz city some features are very important in terms of space satisfaction and health and hygienic. All urban spaces affect health and quality, and this is related to the use and function of space. Evidence increasingly shows that vast environments can reduce stress, encourage exercise, and improve health.

Impacts of urban green spaces and landscape architecture on human's health

Over half of the world's population now lives in urban areas, and this proportion is expected to increase. While there have been numerous reviews of empirical studies on the link between nature and human health, very few have focused on the urban context, and most have examined almost exclusively cross-sectional research (Kondo et al, 2018).

Studies of human health responses to urban green space are especially relevant to governments, organizations, and communities that are making efforts to either introduce new or preserve existing green space for residents of urban areas. Urban planning and place-based initiatives are increasingly addressing not only economic and environmental priorities, but also public health goals (Branas and Macdonald, 2014, 157).

Cities are increasingly adopting an urban health agenda (Corburn, 2009, 541-546), which prioritizes the relationship between urban land, natural resources, and human health. These groups need evidence that is relevant to land and natural resource management as well as health outcomes in urban areas

Therefore, negative association is between urban green space exposure and mortality, heart rate,

violence, and also depression and stress, and positive association includes attention, mood, and physical activity.

MENTAL AND PHYSICAL HEALTH ELEMENTS

Mental health

Aspects of brain function, including cognitive development and attention restoration, may be pathways by which environments affect mental health (Gidlow et al, 2016, 22-29; Tyrväinen et al, 2014, 1-9; Mayer et al, 2009, 607-643).

Urban green space exposure could impact weight status or other measurements of the metabolic system via cardiovascular, mental health and physical activity pathways (Carrus et al, 2015, 221-228; Brown et al, 2014, 390-399; Tamosiunas et al, 2014, 20).

There was a general finding that exposure to urban nature compared to urban built environments improved multiple measures of cognitive function or development, including attention or attentional capacity and working memory.

Physical health

Whether or not someone engages in physical activity may be influenced not only by individual characteristics, but also by the accessibility, features, condition, and actual and perceived safety of their surrounding physical environment (Owen et al, 2004, 67-76).

Increased exposure to urban open space could improve health by increasing opportunities and actual physical activity levels. This review is a step toward assessing the possibility of causal relationships between nature and health in urban settings. In this diagram, the elements that have impacts on increasing the health's level have been showed briefly (diagram no. 1):

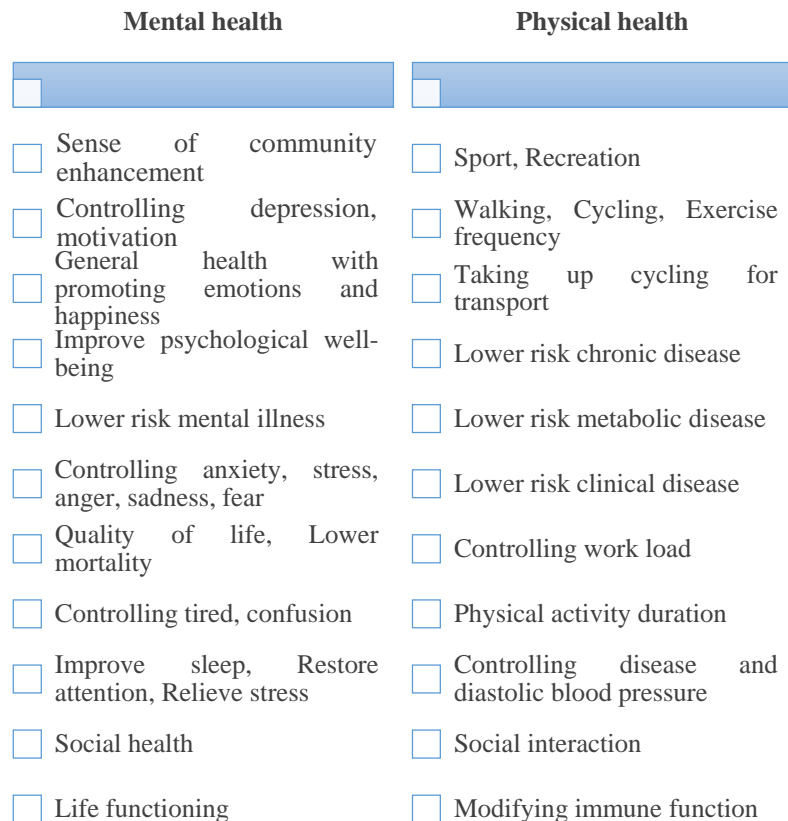


Diagram 1: Effective elements for health improvement

CONCLUSION

Ensuring city-wide distribution of urban public spaces is a way for governments in Shiraz city to reduce

inequalities and reallocate benefits. The benefit of preparing a city-wide strategy is the protection and creation of a network of high-quality public spaces. City-wide policies and strategies should ensure planning, design and management of public spaces at different scales in Shiraz. Without a clear strategy, it is difficult for local governments in this city to priorities, spend and plan resources and to show how much public space is valued, and to mitigate the negative impacts of site specific interventions.

Public space offers an integrated and holistic approach to sustainable urban spaces development in Shiraz. Building on the interlinked principles of the new urban public places:

- a) Public space lends itself well to participatory, gender and age responsive approaches, and to landscape planning in Shiraz that catalyzes on the benefits of ecosystems to health and quality of life, providing equal access and making sure to leave no one behind.
- b) The commons provide the space for participation of urban stakeholders from different classes of the society to advance sustainable and inclusive urban economies. Investments in streets and public space infrastructure improve urban productivity, livelihoods and allows better access to markets, jobs and public services, especially in developing city such Shiraz where over half of the urban workforce is informal
- c) Adequately planned and designed public space raise issues regarding the right of people to freedom of artistic expression, political assembly and civic empowerment, to enjoy, engage and exchange with each.
- d) Public space creation, protection, management and enjoyment are ideal opportunities for the involvement of all citizens in Shiraz, ensuring that individual and differentiated interests are transformed into collaborative practices.
- e) Public space is critical for environmental sustainability. Adequately planned public spaces play a crucial role in Shiraz city life and designed green open spaces can act as sustainable system, and be a great wildlife habitat.
- f) Creating leisure facilities and recreational services plan an important role on city life and people's mental and physical health.

Implementation of new urban spaces

Some of the key driver that have been distilled from the issue paper on public space and the dialogues leading up to the adoption of the new urban public spaces include:

1. At regional and city level, city-wide strategies need to focus not only on places and spaces but on the form, function and connectivity of Shiraz city as a whole.
2. Local authorities should be able to design the network of public space as part of their development plans in Shiraz.
3. As cities expand, urban projects need to ensure adequate public.
4. Debate on targets, indicators and principles on measuring the distribution, quantity, quality and accessibility of public space.
5. At neighbourhood level, urban design should work with communities to foster social inclusion, gender equality, and health improvement, celebrate multiculturalism, and also enable urban livelihoods, thus creating rich, vibrant spaces in the urban commons.
6. Laws and regulations in Shiraz city need to be reviewed, to establish enabling systems to create, revitalise, manage, and maintain public space, including participatory processes to define their use and manage access to public spaces.
7. Land value sharing and land readjustment tools to be widely adopted and promoted for municipalities to capture private values generated by better public spaces in Shiraz to sustain investment in public space through architectural design.
8. Considering services and leisure facilities play essential role in people's lifestyle and health. Therefore, providing recreational equipment for urban development as well as designing green spaces through landscape architecture enhance the level of physical and mental health.

The liveliness and continuous use of public space as a public good lead to urban environments that are well maintained, healthy and safe, making the Shiraz city an attractive place in which to live and work. It is important for local governments to invest in creating urban public space (table no. 1):

Table 1: Key drivers for action: implementation of public spaces led to Shiraz urban development

Key improvement's elements	
1	Increasing socio-cultural interaction
2	Improving health
3	Developing safety
4	Promoting quality of people's life
5	Bringing sense of place
6	Developing green spaces and trees in open spaces
7	Creating services and leisure equipment
8	Providing recreational facilities for people

RESULTS

Public space can lead urban development by ensuring that building will only be permitted if public space has been organized prior to development. The link between public space and urban development needs to be understood in each context and legal framework to prevent the creation of unmanaged and/or public space deficiencies common to many cities. Particularly in recent decades, many cities have put public space at the core of urban development. Thus, for Shiraz city it is necessary to create better public spaces and provide a healing environment through landscape architecture.

In the diagram no. 2, the effective factors that enhancing people's health in urban public spaces have been showed briefly:



Diagram 2: Effective factors that enhancing people's health in urban public spaces

Recommendations

Public spaces are a vital ingredient of successful cities. They help build a sense of community, civic identity and culture. Public spaces facilitate social capital, economic development, and community

revitalization, and also people's health enhancement in Shiraz. Thus, governments could invest in designing urban public space (diagram no. 3):

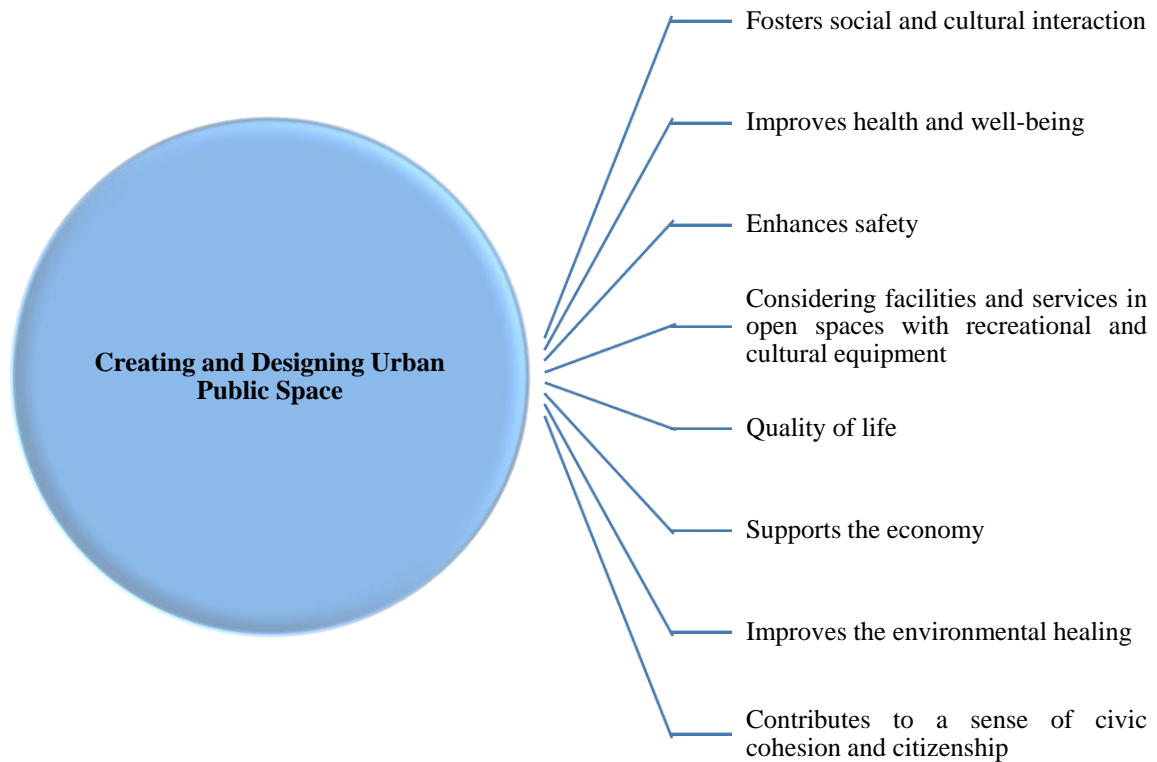


Diagram 3: Recommendations for enhancing people's health in urban public spaces

CONCLUSIONS

Finally, urban planners and public health professionals need evidence of the impacts of specific therapeutic or place-based interventions to help address public health issues facing their constituents. There is a need for more (randomized, controlled) intervention studies to assess which specific changes to urban environments and public spaces, and also to the everyday habits and routines of urban residents in Shiraz city, are needed to make a difference to chronic disease, injury and violence related outcomes.

These findings may assist urban managers, organizations, and also communities in their efforts to create new or preserve existing urban public spaces.

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Investigating Water Effect in Tehran Local Parks

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ABSTRACT

This paper shows that the relationship between children and nature is destroyed because children's leisure time is almost spent in non-physical activities, thus they have fewer opportunities to experience the environment. Water is a part of our lives. Few children can resist water's attraction. Important questions of research are: What is the water role in the playground? Which forms of water can supply the needs of children and which form can educate them?

A qualitative research method is adopted for analysis. Conditions are observed based on the water role in some parks in Tehran. The results show that regardless of the presence of water in Iranian architectural history and Iranian gardens, using water in the playground is disregarded. In this research, considering water's role in education and development of mental and physical skills, a model is presented to design a playground by use of water. It is to develop children's personal, social, physical, aesthetic skills, and to propose an educational playground.

Keywords: Children, Playground, Water, Nature.

INTRODUCTION

A geographical overview of Iran cities shows the dependency between urban life and access to water resources. Water with different characteristics creates different emotions in humans. Therefore, always it is used in places as diverse as man-made water reservoirs, like ponds and water fountains, etc. (Homaei et al, 2012). Based on this we can conclude that water has long had an important role in Iranian architecture and it has been used in various forms. Nowadays the cities grow and grow more without necessary consideration to children needs. Our children suffer from a lack of enough physical activities as well as a lack of enough relationships with nature. play spaces and opportunities are Children's under threat due to the ongoing processes of urbanization and its special condition" the Corona Pandemic" (Uchiyama, 2020). Bozkurt (2019) believes that casual observation and personal experiences show children like water and water play. One of the early studies that explored the relationship between water and children has shown that the presence of water is important for children found that the majority of children prefer water features rather than sculptures and statutes. This was a significant finding to understand how important the water in urban open spaces is for children (Derr and Lance, 2012).

Therefore, improvement of the quality of playground with using water has a significant impact on personal growth and social interaction, maximizing physical activity, sustainably connecting with nature, and... Understanding young children's perspectives about their environment are important and should be taken into consideration in research as well as in practice. It is noticeable that in recent years, most of the children's leisure time is spent watching TV and doing other non-physical activities. Hence, creating more recreational spaces is considered to prevent idleness, loss of awareness of one's environment, and lack of interaction with the environment. Unfortunately, it is in most cases observed those children's spaces have been designed without consideration of their real needs. For example, only a little attention has been paid to their psychological characteristics such as a need for a direct relationship with nature. To actualize children's creative abilities, it is crucial to pay special attention to the balance between the spaces designed for children and their developmental needs and abilities. This study examines children's behavior with water. The

influence of the environment on children's growth from the viewpoint of developmental and educational psychology is studied and could be used in the designing process by architects and interior designers who design children's spaces. Water use in designing children's playgrounds and put them in direct contact with the water makes a proper condition to training and retraining to create an environment that developed physical and mental skills.

UNDERSTANDING OF PLAY

Since the time of the classic Greek philosophers, the play has been considered the characteristic mode of behavior of the young child, an expression of the natural spirit of childhood and thus a key defining feature of childhood (Fromberg and Bergen, 2006; Kleine, 1993; Mayall, 2002). No one definition of play can encompass all the views, perceptions, experiences, and expectations that are connected with it.

In one meaning, play is viewed as offering a time and space for the separation of children from the adult world of work and a medium through which young children can make sense of, and feel at the playground in the world. (Kernan, 2007).

CHILDREN NEED TO PLAYING

Children use their senses, their minds, and their bodies to find out about and make sense of what they see, feel and experience in the world around them. They gather information and develop new skills, including thinking skills. They form ideas and theories and test these out. They refine their ideas through exploring their environment actively and through interacting and communicating with adults and with other children. Much of this happens through play and other experiences that allow children to be creative, take risks and make discoveries. As they learn, they retest their theories adjusting them to take on board discoveries and new experiences (Aistear).

In early childhood, most children develop physically and cognitively through exploring their environment, though some have disabilities that make this more difficult to achieve. As well as building knowledge and developing skills, children also need to develop positive dispositions and attitudes towards learning. They have an innate drive to get to know the workings of their world. The adult can foster learning by planning activities for them through which they can experience success as learners. This means planning activities that are suited to children's individual needs and connect with their experiences and interests while at the same time challenging them to extend their knowledge, refine their skills, and work together to solve problems (Aistear).

Playing importance

The way the physical environment is designed and configured influences how children feel, act and behave. The physical environment allows growth and development through activities and materials in defined play areas (Clayton & Forton, 2001). Progression in play reflects the observation and assessment of children's knowledge, skills, and attitudes to provide developmentally appropriate experiences. Progression in the play comes about as a result of a real understanding of the interests, needs, and experiences of the child (Doreen et al, 2015).

Play is a universal phenomenon and a right of childhood. It is spontaneous, rewarding, and fun with several benefits:

Education: helps children learn and build skills that lay the foundation for learning to read, write and do the math. **Social skills:** provides opportunities to socialize with peers of the same age, and to learn to understand others, to communicate, and to negotiate. **Cognition:** encourages children to learn, imagine, categorize and problem solve. **Therapeutic benefits:** Gives children the opportunity to express troubling aspects of their daily life, including stresses, trauma, family conflicts, and other dilemmas (Peter K. Smith, 2013).

Environment importance

Definition of the Environment to understand the play, we first must understand the importance of the environment in the eyes of children and adults. Some people may see the environment as insignificant, but for teachers, parents, and educators it is something that needs to be considered a high priority. The environment is defined as the physical environment, its surroundings, and a specific setting (Vickerius & Sandberg, 2006). The physical environment will vary depending on the age of children. The infant, for example, will designate the eating, sleeping, diapering, and play areas as primary activities. However, the most important space in which activities will be performed is the play area. The play area of infants needs to be configured so that they can grasp and reach age-appropriate toys or pull themselves up when practicing standing or walking. Infants will need to be down on the floor exploring their environments with toys to look at, listening to things around them, feeling, chewing, pushing, pulling, stacking, rolling, turning, squeezing, and shaking (Vance & Boals, 1989). The physical environment for a toddler has eating, toileting, and playing areas. Toddlers need spaces that allow them to experiment, explore, and discover things around their environment. They are constantly moving or on the go and need many opportunities to practice newly emerging skills. The preschool will have similar physical space needs to the toddler. Therefore, eating, toileting, and play areas continue to be essential. Learning centers are emphasized in the preschool; such centers include block, art, pretend or dress-up, science, and music, just to name a few. (McLachlan, 2013).

PLAYGROUND

Playgrounds provide space and structure for children's socialization, imaginative play, and physical activity. However, not all playgrounds are created equal, and it seems that adult-designed spaces are increasingly unsuccessful in meeting children's needs or expectations about outdoor play. Playgrounds should encourage physical activity, social interaction, creativity, and problem-solving as well as contact and interaction with nature (Wood & Martin, 2010).

Ideally, play spaces design needs to support the preceding functions. Specifically, effective playgrounds: include natural elements (e.g. sand, water); support that encourages interaction and socialization; are highly accessible and cater to a variety of demographics and backgrounds; provide risk and challenge, however, are safe and free of hazards; have pleasing aesthetics; stimulate children's imagination and creativity; and include space for active play (Wood & Martin, 2010).

Natural playground

Natural playgrounds have the additional benefit of providing children with more opportunities than typical pre-formed playgrounds to develop gross-motor skills (e.g. climbing) (Fjortoft, 2000 & 2001). Contact with nature has been associated with several health benefits for children, such as improved cognitive function, increased creativity, improved interaction with adults, reduced attention deficit hyperactivity disorder symptoms, and reduced rates of aggression (Faber, et al, 2001 & 2001 & 2004; Wells, 2000).

Children experience a great sense of freedom in outdoor settings. The large spaces provide opportunities for children to use their whole bodies to explore, plan, and implement these plans without limitations on noise and activity (McGinnis & Kozlowski, 2013).

In a study of 41 programs, it was found that in lower quality outdoor environments children engaged more in functional or repetitive play, while in higher quality outdoor environments, children showed a tendency to display more constructive play than children in lower quality settings. As the quality of the outdoor program decreased, the frequency of negative behaviors increased (DeBord, Hestenes, Moore, Cosco, & McGinnis, 2005).

Fixed equipment leaves little room for children to play creatively since there is generally a finite number of ways to use each aspect of the equipment. Traditional playgrounds consisting of fixed equipment (such as slides, swings, monkey bars) do not offer opportunities for children to play creatively (Walsh, 1993) and promote competition rather than cooperation. Jacobs (1980) suggested that privacy helps in the

development of personal autonomy as it gives the child an opportunity to come to terms with his thoughts and feelings. Privacy also enables children to release their emotions and to gain respite from the pressures of social norms and expectations (McGinnis & Kozlowski, 2013).

WATER PLAY

Young children can spend countless hours playing with water: pouring it back and forth, watching it spill over the edge of a container, blocking its stream, directing its flow, splashing gently, making waves, and pouring some more. When a water table is not available, they can often be found "washing their hands" in the bathroom for long periods, mesmerized by the water. Sometimes it is hard for adults to encourage them to leave the sink (Gross, 2012).

Few children can resist water's attraction. What is going on here? Water is fascinating, fun, and multifaceted. Children can play with it endlessly. But play, for play's sake, is not water's only value (Crosser, 1994, Tovey, 1993). Indeed, water play is a compelling focus of study for young children (Chalufour & Worth, 2005).

Early Experiences in Science & Technology

- explore the properties of water e.g. pour, run, drips
- ask questions about how things work and why they happen e.g. stones in water, water wheels, the flow of water, floating, sinking
- Use their senses to investigate water e.g. color – sight, baby bath – smell, hot/cold – touch, bottled water – taste.
- observe how objects behave in water
- make predictions
- use cutting, folding, joining and building skills to make boats for water play
- Explore ice in water (Doreen et al, 2015).

LEARNING BY WATER PLAY

Water and a few inexpensive tools can provide a sensory and learning experience of immense proportions. What is it children get out of their water study, which looks so much like fun? Free play with water can build the foundation for the understanding of a multitude of scientific concepts, including those in

- Physics (flow, motion),
- Chemistry (solutions, cohesion),
- Biology (plant and animal life), and
- Mathematics (measurement, equivalence, volume).
 - compare the amount of water in different containers by pouring from one to another
 - understand and use mathematical language e.g. full/empty, need more/less, heavy/light
 - Compare the size of containers e.g. which is the biggest? Which holds most?
 - Talk about the shape of containers – straight sides, curved sides, circle at the bottom, etc.
 - Explore personal hygiene e.g. using soap, washing dolls, clothes (Doreen et al, 2015).

Mastery of these concepts will support children's understanding of academic subjects in later schooling and life. Science is indeed a "serious play" (Wassermann, 1990). Science is "everywhere around us. What can children do to increase their understanding of science? Everything!". Children inquire, observe, compare, imagine, invent, design experiments, and theorize when they explore natural science materials such as water, sand, and mud (Gross, 2012).

DEVELOPING SKILLS BY WATER PLAY

Water play can affect personal, social, emotional, physical, creative, Knowledge, and Appreciation of the Environment skills in children.

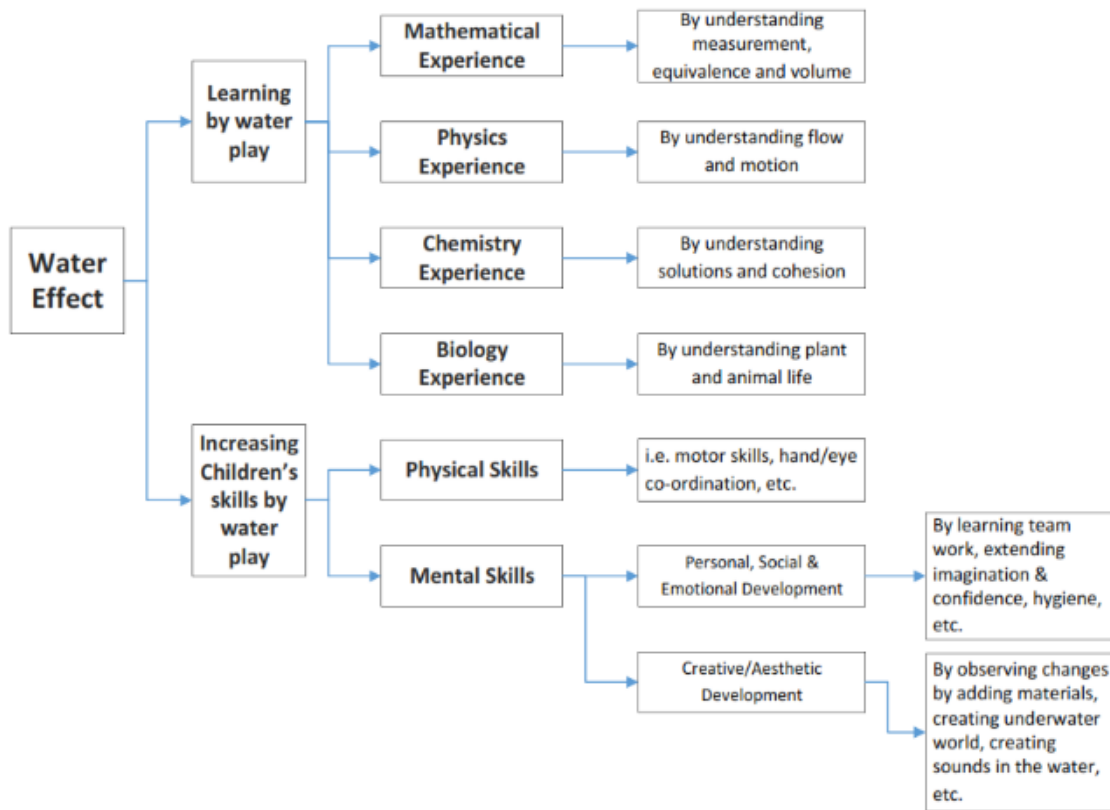


Figure 1- Water effect on children

Personal, Social & Emotional Development

These skills can be developed through one or more of the below subjects:

- experience the therapeutic value of water play
- learn how to use water safely – understand rules for water play
- talk about where water comes from
- enjoy the sensory nature of water adding colors, other items e.g. glitter, varying temperature
- learn how to work as part of a group e.g. holding funnel whilst another child pours
- extend imagination through the addition of other resources e.g. boats, wood, seashore items
- become confident at carrying out a range of activities in the water e.g. pouring, blowing bubbles
- Understand & use positional words e.g. pouring through, floating on top of, etc. (Doreen et al, 2015).

Physical Development

- develop fine motor skills – manipulating tools, filling – pouring, emptying, stirring, squeezing, pushing, pulling
- developing hand/eye co-ordination e.g. filling and emptying containers of different sizes
- be aware of the space in the water tray and be able to share it with others
- Use tools, water, and objects with increasing safety e.g. be aware of what happens when a lot of water gets on the floor (Doreen et al, 2015).

Creative/Aesthetic Development

- observe color change through adding paint or food dye

- introduce marbling techniques
- explore the effects on the water by adding natural and man-made materials
- create an underwater world to encourage imaginative play and language
- create sounds in the water e.g. blowing, splashing, waving
- Make musical instruments – filling bottles with water to different levels (Doreen et al, 2015).

RESEARCH QUESTIONS AND METHODOLOGY

What is the water role in the playground? Which forms of water can supply the needs of children and which form can educate them?

Regarding the interdisciplinary approach of the research, the field of environmental psychology has been deemed appropriate for an explanation of the hypothesis and its testing. Based on this, the content analysis approach and logical reasoning were used at the stage of studying and explaining the subject, and general results are presented in this article.

To test the hypothesis, research methods of environmental psychology, such as observing the behavior of children in a neighborhood park, special questionnaire of children, analyzing their behavior and paintings around the park, and their practical participation in the process of design and shaping the environment of the park will be put to use.

CASE STUDIES

To answer the research questions, four cases in the city of Tehran were randomly selected to find the water role in the park.


Results

The results of this study indicate that the most challenging issues for the needs of children in connection with the natural elements and water in the ground in Tehran are:

- Non-use of water in the children's playground
- Failure to use a different feature of water (flow, motion, and...)
- Did not provide favorable conditions for direct connection Child and water
- Do not use the element of water, along with other natural elements.

According to investigate the role of water in 4 parks of Tehran and water crisis Also according to the needs of children, we will give some design solutions for water use in the playground.

Table 8- Summary of case study

	Name of park	Strength	Weakness
	Niavaran park	The use of water as an absorbing element in the entrance	The lack of direct contact with the water and playground
		Using water sound to create a refresh in space	
	Mellat park	The use of water as an inviting element	Do not use water several features



		Create the sound of water using a fountain	
	Park Aboatash	Use water and mix it with light to attract children	Placement of the water element in the public space
		Excite the children using fountains	
	Park Sae	Use of water and birds at the park entrance	The lack of direct contact with the water and playground
		The use of colored fences around ponds	Lack of direct access to water for children
		The use of water presence in space for organic (ponds)	Do not use water in various forms such as fountains
		using water as an attractive point for children	

Table 9- Design principles of children playground using water [Reference: Author]

A pattern of water use in the playground	Children's Achievement	Suggestions
Designing playgrounds in a way that different groups of children have access to be there.	Increased social interaction	The use of pond water and create the right conditions for the children to play with water together
	Enhance the relationship between children and the natural elements: water	Create the right conditions for the child to touch the water
Children's playgrounds designed according to the needs and behavioral patterns of many different ages	The possibility of group play with water	Ground spray: kids work together to cover the smaller nozzles to create one big gusher effect with the interactive ground sprays below.
	Water use, along with other natural elements (sand)	Sand and water box: children can splash and mix away, make sandcastles, and "bake cakes".
	Encourage children to do physical activities	Water-play activators: are a fun and safe way to add sensory stimulation to playground design

		while considering water consumption.
	Create the right conditions to foster children's creativity	Discovery stream: full of fascinating water weirs that challenge the mind, evoke thoughtful play, and allow water-players of all ages to get involved.
Learning through water paly	Make children with different water features and learn through it	Mill Wheel of wood or metal: put something into motion by means of the visible power
Safety in the use of water in the playground	Monitoring and regular visitor of equipment	Controlled access through a Fence.
		Area free of slip, trip & fall hazards.

CONCLUSION

Water in ancient human thinking is closely related to the sky and it is one of the most important natural elements in many ancient lands, especially in hot and dry lands where people were facing water shortages, particularly important in people's lives, and that's why it sanctified. This study has indicated the relation between using water in the playground and the impact on children's abilities. The child's interaction with the environment and water is of great importance, in a way that it affects the physical and mental abilities and the child's learning. Based on research conducted presence of water in various forms such as ground spray or sand and water box can make a fantastic playground for children.

The safety and also due to the water crisis is considered as important points of the playground design using the element of water.

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Shared Spaces of Residential Complexes and Independent Mobility: Roles in Promoting Children's Independent Mobility; A Case Study of Tehran

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ABSTRACT

Children's independent mobility (CIM) has declined dramatically in recent decades; despite its benefits in facilitating childhood development, promoting physical activity, and combating the obesity epidemic. Moreover, many parents are caught in 'social traps', and further limit their children's independent movement in their neighboring areas. As a child's first independent outdoor experience, this paper attempts to study the shared spaces of residential complexes and identify the qualities of shared spaces that can contribute to and improve Children's Independent Mobility (CIM). This study considers the impacts of housing and neighborhood environments on two modes of CIM home-based independent mobility and unsupervised outdoor play while considering personal and social factors in open spaces of residential complexes. Given the diversity of its residential complexes, Tehran is chosen as the case study of the research. The research employs a qualitative method to respond to the research questions. The data is collected through constructed observation sessions in twenty-five residential complexes in 22 districts of Tehran, as well as interviews with children, parents and experts of the field. The analysis of the data introduces the functional and social dimensions of planning and design of the shared spaces of residential complexes, among others, to be the most influential on CIM. Accordingly, keeping children secure from all possible risks and threats, the possibility to have eyes on the shared spaces and supervise children, attaining safety of the children, having pedestrian-friendly and playful spaces and a sense of community among the neighbors are the most important qualities to encourage children's independent mobility within the shared spaces of any residential complex. Social traps and lack of responsive quality control and evaluation system for child-friendly residential complexes emphasizes the necessity to develop a qualitative framework to promote opportunities for children's independent mobility and unsupervised play in shared spaces of residential complexes while fulfilling parents' expectations from the qualities of the built environment to permit CIM within shared spaces of the residential complex.

Keywords: children, children's independent mobility, shared spaces, residential complex, Tehran

INTRODUCTION

The concept of children's independence mobility has been considered in the field of children's urban life in many countries in recent years and has been proposed as an indicator to assess the suitability of urban spaces with children's needs. Numerous studies (Gater, 1991; Riazi & Faulkner, 2018; Gill, 2021) have shown that in different countries and over the past three generations of children, there has been a significant reduction in the number and variety of places that children have been able to visit independently e. g in the United Kingdom, there was a 71 per cent drop in children traveling independently to school between the 1970s and 1990s, with only nine per cent of children attending school alone (Hilman et.al, 1990). Researches show that in richer countries, children in the early years of school experience less degree of independence in public spaces and gradually, with increasing age, their tendency to move independent in urban environments grow (Runder, 2012).

Numerous factors such as children's personality traits, socio-economic status of the families and the physical environment of urban spaces are influential in the formation of children's independence mobility (CIM). According to the scope of this study, factors limiting motor independence in urban environments include the increasing use of private cars in the city, unsafe paths for pedestrians, long distance from home to the child's destinations such as school, social traps and parents' concerns about the dangers in public environments due to the presence of strangers and delinquency in public spaces, etc. Decreased children's independence has reduced their relationships and interactions and has had a negative impact on children's development (physical and mental); Thus, many cities, especially large cities, are known to lack the qualities needed to raise children.

In addition to changes in the form and function of the city, changes in the private domain of family life have also affected the growth of children. The growth of the urban population and the consequent reduction of the per capita housing and the prevalence of settling in apartment complexes have created more spatial restrictions for children's activities, especially their play and mobility in the private domain of their homes. According to the statistics of 2016 in Tehran, about 72.8% of residential units have an area of less than 100 square meters and about 12% have an area of less than 50 square meters (Statistics Center of Iran, 1398).

Decreased children independent mobility in semi-public and public domains of the city affected by living conditions in today's cities and limited the possibility of play and physical activity of children in the private area of family life due to shrinking housing units by; It has also led to the child's tendency to play computer games lonely, sedentary lifestyle, and as a result, increase the rate of obesity in children and threaten their physical health.

However, the impact of various other factors such as changes in the average household population, lifestyle, diet, etc. cannot be ignored in this regard. In Iran, accurate statistics of children's physical activity are not recorded, but a study of statistics from other countries shows that less than 10% of children and adolescents are active (moderate to severe) at least 60 minutes a day. Inadequate conditions of public spaces in cities and spatial limitations in residential units, show the inefficiency of both public and private domains of children's living for physical mobility and promoting their health. On the other hand, during the last five decades, living in residential complexes of any scale has been established as a model of living in Tehran²³; Thus, a third realm (semi-public or shared arena) has been formed for the residents of residential complexes, which can be a suitable platform for many children's activities, especially their play.

Although the concept of children independent mobility has often been considered in public areas of the city (especially between school and home), in recent research in this field and due to the epidemic of Covid-19 disease during the last two years; this concept has also been considered in the scale of housing, neighborhoods and residential complexes. It is possible to integrate children with the community and involve them in urban everyday life by creating safe and accessible spaces for children and leading their physical activities in these spaces. Children need spaces where they can move freely, away from danger, be active, and socialize with other children and even adults.

A study of the total number of building permits in the period 2010-2020 in 22 districts in the city of Tehran shows that except for districts 1, 3 and 22, less than 10% of the issued permits have children's play areas. Statistical studies show that the economic status of residents, the amount of return on investment in construction and land prices play an important role in the construction of additional facilities such as children playgrounds. Another important point is the status of the playground from the time of issuance of the building permit to its implementation; In some cases, (residential complex studied in area 1 in this study) was observed, despite the mention in the certificates, the construction of

²³ Approval of the law on apartment ownership on 1343/16/12, consisting of eleven articles and a note in the Shura Council

the playground has not been implemented or its implementation by the builders has been postponed to the unknown future. Figure 1 shows the percentage of residential complexes with playgrounds in the building permits compared to the total number of issued permits by 22 districts of Tehran.

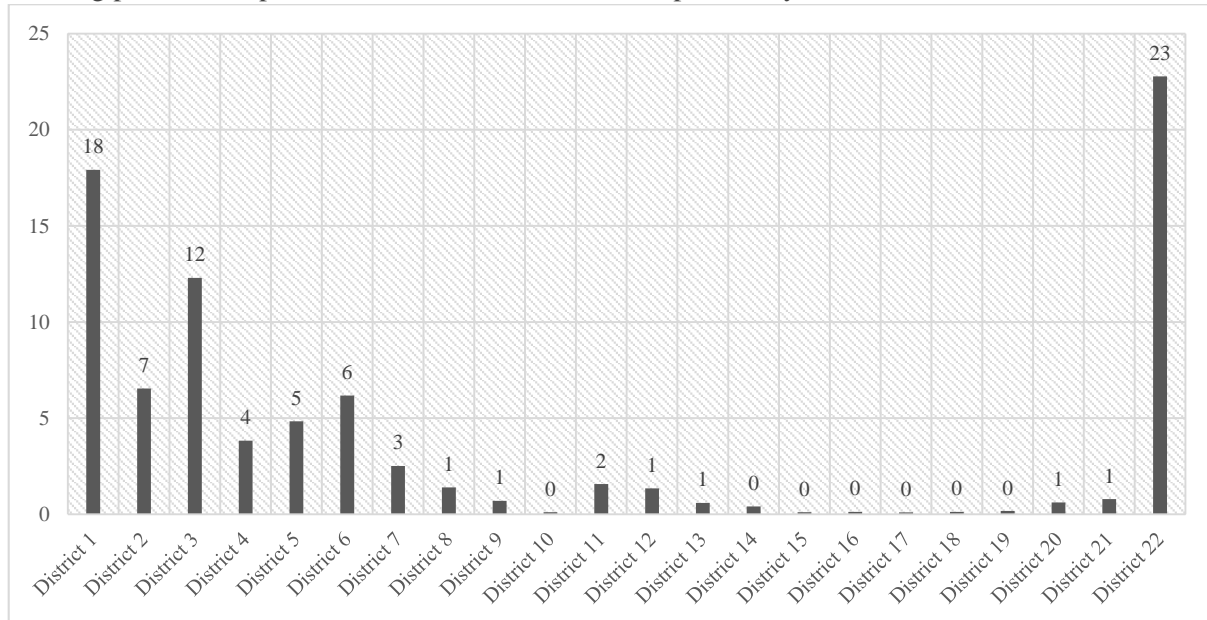


Fig. 1- the ratio of residential complexes with playgrounds in the building permit to the total number of permits issued for residential complexes (percentage) in the 22 districts of Tehran: (Municipality of Tehran, 2020)

Despite the country's aging population, children make up a significant portion of the country population; According to statistics released by the Statistics Center of Iran, children make up about 23.4 percent of the population. This amount is still significant compared to developed countries (about 16%). This issue, along with other essentials such as the necessity of children's physical and mental health and its impact on the future of society, the realization of the environment and the child-friendly residential complex is considered as a serious necessity.

The current situation of residential complexes in Tehran indicates serious shortage in allocating space for children to play and independent mobility in residential complexes, so that sometimes children play in common areas is considered as an undesirable and even annoying factor. Weaknesses in applying the results of existing studies on concepts such as the child-friendly environments and city and serious shortage in developing rules and regulations, especially in residential complexes, are cited as the cause. This study focuses on the shared spaces of residential complexes as the child's first experience of being outside the home and Provide planning and design guidelines to promote children independent mobility (Children 5 to 12 years).

THEORETICAL FRAMEWORK

Residential complex

In the early 1930s, residential architecture emerged its first modernist tendencies in the city of Tehran, and from the mid-1940s, the construction of apartment houses for tenants with different income levels in response to the wave of urbanization and rising urban land prices began. The large number of rental units in Tehran was created due to the growth of the shared class and the industrial basis of the economy of this class (which required a growing population of urban workers), and rising land prices. In the 1950s, with the horizontal growth of the city, the central areas were gradually identified with apartment residential complexes, and terraced houses and short courtyards changed to medium-sized apartment complexes. Construction of Saman Residential Complex as the first densely populated complex in

Tehran in 1969, is a milestone in construction of high-rise residential complexes in Tehran. While before 1965 the Land Ownership Law prevented the construction of residential apartments, the approval of the Apartment Ownership Law encouraged the construction of apartment buildings and the popularity of building high-rise residential complexes such as ASP (with 389 residential units). In 1975 and Eskin (with 270 residential units) in 1977 with the cooperation of foreign companies continued until the Islamic Revolution (Bani Masoud, 2020).

In reviewing the samples, documents, approvals, rules and regulations, various definitions of residential complex are provided and in most of these documents, the residential complex is based on features such as the presence of public services required by the residents in the complex, the area of the property, the existence of multiple building blocks in the plot, the area of the plot and the number of residential units in the complex have been defined and limited. Among the approved and announced documents, "Urban planning and architecture rules and regulations for people with physical disabilities" approved in 1999, has defined a residential complex as: Residential buildings that have more than four residential units in one floor or more Eight units on several floors. According to the spatial scope of research in Tehran, the definition of a residential complex is based on the rules and regulations of the detailed plan (approved in 2012, summer edition 2019) based on the allocation of common spaces and at least 6 residential units.

Shared spaces are spaces that are common to all occupants but are also indivisible. These spaces, like the joint, are the interface between the private domain and other public domains. Today, the dichotomy between the private and public concepts, which is based on modern paradigms of ownership, has emerged in human individuality. It is in this context that common spaces have an intermediate position: on the other hand, laws and regulations consider these spaces in the possession of different owners, but the use of these spaces among users is limited to a few functions. Based on these interpretations and considering the intermediate function of this group of spaces, the use of the term "intermediate areas" is appropriate. In the present study, the intermediate areas are open spaces such as green spaces, courtyards, children's play spaces; Closed spaces are lobbies, parking lots, sports areas, meeting rooms, corridors and semi-open spaces such as the pilot.

Children Independent Mobility

Independent mobility and movement of children without the supervision of adults in the neighborhood or city is called CIM (children independent mobility). This mobility can be active in two ways (walking, cycling, etc.) to the park, playground and school with friends and peers or inactive (using the public transportation system) (Riazi & Faulkner, 2018; Qiu & Zhu, 2021). In recent research, in addition to the issue of independent mobility of children between home and school, another main species with travel purposes other than school has been introduced. This species is defined as the child's independent travel and presence in the perimeter of the home and often for the purpose of play (Qiu & Zhu, 2021). Children need safe spaces where they can move freely and actively, have independence of mobility, and socialize with other children and perhaps adults. These opportunities not only affect the health of children, but also have a lasting impact on the child's entire life. In addition to being present in public spaces and outside the home, it creates a sense of place, a sense of belonging and personal identity for children (Carroll et al., 2015). Children who have sufficient independence in their actions can improve skills such as perceiving the environment, orienting and finding their way in the environment. The more independent the child is in the environment; the more abilities the child acquires. Children's independence in public environments leads to a greater sense of self-worth and self-esteem. Contact with people and children will expand the child's territory and communication network (Churchman, 2003). Wolley et al. (1999) believe that urban environments become part of their personal and social identity due to the growth of children's independence in them, and attachment to places is very

important for their personal identity. Also, social connections that are formed during children's independence of movement in public environments, create and promote social capital (Carroll et al., 2015).

Based on the model presented by Moore (2017), three domains are defined for the child's movement space. The range of a child's habits is the area around the home that is used on a daily basis for extracurricular activities. The child's recurring domain, which is wider than the child's range of habits (Habitual Range), includes social spaces that the child has frequent access to and has the freedom and time to access (Frequented Range). The third domain is the occasional domain of children (Occasional Range), which shows the limits and edges of the domain of children's independence. It includes spaces that the child has access to through public transportation and is no longer just a pedestrian territory. As the child grows, the size of his realms expands and gets bigger. Most of these domains are different and diverse among children according to factors such as age, gender, personality and parents' perception of the neighborhood. According to Moore's model, most children's daily activities take place within the range of children's habits and repetitive activities. These spaces are often used by children on foot or by bicycle (Loebach & Gilliland, 2019)

Factors affecting children's independent mobility based on levels of socioecological framework

Individual correlates of children such as age and gender of the child: Parents' view of the child's independent presence in public settings is greatly influenced by his age and gender. There are significant differences between the abilities of children under the age of 11 and between the ages of 11 and 15 in terms of the ability to go to school independently or to engage in physical activity in a public setting. In general, children between the ages of 8 and 12 receive more permissions from their parents for independent presence and mobility in public. However, many parents seek freedom of movement for girls and boys in the public domain; But boys are often seen more in public neighborhoods, and the effect of gender on children's independence of movement cannot be ignored.

Interpersonal correlates: Research shows that children have more freedom and better social interaction with their neighbors. Sense of community affects the sense of concern of children and their parents about social threats such as the presence of strangers (Runder, 2012).

Social environment: Social class does not affect the degree of motor independence of children. Parents in every socio-economic class in society have specific concerns about the independent presence of children in public settings (Runder, 2012). The social climate of a neighborhood, the degree of social cohesion, the existence of common values and norms, the parents' image of the family's place of residence, concerns about the presence of strangers, the rate of crime and delinquency, the extent of child abuse (Riazi & Faulkner, 2018).

Built and physical environment: Intensive urban form will be desirable in terms of mobility independence due to the short distances between the origin and destination of children. The compact urban form increases population density in public places and promotes a sense of security in children for independent mobility. The urban form is also considered in terms of the type of housing and residential style of children; For example, children living in apartments (due to the lack of a private and independent yard) have more independence of movement than children living in villas; Because these children need freedom of movement to play and work (Hillman et al., 1990). Semi-private realms in residential areas such as residential complexes will be very important and useful for children's independent mobility. Children and their parents will not have many worries and fears about these areas. Other characteristics such as density, pedestrian facilities, cleanliness, green space, access to nature, etc. will also be effective in shaping children's independent mobility in public areas. (Riazi & Faulkner, 2018). In addition, natural characteristics such as climate, air quality, temperature, etc. can affect the degree of independence and mobility of children under the influence of time. Issues such as

air and pollution will also add to parents' concerns about their children's presence outdoors (Ayllón et.al, 2021).

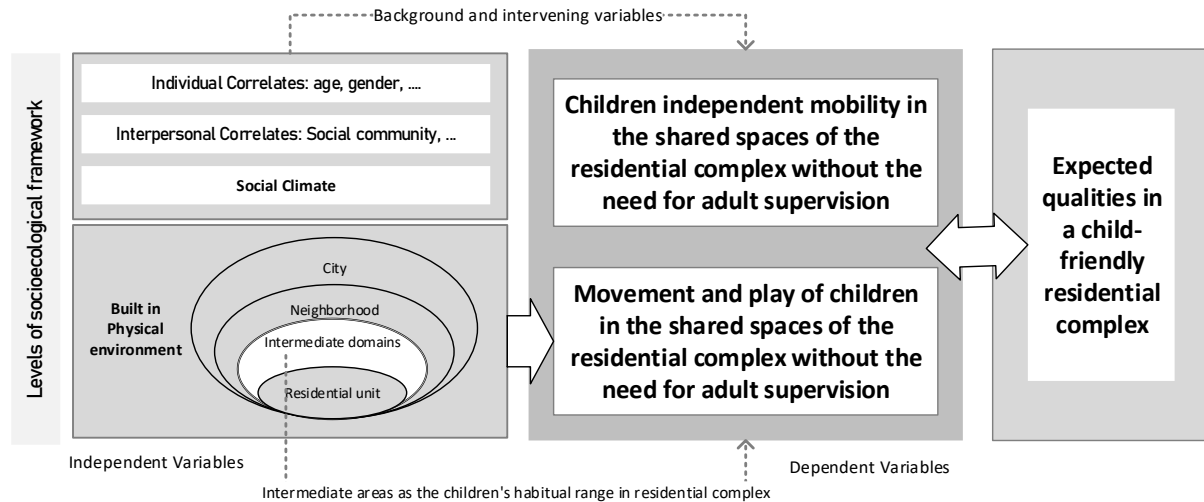


Fig. 2 - Conceptual framework of factors affecting the children independent mobility centered homes in the shared spaces of residential complexes

RESEARCH METHOD

The research in terms of purpose, descriptive-analytical; In terms of results, it is practical; The type of argument used is inductive and the process of doing it is qualitative. With the review of the background and limitations of research on the subject of child-friendly residential complexes and the home-centered children independent mobility and the lack of a qualitative framework on this subject, it is necessary to develop the dimensions and criteria of the subject with a qualitative method. In general, research is done in three main stages:

Step 1 - a documentary study on the subject of the research core (home-centered children independent mobility - 20 studies) and the areas affecting it (child-friendly residential complex - 35 studies); Then, the texts are analyzed by the technique of categorical content analysis and extracting the expected qualities (as planning and design criteria) and achieving a theoretical framework based on the variables.

Step 2 - Field survey based on the obtained criteria and their accuracy. At this stage, based on the theoretical framework, the observation checklist for residential complexes in Tehran and interview questions for children, their parents and professionals were prepared and their validity was assessed by obtaining the opinion of experts. Data collection at this stage was done with two tools of direct observation and semi-open interview in 25 selected residential complexes in Tehran. Sampling of residential complexes is based on maximum diversity in terms of area, number of residential units and the scale of the complexes and their distribution in all 22 districts of Tehran (each district has at least one residential complex). The children interviewed were 53 people in the age range of 5 to 12 years (both girls and boys respectively) living in the study complexes. The number of parents interviewed in these complexes is 38 and the number of professionals interviewed (in the disciplines of architecture, urban design and child psychology) is 16.

Step 3 - The data obtained in each section are analyzed separately and with the content analysis technique of the evaluation type (analogy and evaluation of the resulting codes with the theoretical framework of the research basis). The data encoding process is performed in three steps (free, selective and axial) in Maxqda software, for all the resulting qualitative data. Total free codes obtained from observing residential complexes (268 codes), interviews with children (431 codes), interviews with parents (234 codes) and interviews with specialists (146 codes) in the form of criteria for achieving

children's motor independence in the field. The intermediate parts of the residential complex were combined and a total of 49 planning and design criteria for the residential complex were integrated and presented in eight quality dimensions of the environment.

RESULTS

In the first stage, the theoretical foundations of the research base are formulated by examining the existing documents and researches in the mentioned subject areas. During the quantitative content analysis of the texts, the mentioned criteria that had the highest frequency were identified in two issues: child-friendly residential complex and children's home-centered independent mobility.

In the case of a child-friendly residential complex, eleven key criteria include safety and security, children's comfort and well-being, children's health and well-being, children's access to play, happiness and imagination, social interactions (generational-intergenerational), sense of belonging to the residential complex, possibility of children's participation in environmental affairs, physical attractiveness, accessible nature, legibility of residential complex for children and learning via environment for them were extracted. In the matter of children independent mobility, nine main criteria have been identified.

Most of these criteria are defined from the parents' point of view. Because in the issue of children independent mobility, two groups of children and parents are the most important actors, and attention to parents' concerns about the independent mobility of their children in the shared areas of residential complexes (especially large-scale) in developing a theoretical framework matters. These criteria are: proper orientation of children in the shared areas, proper neighborhood ties and the existence of trust between residents, formation of a suitable social climate in the residential complex, child safety, visual motivations for children's mobility, pedestrian friendly residential complex, playfulness of shared areas, play and mobility of children as much as possible and natural open areas encourage children's mobility. In each of the texts, the expected environmental qualities under each criterion are introduced according to the frequency of each. By combining criteria and qualities with each other in areas related to the subject, the theoretical framework of the research has been formed.

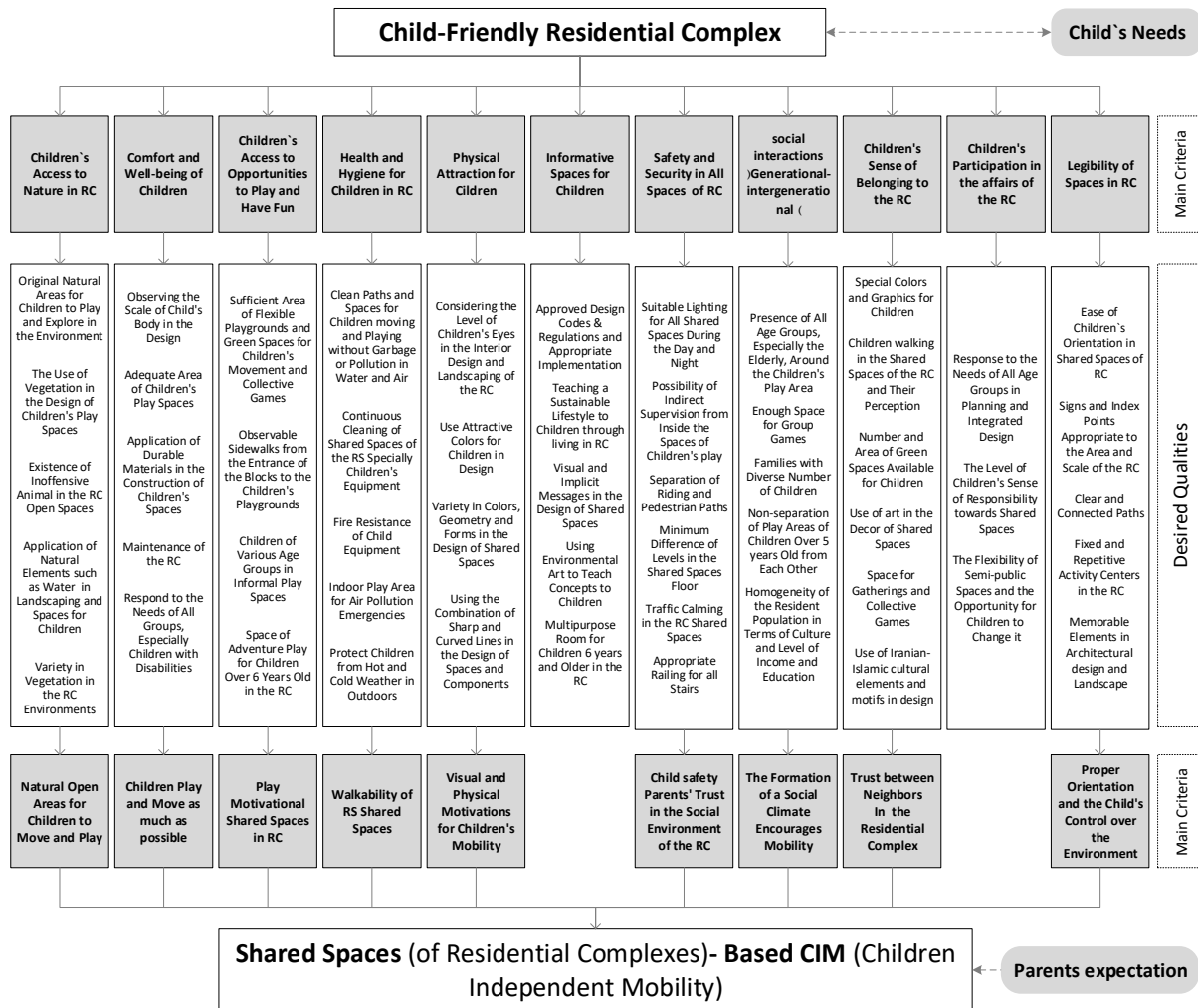


Fig. 3 - Theoretical framework for the home-centered children independent mobility in the shared areas of residential complexes

According to the theoretical framework, the observation checklist was compiled for the shared areas of residential complexes and with the opinion of experts in this field and the necessary corrections, the necessary information for each subject was collected in the form of statistics, text and images. An example of a textual (descriptive) -image impression of a residential complex (used in content analysis) is as follows:

Studies conducted in 25 samples of residential complexes in Tehran show that a small number of surveyed complexes have a special space for children to play (designed). In most of these complexes, there is social supervision due to the openings of residential units to this space or its proximity to the passage of residents. However, in some cases (such as Omid Residential Complex, District 14), children's play areas are located behind building blocks and are less used by children and families due to the lack of security. In a number of large residential complexes surveyed (Kushk, District 12; Farhangian, District 9), despite the existence of play space, due to age and lack of proper repair and improvement, these spaces do not have the necessary standards for child safety and use (Asphalt pavement, worn and rusted play equipment). In residential complexes without special space for children to play, children play in the parking lot (open area, closed ones in ground floor or basements) is abundant; Which are not suitable due to the pollution of the closed parking space and their low safety.



In small and medium-sized residential complexes, their open space is dedicated to parking ramp space, decorative green space or open parking lots; While in large complexes there are flexible open spaces for activities and group games of children in older age groups.

Separation of pedestrian and pedestrian paths in residential complexes is often done with separate entrances. In large residential complexes, the separation of the carriage from the pedestrian is done by considering the sidewalk (with different surface levels or different materials) on one or both sides of the carriageway. There is no calming of pedestrian traffic and installation of warning signs in the vicinity of play areas and the presence of children in the residential complexes under study. Also, in some newly built residential complexes (such as Bagh-e Behesht Complex, District 2), a marginal parking has been banned throughout the open space of the complex; This issue has provided a good ground for the presence and independence of movement of children.

The green space of many of the studied complexes is decorative and it is not possible for children to be present and interact with natural elements; It has even been observed in several cases that the management of the complex has prohibited the presence of children in or near the green space. In large residential complexes with significant open space (due to lower occupancy level), green space in a larger area and better quality is available to children.

The field studies on the main issues related to children's motor independence in the shared areas and in the form of descriptive statistics are as follows:

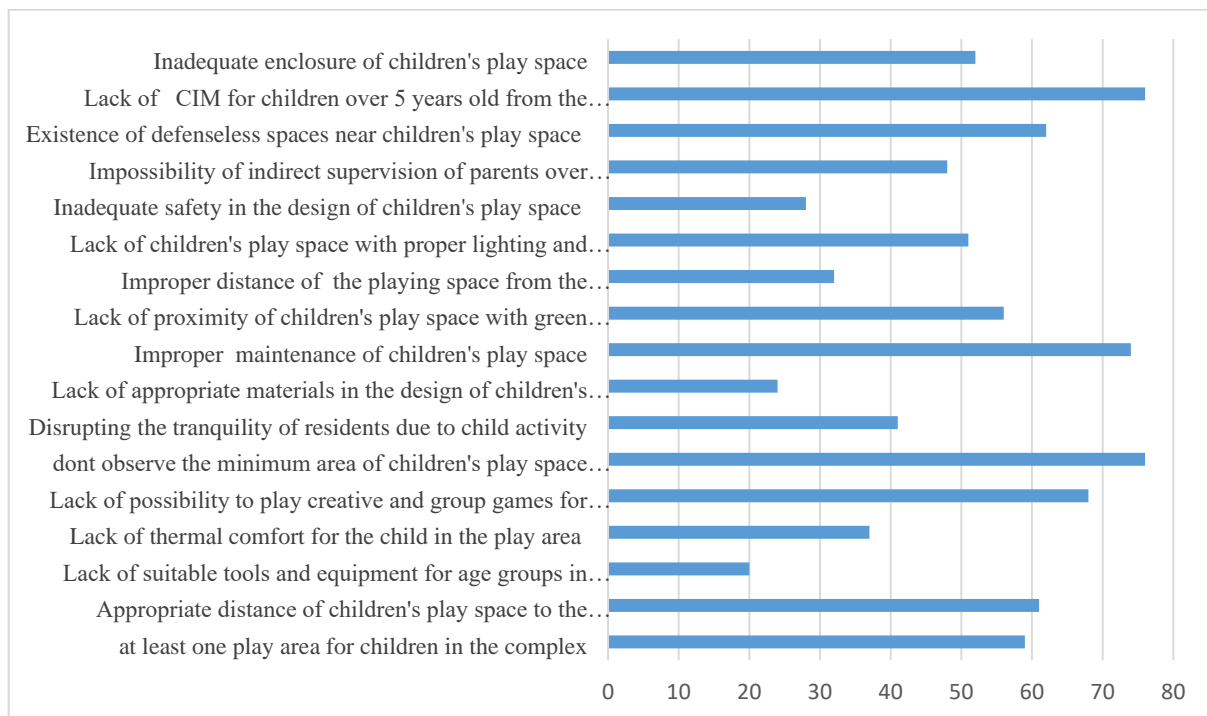


Fig.4 - Statistical presentation of the condition of children's playgrounds in the observed residential complexes (percentage)

The diversity in the scale of the residential complexes under study (small 10-unit residential complexes to very large complexes) indicates the need to classify residential complexes and meet the needs in areas that require special attention for planning and Design in the shared areas of residential complexes is based on species. The situation of the shared areas of the selected residential complexes in Tehran reflects the existing guidance and control system and the views of urban management, planners and designers on the issue of children. Examining the existing requirements in the field of special attention to the needs of children in the inadequate design and abandonment of these requirements is identified. An examination of the general condition of the shared areas also shows that most planners and designers do not have a clear strategy for designing the shared areas of the complexes, and in general the group of children is forgotten in the design process. There are serious weaknesses in the lighting of the spaces and the maintenance and quality of the shared areas, as well as the cleanliness of these spaces. The set of perceptions and observations made on the shared areas of 25 residential complexes in Tehran have been analyzed and evaluated, and the most important areas that need to provide planning and design solutions are identified according to the table below.

Summary of observations made in environments used by children in sample residential complexes	
Weaknesses	<p>Lack of attention in the standard design of entrance stairs and floors with children's scale (size and shape)</p> <p>Lack of attention to the movement path of children in relation to the riding path</p> <p>Lack of attention to the placement of the play space in relation to the blocks and the vulnerability of the facades (due to age and poor construction)</p> <p>Inadequate and insufficient lighting of stairs, parking lots, etc.</p> <p>Mixing bicycle movement and children's play space</p> <p>Establishment of children's play space in corners and corners away from sight and supervision</p> <p>Lack of control over the spaces between the blocks and the possibility of the presence of strangers near the children's play area</p> <p>Existence of lost spaces in residential complexes</p> <p>Improper navigation and orientation of children</p> <p>Lack of sufficient knowledge of neighbors towards each other</p> <p>Improper placement of various installations on the facade and the possibility of their collapse</p> <p>Children play in the parking spaces of the complex and threaten their safety and existing pollution</p> <p>Use of harmful materials in covering common spaces and incorrect execution of materials</p> <p>Children have access to the mechanical and electrical installations of the building in shared areas and threaten their safety</p> <p>Lack of attention to the thermal comfort of children in the compound and open spaces of the complex</p> <p>Lack of attention to the companionship of colors according to the scale of space in the design of common spaces used by children</p> <p>Lack of proper updating and maintenance of the complex due to weakness in the legal foundations of complex management</p> <p>Lack of attention to the scale of the child's body in the scale design of spaces, furniture and elements</p> <p>Children do not have access to existing green spaces</p> <p>Lack of connection of children with pristine nature</p> <p>Lack of diversity in vegetation</p>
Strengths	<p>Implementation of special ceremonies for children and adults by the managers in residential complexes with a homogeneous socio-economic structure</p> <p>Existence of time constraints for children in the public spaces of the complex has led to the formation of communication between families.</p> <p>Existence of regulation for green spaces in the open area of the complex</p>

Opportunities	<p>Possibility to use the roof space as a children's play space</p> <p>Ability to plan and design green space in relation to children</p> <p>Possibility of forming neighborhood ties due to the small community of residents</p> <p>Design of special multi-purpose spaces for children in combination with the shared spaces mentioned in the set of criteria of the detailed plan of Tehran, such as the meeting hall or the entrance lobby</p> <p>Ability to strengthen children's sense of belonging by designing spaces and special events for them</p>
Threats	<p>Continuation of management methods based on old rules and regulations and degradation of maintenance status of residential complexes and their quality</p> <p>The possibility of losing more sense of belonging to the environment and the occurrence of vandalism and other consequences at older ages</p> <p>Loss of children's safety as much as possible if the current situation continues in terms of sense of neighborhood and ...</p> <p>Loss of contact between the child and nature as a result of the continuation of problems such as pollution</p> <p>Low residential history of most residents, which causes neighbors to distrust each other</p>

Table 1: Results of observation of residential complexes in relation to opportunities for children's independent mobility in the shared spaces of the residential complex

CONCLUSION

Social conditions, the existence of multiple social traps, the lack of guidance and quality control systems for child-friendly residential complexes and the lack of legal requirements for inclusive design have led to the development of a quality framework to promote opportunities for independent presence and free play of children in The shared areas of residential complexes in Tehran should be formed around two main axes; First, the parents' expectations regarding the spatial qualities required to issue a permit for the child's independent and free presence in the environment and play with a group of friends and peers, and secondly, the complex has the necessary space for the child to play and move and respond to his needs. Examining the obtained data and comparing them with the theoretical framework, it seems that in the current situation that a significant percentage of residential complexes in Tehran lack child-friendly qualities and social traps are spreading. Found; the social and functional dimensions of the intermediate domains are more important. The most important qualities required in the process of planning and designing the shared areas of residential complexes in Tehran to promote the motor independence of children's homes, keeping children safe from all hazards such as high speed of the car, controllability of the area Intermediate (focusing on indirect monitoring), security, walkability (lead to social cohesion and intergenerational and intergenerational interactions for children) and children's access to more opportunities to play in the shared areas of residential complexes And neighborhood links. In order to achieve the results (in the form of different types of residential complex in Tehran) it is proposed to formulate appropriate requirements for the concept of children's independent mobility around residential spaces in the form of rules and regulations and design guide along with the definition of monitoring and control tools.

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Measuring the Physiological Response of Users in Urban Open Spaces in order to Evaluating Emotional Response (Case study: Imamat St., Mashhad)

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ABSTRACT

Emotions and affections are an integral part of human beings. Despite the complexity of recognizing them, the effects of emotions on decisions and environmental preferences are undeniable. With the growth of technology, new methods for measuring emotions in urban spaces have been identified. The purpose of this research paper is to identify the factors affecting the physiological response in urban spaces. In the first step of this research, by reviewing the literature, a conceptual model for measuring emotional response is presented. The case study of this research is Imamat Street in Mashhad, in which the physiological response has been measured. The research method was quantitative, and a biometric sensor device was used to collect data in the environment, and data were analyzed quantitatively with descriptive statistical indicators. Finally, they are mapped and positive and negative sense of users in this space is analyzed. 20 people participated in this survey and shared their emotional response in selected part of Imamat street with has one kilometer length. Results showed that, users' emotional response was pleasant. It can also be concluded that among the factors affecting the emotional response, the effect of non-physical factors is more than physical factors. For example, the type of activity and natural elements in space had the greatest effect on the desired emotional response and also the role of natural space in regulating heartbeat rate was more than other factors.

Keyword: Emotion in the city, Affective response, Physiological response, Urban Street

INTRODUCTION

The city is seen as a space for the daily life of citizens, which is perceived by them consciously or unconsciously (Pakzad, 1997, p. 30). Urban life experiences suggest that the behaviors and decisions of citizens result from the personal perception and mental evaluation of spaces (Klettner, Huang, & Schmidt, 2011, p. 1). This perception and evaluation are subject to the people's emotions in space. Emotions are considered to be vague and unknown aspects of human beings (Hughes, 2003, p. 5), and thereby, there are always challenges in their assessment (Li et al., 2016, p. 1). Different theorists have suggested some approaches to measuring emotions. For example, Desmet (2001) sees emotion as a phenomenon containing four components of behavioral reactions, mood reactions (such as changes in a person's face and voice), physiological reactions (heart rate and respiration rate fluctuations, etc.), and mental and internal experience. These components can be utilized for measuring emotions (Maghsoudy, Seyedian, Mahnam, Shahroudi, 2017, p. 100). Hogertz (2010) introduces three physiological, behavioral, and cognitive levels for expressing emotions in the environment (Hogertz, 2010, p. 32). This study was focused on measuring emotional response based on physiological response assessment and designed to find out what environmental factors can affect the physiological response of citizens. A review of the background of research done in this area reveals that we can find the roots of examining emotions in the city in studies related to environmental psychology. Some theories have been developed and presented in this context by Brunswik, Berline, Lynch, Altman, Rapaport, etc., which have brought new dimensions to this knowledge (Barati & Soleimannejad, 2011, p. 20). Environmental psychology stresses the impact of the physical environment on the behavior process and perception (Mazumdar et al., 2018). Brunswik comes up with the theory of "Probabilistic Functionalism" in studies related to human and environmental and believes that the organism and the environment are effective in the

process of perception. The environment provides many stimuli, and the observer should interpret the most important ones accurately to show the desired behavior or action (Francis, Mc., 1953, p. 93). The digitization of emotions' map in the city was initiated with the development of technology, which was first realized by Sorin Matei (Klettner & Gartner, 2012). Based on the idea of a mind map, he and his colleagues developed and presented the sensory perception of individuals of fear and comfort in the city of Los Angeles as a digital map and a three-dimensional model using personal reports (Darban Rezaei, Rezazadeh, Ostadi, & Akbari, 2019, p. 75). Valtchanov and Ellard (2010) assessed the effects of the natural environment on stress levels in the virtual reality environment. They used the center of Shibuya in Tokyo, Japan as the urban environment (Valtchanov & Ellard, 2010, p. 361). Utilizing Electrodermal Activity (EDA) as well as the Skin Conductance Response (SCR) measured by a Wristband, Carsten Hogertz (2010) investigated the relationship between urban environment features and psychophysiological arousal responses in an urban street (Hogertz, 2010, p. 31). Benjamin Sebastian Bergner et al. (2011) employed biological sensor devices to record stress in physically disabled subjects (Bergner, Zeile, Papastefanou, Rech, & Streich, 2011). Using the Skin Galvanized, Christian Nold evaluated stress and spatialized emotions for the first time (Bergner, et al., 2013). This project was performed in more than 25 cities with the participation of about two thousand people (MacDonald, 2014). Bernd Resch et al. (2015) measured the individuals' emotions with biological sensor devices and assessed the application of this information in urban planning (Resch, et al., 2015). Utilizing a biological sensor, Li et al. (2016) quantified the relationship between people's emotional response and urban space (Li et al., 2016). Osborne and Jones (2017) did a comparative study on the emotional response resulting from physiological data in real space and virtual reality (Osborne & Jones, 2017). The biological data has been also used in attracting participation (Fathullah & S. Willis, 2018, p. 1) and the measurement of optimal population density (Engelniederhammer, Papastefanou, & Xiang, 2019, p. 1). Due to the background of the reviewed studies, this research was set to examine the level of arousal and deactivation in the urban space, which encompasses spatial diversity and character. Meanwhile, it was tried to identify the relationship between arousal and deactivation under the influence of emotions and the influential environmental factors. In this research, we initially described the literature, definitions, and the significance of studying emotions in spaces and the city followed by reviewing physiological response measurement methods. Then, the physiological data collection method was explained. Ultimately, the data were analyzed and the results were presented.

THEORETICAL FOUNDATIONS

The definition of emotion and physiological response

"Emotion" is a commonly used word and efforts have been made for decades in articles and sciences to come with a common definition for this concept. As suggested by Young (1973), "Besides psychologists, often everyone knows what emotion is...". Oatley, Keltner, and Jenkins (2006) state that "emotions may be considered as multi-part responses to challenges or opportunities, which matter to personal goals (especially social goals)" (Houtkamp, 2012, p. 17). From a physiological perspective, emotion refers to the transmission of the stimulus effect (or the message of the sender) from the sensory receptor to the central nervous system, which can be objectively tracked (Pakzad, 2015, p. 3). According to Boring, although emotion emerges from the human physical perceptions through the five senses, however, it is something immaterial and purely spiritual. Although emotion is made based on active and passive news, it does not seem to be something that can be defined precisely (Grütter, 1987, p. 7). On the other hand, emotion, has no cognitive value and is acquired passively, and appears to be 100% physiological (Pakzad, 2015, p. 3). In general, emotion can be seen as a mental-physiological output that influences people's mentality of the space and their behavior in space. Therefore, the physiological (physical) responses of individuals to environmental variables may be considered as the result of changes in emotions.

Emotion-related theories in the city

Emotion is a psychological subject and the theorists of the psychological sciences have taken the first steps to recognize and describe it. The effects of emotion on other aspects of human life have contributed to its influence on other sciences. As described by Burns (2000), the emotional experience in the urban context has been discussed in different fields such as sociology, psychology, anthropology, and geography (Burns, 2000, p. 67). Hence, each of these sciences has provided different theories concerning emotion. In general, one can say that the individuals in the fields other than psychology who have presented theories about emotion often have mentioned the importance of considering the emotional layer in their field of study, and suggested that every emotion can be associated with a response or reaction in the form of an obvious behavior or a kind of mentality in the person. In recent theories with further acceptability, the process of emotion emergence has further evolved and some models are also presented by combining with emotional categorizations. The comparison of differences and the commonalities of these theories are given in the table 1.

Table 1: The comparison of theories related to emotion

Theory/Theorist	The emphases of each theory	The components of interest
James (1884-1890)	The initial process of stimulus to the emotion and the body's response to emotions	-
Lynch (1960)	Preparing the perceptual map	Readability
Hall (1959-1966)	Paying attention to collective emotions and being influenced by the cultural teachings	Culture
Schachter (1964)	Completing James's theory in the stimulus-emotion process and paying attention to the intensity and quality of emotions	-
Ekman (1992)	He considers emotion as a quick response to the situation and sees the type of this response directly related to previous experiences.	Signs, illustrations, emotional effects, regulators, and moderators
Kaplan & Kaplan (1982-1989)	Paying attention to feeling (emotion) as the main way to survive in the environment	Preferring environments with fast and integrated information, readability to understand the environment, mystery, and complexity to create interest in the environment
Appraisal Theories (1960-1996)	Emphasis on the unconsciousness of emotion, paying attention to the multiplicity and diversity of emotions resulting from a particular stimulus	The impact of personal characteristics (needs, goals, general health, etc.) on the perception of emotion
Russell (1974-2003)	Manifestation of emotion in behavior in the form of staying in the environment or avoiding it Influenced by the assessment theory Introducing the keywords of emotional quality, emotional components, core affect, etc. Introducing the Stimulus Organism Response model The effect of pleasantness-arousal-dominance variables on showing emotions Integrated and holistic attention to the environment	The simultaneous effect of environmental and personality traits on emotions, paying attention to past experiences

	Using the semantic differentiation index	
Lang (1993)	Emotion as a behavioral tendency, an absorbent-repulsive emotional model (influence by Russell)	-
Nassar (1998-2008)	Influenced by Lynch's mental map Distinguishing between emotion that is unconscious and cognition that is conscious Distinguishing between traits effective on emotional evaluation and traits that are constant in emotional evaluations.	Factors affecting loving the environment: Naturalness, proper maintenance, open spaces, historical significance, and order
Barrett (2006)	Influenced by Russell Nuclear emotion as a form of perception	-

References: (Houwer & Hermans, 2010, pp. 10-23) (Darban Rezaei, Rezazadeh, Ostadi, Akbari, 2019, p.75) (Fathullah & S.Willis, 2018, p. 4) (Carmona, 2003, p.88 , 179) (Gehl, 2010, p.33) (Hall, 1973) (Hall, 1990) (Houtkamp, 2012, pp. 18-45) (Altman, 1975, p.43) (Shovala, Schvimer, & Tamir, 2017, p. 35) (Russell & Snodgrass, 1987, p.249). (Ferreira, Johanssona, Sternudd, & Fornara, 2016, p. 61) (Hogertz, 2010, p. 33) (Nasar, 2011, p.163) (Mohammadi, 2019, p. 41).

Among these theories, the theory developed by Russell/Snodgrass/Mehrabian has been supplemented by theorists in other studies and utilized in many studies. Despite not describing the factors affecting emotion in detail, this theory has considered environmental and non-environmental(human) factors simultaneously, which brings the capability of adapting to the categorizations of urban design dimensions made by thinkers such as Cremona (2003) and Golkar (2000).

Factors effective on emotions in the city

Emotions have a temporary and transient nature and go through changes almost quickly. Although this may make it difficult to study and assess emotions, however, it seems to provide a good advantage in turning a negative feeling into a positive one or intensifying positive emotions in urban spaces. Recognizing the factors influencing emotions and their effectiveness appears to be important, aimed at transforming and intensifying the emotions. Thus, in the book "The Meaning of the Built Environment", Rapaport suggests doing a research to identify the elements and methods that affect emotions, actions, preferences, and behaviors in specific situations with the goal to better understand and study them (Rapoport, 1982, p. 46). Various studies have listed various and numerous factors that can influence emotions. The relationship between physical traits, abstract traits, and emotional evaluation has been the subject of many studies. In fact, emotions have not yet been combined together in an integrated environmental assessment theory (Houtkamp, 2012, p. 40). However, some of the factors emphasized by the researchers are given in the following.

Color is known as one of the factors with a special psychological effect on the viewer (Grütter, 1987, p. 496). It may also influence the behavior and speed of movement in space or the perception of space tightness and openness (Francis, Mc, 1953, p. 93). **Light** is another factor affecting emotions and the color of light influences the resulting emotion (Francis, Mc, 1953, p. 94). Light has the potential to affect stress hormones and people's performance (Shahroodi, 2014, p. 7) and plays its most crucial role at night. **Texture** determine the depth and dimension of space (Ulrich, 1983, pp. 101,102) and can be perceived through the eyes and touch (Bagheri, 2012, p. 55). The rough, brick or rocky texture may have an impact on the character, excitement, etc., while soft tissue such as plaster can seem relatively dull or boring (Naz, Kopper, McMahan, & Nadin, 2018, p. 3). **Shape and form** also affect the emotion and perception of space. Being square or rectangular, curved or angular, and regular or irregular influence the size or magnitude, heaviness, and peacefulness of the space (Francis, Mc., 1953, p. 238., Grütter, 1987, p. 284., Hall, 1973, p. 68., Beigi, 2015). **Natural elements** are known as the most important factors affecting emotions and the richness of the plant landscape and green hierarchy can influence positive emotions (Li, et al., 2016, p. 12). Natural landscapes are associated with more peace and less excitement compared to urban landscapes (Kim, Cheon, & Kang, 2019, p. 3) so that anxiety disorders appear to be more common in urban areas than in rural areas (Engelniederhammer,

Papastefanou, & Xiang, 2019, p. 1). Berman, Jonides, and Kaplan (2008) compared the effects of interaction with natural environments versus urban environments. They concluded that people have shown a better performance to do activities related to working memory after walking in a local park compared to walking in a downtown area. Ulrich et al. also demonstrated that watching and seeing pictures and videos of natural landscapes has the potential to significantly decrease physical stress and improve the emotional states of individuals (Valtchanov& Ellard, 2010, p. 359).

Every kind of landuse causes a special feeling due to the expected characteristics. Adapting the Russell and Snodgrass theory to a variety of landuses clarifies that each landuse benefits from a level of motivation and pleasantness (Mohammadi, 2019, p. 46). The **cultural background** also has an undeniable impact on the sense of space so that individuals familiarize themselves with different matters with their emotional experience and emotions in their age of socialization, learn emotional rules in various situations, and comprehend how to manage their feeling and emotions (Kalantari, Kianpour, Mazidi Sharaf Abadi, 2015, p. 306). In other words, all cultural features and backgrounds can affect the way a person engages with space (Daly, Mahmoudi Farahani, Hollingsbee, & Ocampo, 2017, p. 5). Cultural characteristics have been introduced as one of the factors affecting stress in a research done by Pykett et al.(2020, p. 17). The **individual's mental imaginations** and **past experiences** (Houtkamp, 2012, p. 26), **personality traits** (Klettner, Huang, & Schmidt, 2011, p. 1., Ferreira, Johanssona, Sternudd, & Fornara, 2016, p. 66., Burns, 2000, p. 73), and **moods** and **mental states** (Francis, Mc., 1953, p. 73., Houtkamp, 2012, p. 26., Pakzad, 2015, p. 139) are considered as other factors effective on emotions caused in space.

The rate of the **crowd** in space, and the feeling of crowdedness also influence the emotions of people in urban space. However, crowds and bustles do not always have a negative aspect (Whyte, 1980, pp. 176,177) and there is an optimal limit for the crowding rate based on the Hall classification (1966) concerning the distances (Hall, 1990., Gehl, 2010, p. 123), which varies according to different cultures. But, as shown by research, when someone forcefully enters another's personal space, he will cause anxiety, stress, a sense of escape, aggression, and negative emotions in that person (Engelniederhammer, Papastefanou, & Xiang, 2019, p. 2). When the boundaries of personal space are broken, anxiety and stress, and even the sense of escape and aggression would appear (Altman, 1975, p. 67). **Noise pollution**, although it is recognized as one of the major factors affecting emotions, has an impact on increasing the feeling of crowdedness as well. It has also been known to be linked to high levels of aggression in laboratory situations (Francis, Mc, 1953, pp. 95-99). **Vehicular traffic** is also associated with increased noise pollution as well as causing a sense of fear of accident and decreased safety (Gehl, 2010, pp. 90-102).

Methods for measuring the physiological response in the city

Various methods have been employed in different studies to assess and measure emotions. These methods can be classified into different categories according to their common features. Most studies conducted on the subject of measuring emotions can be divided into three categories based on the tools used in them to extract emotional data: 1) Social media, 2) Applications, and 3) Wearable devices (Fathullah& S. Willis, 2018, p. 5). However, the use of wearable devices is recommended to collect physiological data due to the research goal set to examine the physiological response.

Humans are well capable of receiving or sending messages based on their sensory and emotional states by changing the skin temperature of different parts of the body. Emotional and sensory states also manifest themselves by changing the amount of blood present in different parts of the body (Hall, 1990, p. 75). In other words, emotions are accompanied by the body's reactions, which are caused due to changes occurring in the nervous system (Houtkamp, 2012, p. 55). The biosensing approach refers to the mechanism in which the human mind and activity are formed by the actions of the physiological sciences (Pykett, et al., 2020, p. 4). The biosensing measures of the physiological response also provide a powerful tool for receiving individuals' unconscious responses to environmental stimuli. The studies in the areas of science and emotion assessment utilize biometric equipment and biosensors to employ the process of physical response measured by these devices to evaluate the emotional state (Osborne &

Jones, 2017, pp. 1, 3). The biosensing technologies often gather a combination of physiological and cognitive data, which are nowadays used in tracing the emotional responses of individuals moving within the city (Pykett, et al., 2020, p. 1). The advances made in technology can be applied to measure emotions in different sciences. As Nassar (2008) argues, physiological and behavioral metrics and indices may contribute to evaluating the level of involvement with the environment. Physiological measurements, as objective measures, are seen as valuable emotional responses since they may happen unknowingly and transiently (Houtkamp, 2012, pp. 55,56). The advantages and disadvantages of such tools are summarized in the table 2.

Table 2: The advantages and disadvantages of physiological response measurement devices in assessing emotions

Advantages	Disadvantages
<ul style="list-style-type: none"> • Receiving unconscious reactions to environmental stimuli • Recording temporary and transient reactions • The ability to independently use time and place (in the real or virtual environment and time) • Independent of the perception process • Independent of language and cultural teachings • Demonstrating mental load and stress 	<ul style="list-style-type: none"> • Accepting some mental situations and getting used to them despite the recording of the body's reactions by devices • The belief of some people in the revelation of thoughts by this device and the possible avoidance of using it • Difficulty in finding the cause of an emotional reaction • The complexity of data interpretation • The intervention of the individual's psychological characteristics along with environmental stimuli and the complexity in distinguishing between them • Inability to distinguish between changes caused by physical activity or emotion in cardiovascular indices

References: (Resch, et al., 2015, p. 517) (Houtkamp, 2012, p. 56) (Bergner, Zeile, Papastefanou, Rech, & Streich, 2011, p. 249) (Nold, 2018, p. 2,14) (Pykett, et al., 2020, p. 14) (Shovala, Schvimer, & Tamir, 2017, p. 36) (Osborne & Jones, 2017, p. 1)

Various devices are developed to measure emotions with physiological tools, which are connected to different parts of the body and measure the physical response. These devices include headbands, glasses, wristbands, shoe-attached sensors, as well as sensors attached to the chest and armpits. Meanwhile, wristbands can be used more in urban spaces and have been employed more than other equipment in different studies. These devices measure various information. A description of each of these data is provided below.

- Electrodermal activity (EDA): It reflects the high-energy dimension of behavior, especially emotion, regardless of the intensity of the emotion. In other words, the EDA reflections extract arousal by pleasant and unpleasant stimuli (Hogertz, 2010, p. 32), including changes in blood pressure, heart rate, etc. (Fathullah & S. Willis, 2018, p. 6).
- Galvanic skin response (GSR): The galvanic skin response (GSR) is known as one of the most sensitive signs of emotional arousal. The GSR measures the amount of sweat discharged from the sweat glands. Whilst sweat secretion plays a major role in regulating heat and sensory discrimination, changes in skin heat conduction are stimulated by sensory stimuli. These changes appear as a sign of "emotional intensity" (Daly, Mahmoudi Farahani, Hollingsbee, & Ocampo, 2017, p. 5., Fathullah & S. Willis, 2018, p. 6). The long-term monitoring of the GSR allows us to observe and evaluate the response of the sympathetic nervous system for a longer period of time and provide important physiological information that could not be achieved by low-term monitoring (MacDonald, 2014, p. 116).
- Electroencephalography (EEG): An electroencephalography device is employed to record emotional situations. The method is used to understand the neural context of human cognitive responses to external stimuli such as situations and environments (Daly, Mahmoudi Farahani, Hollingsbee, & Ocampo, 2017, p. 5). The disadvantage of the EEG recording method is the need for a signal recorder and its somewhat sensitivity to noise and disturbance (Maghsoudy, Seyedian, Mahnam, Shahroudi, 2017, p. 102). Its unique aspect relies on its ability to collect the data second by second and without interruption (Kim, Cheon, & Kang, 2019, p. 2)

The research conceptual framework

Based on what mentioned in the previous sections, various environmental variables and factors were found to affect the human emotions regarding space and create a feeling in the person. According to

studies, environmental emotions appear in three physiological, cognitive, and behavioral layers, respectively, and can be studied accordingly. At the physiological level, changes occurring in physical symptoms such as skin temperature, heart rate, blood pressure, and sweating intensity indicate emotional arousal. At the cognitive layer, emotion manifests in the form of mental image and mental feeling, which can be assessed in people's words and through interviews. The environmental emotion may be examined as the tendency to stay or not stay in space as well as the speed of passing through space or pausing within it in the behavioral layer. In the meantime, based on the Russell-Snodgrass model, the cognitive response indicates the type of emotion, while the physiological response demonstrates the intensity of the emotion by identifying the level of arousal or relaxation. Two pleasant and unpleasant spectra can be considered for arousal and relaxation by combining the type and intensity of the emotion. In this study, we set our goal to use the heart rate index to measure emotions in urban areas and spaces. The heart rate is recognized as one of the most important biological symptoms associated with emotion that the first sign of change occurs through it in the event of any change in emotions.

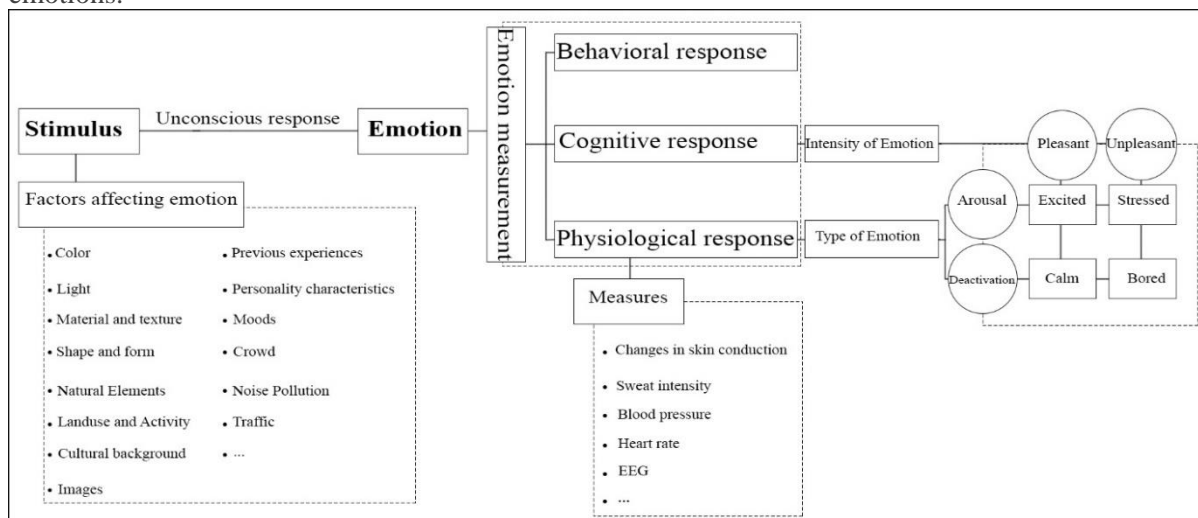


Fig. 1: The research conceptual framework

METHODOLOGY

This was an applied research, which was focused on the use of physiological sciences in the field of environmental psychology and urban planning. The strategy used in this research was mostly quantitative. We invited 20 participants with relatively homogeneous characteristics in the age range of 20 to 30 years (10 females and 10 males) to perform the practical test. They were asked to walk through a pre-determined route with a variety of natural, traffic, retailing, and inactive spaces. Their heart rates were measured with the Empatica E4 device along the walking route at specified intervals and areas where changes occur in environmental factors. The data were localized by GPS and the heart rates of people were determined and recorded in each place.

The lowest heart rate in each individual was considered as the baseline of his heart rate for physiological data analysis. Also, the spectrum of fluctuations for each person was studied separately. Accordingly, the heart rate changes were calculated. Then, the emotional mapping was prepared by establishing a relationship between numerical data and spatial data in ArcGIS software as well as providing this information layer for all the participants. Afterward, the mean heart rate changes of the individuals at each point were calculated to measure the outcome of the physiological response. Accordingly, the emotional map of the studied area was prepared in terms of the physiological data. In this step, the environmental characteristics in each place where the heart rate was recorded, were identified to examine the effect of these characteristics on the heart rate changes.

FINDINGS

The scope of the research, the reason for choosing it, and introducing the area for performing the experiment

Imamat Street is located in District 11 of Mashhad Municipality with a northeast-southwest orientation, which begins from Vakilabad highway and extends to the northeast of the city. On a micro-scale, Imamat Street is connected to Vakilabad Highway, one of the highways of Mashhad, and also located near Ferdowsi University. Azadi Park and Ride is located in the southeastern part of this axis and the western side of Mellat Park is located on the eastern edge of this street. Imamat Street has an important place in the western part of the city of Mashhad in terms of connections and recreational role. The following image illustrates the vicinities and absorption zones of the population on this axis.



Fig. 2: The vicinities and zones of population attraction

In this research, we chose a space for the practical study that benefits from a variety in crowding/gathering, diversity in activities (active and inactive edges) besides having a variety of natural and traffic spaces, which allows the comparison of the physiological responses of individuals in different spaces. Hence, a part of the route of Imamat Street in the city of Mashhad was selected in this research, which encompasses spatial diversity, including natural environment with high vegetation, vehicular traffic, retail businesses, rigid wall (inactive wall), fountain, as well as traffic noise without movement interfering with traffic. Thus, the primary section of Imamat Street, from Vakilabad Highway to Imamat 8, was selected. This section has the required variety on the other hand, while it is not a long distance. The selected path is a round-trip route that covers both sides of the axis. The length of this route accounts for about 1000 meters that its pacing starts from Mellat Park, which will cross the street after walking 450 meters on the margin of the Mellat Park; then it includes the active commercial edge with a length of 240 meters to be continued for 210 meters in the inactive edge (the wall of the Regional Electricity Company); it then crosses the street to begin the return path to the starting point.



Fig. 3: The experience navigation path

The order of facing the space in the experiment is as follows: First, the subjects were placed on the natural path of Mellat Park. This path is divided into 3 different sequences according to personality diversity. The first sequence is associated with high vegetation cover, high population density, static crowdedness, and high noise pollution. The second sequence has features such as high vegetation, entrances to the park, and high population density. The third sequence has also a high vegetation cover, dynamism, and the existence of various behavioral patterns, and the presence of more women. After that, the subjects needed to cross a street with a pedestrian crossing and a straight path that its middle island has a small width with vegetation cover and ornamental flowers. On the other side of the street, the subjects entered the sidewalk with the dominance of retail activity, which has a mostly transparent wall, variety of uses and activities. The inactive wall was varied in the color and material of the wall, a sudden decrease in the width of the sidewalk, and the increased enclosure by the rigid wall and more vegetation. The path was then faced with a uniform passive wall with no opening, which has dense vegetation, unfavorable behavioral patterns, high noise pollution due to its proximity to the highway. Also, the presence of security forces in this area was observed densely on most days of the experiment. To return to the starting point, the subjects had to cross a street width that has a rotating ride path and reduced visibility with a pedestrian lane with a change in the speed bump. The middle island is wider in this section and contains the bus station, which causes a population crowding. It has a lot of noise pollution due to the proximity to the highway, along with the interference between vehicular and pedestrian movement in this part. The only positive element is the presence of a fountain.

The analysis of data and findings

The heart rate data in different parts of the route

The heart rate was measured as the physiological item aimed at collecting physiological data given the availability of the measurement tool and its frequent application in other projects. We examined the heart rate changes since the heart rate index varies in each person aimed at benefiting from the comparability feature and for matching the data. Hence, the heart rate data in each individual was subtracted from the lowest number of the heart rate while pacing and the obtained range was used in preparing the spatial map of physiological response and subsequent analyzes. Table 3 shows the recorded heart rate data of 20 participants in each space with a specific space character. According to this table, the natural path 3 with the dominance of vegetation cover and the existence of desirable behavioral patterns has had the lowest level of negative arousal and the highest level of deactivation. Middle island 2 has caused the highest level of negative arousal and the lowest level of relaxation due to having noise pollution, overcrowding, and traffic interference. It should be noted that the heart rate has decreased independently of the emotion when crossing the street because of the cessation of activity, while the negative arousal has been more in this interval than the relaxation. The data are illustrated in the table 3 and figure 4. In this figure, the larger dots indicate the higher number of heartbeats recorded and a darker color represents a higher mean value of the recorded heart rate changes.

Table 3: The heart rate data in each section of the experiment path with different spatial characters

Different spaces	Dots in Figure 4	Heart rate		Heart rate fluctuations		Fluctuations mean	Fluctuations standard deviation	Effective environmental factors	
		min	max	min	max			Positive	negative
Natural Path Sequence 1	1-3	107	132	0	60	28.40	17.11	Dense vegetation cover	Noise pollution Population crowdedness (proximity to subway and park entrance)

Natural Path Sequence 2	4-5	54	127	0	75	29.88	20.34	Dense vegetation cover	Park entrance and crowdedness More presence of annoying people
Natural Path Sequence 3	6-8	53	129	0	68	25.95	16.57	Dense vegetation cover Optimal behavior patterns (Ping Pong sports in the margins) More presence of women (proximity to 9 & women's sports field)	-
Street 1	9 & 11	61	135	0	73	27.27	20.11	Suitable mutual vision Existence of a pedestrian lane Vegetation cover with ornamental flowers in the middle island	Crowded vehicular traffic in some hours
Middle island 1	10	52	135	0	54	25.86	18.81		
Retailing	12-14	50	126	0	61	28.10	16.96	The existence of attractive and diverse uses and activities	Population crowdedness
Diverse inactive wall	15 & 16	54	131	0	81	29.21	20.25	Emotionally desirable views	The sudden increase in confinement Lack of activity attractiveness
Uniform passive wall	17-21	52	135	0	66	30	19.31	Suitable vegetation cover	The uniformity of the wall, space, and lack of activity Undesirable behavioral

									patterns such as smoking
Street2	22 & 24	65	129	4	75	31.31	17.44	-	The accumulation of security forces Rotation on the vehicular path and reduced cross-sighting High vehicular speed
Middle island2	23	69	131	0	58	33.18	15.98	Fountain	Noise pollution Crowdedness resulting from the bus station Movement interference between pedestrians and bicycles



Fig. 4: The heart rate fluctuations mean in different places

The heart rate fluctuations in each space were classified into 7 spectra from “extremely low” to “extremely high” to compare the heart rate in different spaces with each other. According to the following diagram, the highest percentage of heart rate in the high spectrum is related to the middle island (2), street (2), and the passive uniform wall. In general, the deactivation in different types of spaces is more than arousal, and thus, one can suggest that this urban space is generally a relatively quiet space. The diagram below shows the spectral distribution of heart rate fluctuations in general.

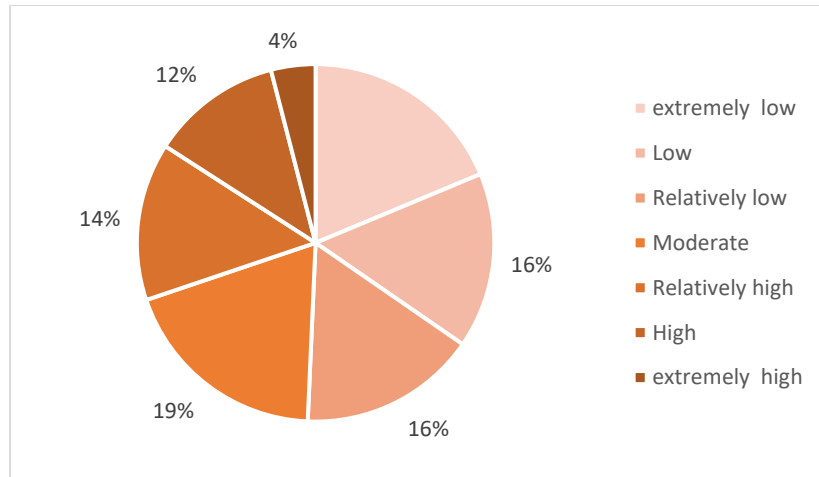


Fig. 5: The heart rate fluctuations

The table 4 shows the distribution of the heart rate data in different spaces in a range of seven and three. Based on the results, the natural path 3 with the lowest percentage of data in the high heart rate range is recognized as the space with the highest relaxation. Similarly, street 2 and middle island 2 with the highest heart rate in the high spectrum are also known as the spaces where the negative arousal has been high and the participants in the experiment have experienced more stress there than in other spaces.

Table 4: The distribution of heart rate data in different spaces

	Extremely low		Low		Relatively low		Moderate		Relatively high		High		Extremely high		Description
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	
Natural Path Sequence 1	13	17.1	14	18.4	8	10.5	19	25	13	17.1	8	10.5	1	1.4	Relative deactivation
	35			46.1%			19	25%	22			28.9%			
Natural Path Sequence 2	10	25	4	10	6	15	7	17.5	5	12.5	5	12.5	3	7.5	The middle of arousal-deactivation
	20			50%			7	17.5%	8			32.5%			
Natural Path Sequence 3	11	20	10	18.2	9	16.4	15	27.3	6	10.9	3	5.4	1	1.8	Complete deactivation
	30			54.6%			15	27.3%	10			18.2%			
Street 1	11	33.3	2	6	5	15.1	5	15.1	5	15.1	3	9.4	2	6	Decreased heart rate due to the cessation of movement
	18			54.4%			5	15.1%	10			30.5%			
Middle island 1	5	23.8	5	23.8	2	9.5	3	14.3	3	14.3	3	14.3	0	0	
	12			57.1%			3	14.3%	6			28.6%			
Retailing	11	19	6	10.3	14	24.1	12	20.7	8	13.8	5	8.6	2	3.5	Relative deactivation with desirable arousal
	31			53.4%			12	20.7%	15			25.9%			
Diverse inactive wall	10	23.3	6	14	6	14	8	18.6	6	14	3	7	4	9.1	Undesirable arousal
	24			51.3%			8	18.6%	13			30.1%			

Uniform passive wall	16	17	19	20.2	13	13.8	13	13.8	14	14.9	13	13.8	6	6.5	Undesirable arousal
	48			51%			13	13.8%	33			35.2%			
Street 2	5	12.8	6	15.4	8	20.6	6	15.4	7	17.9	6	15.4	1	2.5	Stress dominance
	19			48.8%			6	15.4%	14			35.8%			
Middle island 2	1	2.6	7	18.4	9	23.7	7	18.4	4	10.5	10	26.4	0	0	Stress dominance
	17			44.7%			8	18.4%	14			36.9%			

The factors affecting deactivation and arousal

Due to the heart rate data in each part of the space, the factors mentioned next are effective on the physiological response and the resulting deactivation and arousal. It should be noted that the recorded physiological response has resulted from the presence of these factors in space. Also, based on the Russell-Snodgrass emotional model, both deactivation and arousal contain desirable and undesirable spectra, which include gloomy-relaxing and distressing-exciting. Here, deactivation refers to the positive aspect of the decreased heart rate, and arousal represents the negative aspect of the increased heart rate. It should be noted that distinguishing the positive or negative type is just possible by expressing the subject's mental emotions.

Table 5: The factors affecting deactivation and arousal

Affecting factor	Deactivation	Arousal
Vegetation cover	Space greenness The existence of ornamental flowers The pleasant aroma of the plants	Blocked vision and reduced visibility
Population crowdedness	Moderate crowdedness level and emotions of joy and liveliness	Overcrowding and crowded space Excessive desertedness and the reduced sense of security and visibility
Behavioral patterns	Desirable behavioral patterns like exercising	Undesirable behavioral patterns like smoking
Spatial atmosphere	The further presence of women in space The space inclusiveness	The presence of annoying people and groups of thugs
Vehicular traffic	The clear presence of pedestrian crossing The mutual visibility between driver and pedestrian Low vehicle speed	Curvature in the vehicular route and low visibility at the intersection of vehicle and pedestrian movement
Use and activity	The existence of attractive and diverse commercial uses	The existence of large-scale uses with enclosed and passive wall
Confinement	Optimal confinement	The sudden increase in confinement
Facade and wall	The transparency of the ground floor façade The facade permeability on the ground floor The diversity and continuity of the façade	The impenetrable and solid façade
Noise pollution	-	The existence of noise from motor vehicles

CONCLUSION

This study was designed to identify the factors influencing the physiological response in urban spaces. We first explained the conceptual framework of the research by reviewing the background of studies conducted in this area as well as examining the theories related to the emotional response in urban spaces, factors affecting emotions within the city, and the methods of measuring the physiological response in the city. The research methodology was developed and the practical test for assessing the physiological response and the experiment path was determined due to the available tools and methods used in previous projects and studies.

The results obtained from the analysis of the recorded data from the heart rate of the participants in the experiment revealed that factors such as vegetation, vehicular traffic, landuse and activity, behavioral

patterns, crowdedness, noise pollution, etc. are effective on the physiological response, and thereby, affect people's sense. Although the impact of these factors on the desirability and utility of urban spaces has been already proven, however, assessing the physiological response can play a crucial role in determining the threshold of desirability and undesirability of any factor. For example, such an effect on the threshold of the desirability of crowdedness in a range from desertedness to crowding, the threshold of noise from silence to noise pollution, etc. can be mentioned. However, identifying these thresholds was not among the goals of this study. This research was done during the COVID-19 pandemic; thus, the constraints ruling over urban spaces made it more difficult to perform the experiment with more participants. Obviously, conducting the experiment with a larger number of participants can bring more reliable results. The reason for using a homogeneous age and social group was also to decrease the probability of recording data outside the standard range. Naturally, doing research with a larger sample size would allow using more diverse age groups. Based on the aforementioned, some suggestions for designing the space based on emotions are considered as follows:

- The vegetation cover has a significant impact on creating a feeling of peace. The variety in color and type of vegetation may also increase the pleasant feeling. However, if the vegetation reduces visibility, it would be effective in creating an unpleasant feeling.
- The element of water in urban space brings a feeling of naturalness and tranquility in users. However, in a space filled with crowdedness and noise pollution, the noise of water can increase noise pollution.
- The ground floor in urban spaces obviously affects the perception of pedestrians more than other floors. Thus, the transparencies of the wall, its beauty, variety, and coherence have a prominent impact on creating pleasant emotions.
- It is better to avoid building long rigid and inactive walls. If there are such spaces, the ground for creating activity at certain intervals should be provided.
- The street crossing areas should be designed in parts of the route with sufficient visibility for drivers and pedestrians; also, the pedestrian lanes need to be clear.
- When there is a potential for overcrowding, the movement and activity interference should be minimized to reduce the resulting crowdedness and arousal.
- The context for the emergence of desirable behavioral patterns such as exercising in the park, etc. should be provided in all directions and a certain space for undesirable behaviors should be predicted as well.

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Chapter 7

Public Space and Technology

Studying the role of big data analytics in comparison with human perception data in Urban Design issues

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ABSTRACT

The purpose of this study is to discuss about the effective indicators in recognizing different aspects of an urban issue by analysis of digital big data, which recorded by computers and not humans. It is a descriptive research.

Creativity in data modeling, visualization and analysis by data scientists who is familiar enough with Python programming language and Power BI for reports, will play a very important role in discovering hidden challenges in urban spaces. Urban data preparation intelligently, the power of discover and understand the problem, combining different data and creating new and effective results, how to visualize data in order to form a better understanding by employers and urban planning bodies about existing challenges and in one sentence, turning data into information in order to understand urban issues in a more efficient way, will play an important role in the urban design process. In addition, the speed of the planning and design process in all scales of urban design projects will be significantly improved because the need for human monitoring and human resource management in such a phase is minimized.

In this research, after a brief introduction of data science and machine learning algorithms, as well as reviewing the main stages of the urban design process, the contribution of data analysis in urban design science and finding the tendency of researchers and designers to different fields of urban design will be discussed.

In this way, the relationship between data analytics and recognizing behavioral patterns and human sense of urban space experience is very important. Big data analysis is a good complement to human observations in this regard. It can be noted that the error rate in digital data recording is low, so it can be more accurate than any questionnaire because the way people use and experience urban space is very important, not only what they say about it.

Keywords: Big Data, Big Data Analysis, Urban Space, Data Scientists, Data Urbanism

INTRODUCTION

Have you ever considered about the use of recorded data from all your activities and behaviors in the city?

As a citizen, the number your travels and commutes, the movement of your car and its speed, the distance between places you travel at different times, the transactions you have in stores, your desire to visit, study and shop online are all part of data that could be analyzed and provides extracting information and statistics and even models with programming languages for predicting movements, activities, whatever may happen and possible behaviors in the future.

To study this issue, especially in the field of urban design, it is better to take a brief look at big data and machine learning science at first. Certainly, the urban big data has a specific definition, the details of which are beyond the scope of this article, but it will be briefly mentioned.

BIG DATA & DATABASE DEFINITION

Databases and database systems are an essential component of life in modern society: most of us encounter several activities every day that involve some interaction with a database. For example, if we go to the bank to deposit or withdraw funds, if we make a hotel or airline reservation, our activities will involve someone or some computer program accessing a database (Elmasri, R., Navathe, S B. 2011. p3).

A database is defined as a collection of related data, where data means recorded facts. A typical database represents some aspect of the real world and is used for specific purposes by one or more groups of users (Elmasri, R., Navathe, S B. 2011. P27).

Big data for cities, as its name suggests, is primarily characterized by size or volume. It pertains to any and every aspect of the city measured with respect to its population, buildings, transport, and so on, but its importance has only emerged quite recently (Batty, M. 2016).

But in which part of the urban design process is the role of data analysis prominent?

To answer this question, it is better to first examine the various urban design processes to further clarify the steps of a process.

THE PLACE OF DATA ANALYSIS IN THE URBAN DESIGN PROCESS

According to Golkar's study in Urban Design: Process or Processes different urban design processes are classified into seven main types.

1. The Cartesian-inductive process consists of three steps: Data collection, analysis and design.
2. The Test hypothesis -inductive process consists of these steps: Diagnosis and shaping the problem, Data collection by observation, Hypothesis formulation, Test the hypothesis
3. Problem-solving - decision maker process consists of five steps: choosing issues that require attention, targeting, discover or design alternatives, evaluate alternatives, choosing the optimal action.
4. Creative urban design process, which is interaction between problem and solution through analysis, synthesis and evaluation activities.
5. Comprehensive-rational urban design process consists of these steps: comprehensive and non-selective data collection in all dimensions, data analysis, set goals, develop conceptual alternatives, detail alternatives, evaluate alternatives, express alternatives in the form of policies, plans, guidelines and programs.
6. Strategic urban design process that generally consists of three basic parts: strategic analysis, strategic selection, and strategic execution.
7. Interactive urban design process, this model is interested in the dialogue and communication between designers and the design-influenced community.

To find the place of data analysis in any of the types of urban design processes, it is necessary to examine the place of data analysis in different stages of each process. A data scientist organizes mass of irregular and undefined data and discovers problems and issues among them and after modeling by machine learning algorithms, finds the relationships between data and predicts problems and offers proposed solutions; Therefore, at this point, it can be largely understood how important the role of the data scientist in an urban design process could be.

About the function of artificial intelligence in urban planning, "A Human-Machine Collaboration Model for Urban Planning in Smart Cities" by Jaime Meza provides a good category. A Table entitled: The trends on the use of AI in smart cities, comprehensively introduced and categorized the types of Technology (AI), Algorithms and Applications in smart cities. But in this part of the research, the effort is to explain the position of big data and its analysis in different parts of various urban design processes.

After examining the types of urban design processes, seven main stages that are common with quantitative and qualitative differences in all types of urban design processes were extracted, Which

include First Insight, Data Collection, Data Analysis, Setting Goal, Consideration of solutions, Evaluating & Action Planning.

Discovering issues from the supervised or unsupervised big data and discovering the relationships between them is itself a great help in guiding the vision of the project. Increasing the speed and security and reducing errors in data collection and maintenance, as well as increasing the speed and quality of data analysis and the relationships between them by data visualization also show their role in the data collection and analysis stages.

Modeling by machine learning algorithms in the stage of discovering solutions and predicting future behaviors and possible problems, evaluating models and measuring their accuracy in consideration of solutions, evaluating & action planning will be very effective.

There is a brief explanation of machine learning science and some of its applied algorithms in the following to better understand the use of this issue in different stages.

MACHINE LEARNING: CATEGORIZE DATA, FIND RELATIONSHIPS BETWEEN VARIABLES, AND PREDICT RESULTS BY MODELS

Machine learning is about extracting knowledge from data. It is a research field at the intersection of statistics, artificial intelligence, and computer science and is also known as predictive analytics or statistical learning (Muller, A C., Guido, S. 2017. P1).

Machines can learn from input data and the relationships between them and humans use programming languages and modeling science to help machines learn from input data to make good outputs and predictions of input data analysis in future. Good means prediction with the highest accuracy. The higher the skills of the data analyst and scientist in this field, the more valuable this prediction and analysis results will be. Most of websites and applications have machine learning algorithms at their core.

There are three types of machine learning. They are Supervised, Unsupervised and Reinforcement learning. Here, the first two types that are related to the field of urban design will be discussed.

Supervised & Unsupervised Learning

Supervised learning is used whenever we want to predict a certain outcome from a given input, and we have examples of input/output pairs. We build a machine learning model from these input/output pairs, which comprise our training set. Our goal is to make accurate predictions for new, never-before-seen data (Muller, A C., Guido, S. 2017. P27).

Unsupervised learning subsumes all kinds of machine learning where there is no known output, no teacher to instruct the learning algorithm. In unsupervised learning, the learning algorithm is just shown the input data and asked to extract knowledge from this data (Muller, A C., Guido, S. 2017. P133).

Machine Learning Algorithms

Supervised Machine Learning Algorithms: Classification and Regression

It is not necessary to read through the descriptions of each algorithm in detail, but understanding the models will give you a better feeling for the different ways machine learning algorithms can work (Muller, A C., Guido, S. 2017. P32).

There are two major types of supervised machine learning problems, called classification and regression. In classification, the goal is to predict a class label, which is a choice from a predefined list of possibilities.

For regression tasks, the goal is to predict a continuous number, or a floating-point number in programming terms (or real number in mathematical terms).

An easy way to distinguish between classification and regression tasks is to ask whether there is some kind of continuity in the output. If there is continuity between possible outcomes, then the problem is a regression problem. Think about predicting annual income. There is a clear continuity in the output (Muller, A C., Guido, S. 2017. P27).

Here we briefly mention two widely used algorithms.

K-Nearest Neighbours

The k-NN algorithm is arguably the simplest machine learning algorithm. Building the model consists only of storing the training dataset. To make a prediction for a new data point, the algorithm finds the closest data points in the training dataset—its “nearest neighbours (Muller, A C., Guido, S. 2017. P37).

Decision Trees

Decision trees are widely used models for classification and regression tasks. Essentially, they learn a hierarchy of if/else questions, leading to a decision.

Unsupervised Machine Learning Algorithms: Clustering & Dimensionality Reduction

We will look into two kinds of unsupervised learning in this chapter: transformations of the dataset and clustering (Muller, A C., Guido, S. 2017. P133).

In data transformation the algorithms transform original data to a new version which is easy to understand and compare for humans and machines.

Clustering is partitioning data into distinct groups of similar items. For example when you like some photos in a social media, your favourites are being clustered and then future suggestions will be displayed to you based on these clusters.

Similarly to classification algorithms, clustering algorithms assign (or predict) a number to each data point, indicating which cluster a particular point belongs to (Muller, A C., Guido, S. 2017. P170).

This number is called k and this type of clustering is called k-Means Clustering.

K-Means Clustering

K-Means clustering is one of the simplest and most commonly used clustering algorithms. The algorithm alternates between two steps: assigning each data point to the closest cluster centre, and then setting each cluster centre as the mean of the data points that are assigned to it. The algorithm is finished when the assignment of instances to clusters no longer changes (Muller, A C., Guido, S. 2017. P170).

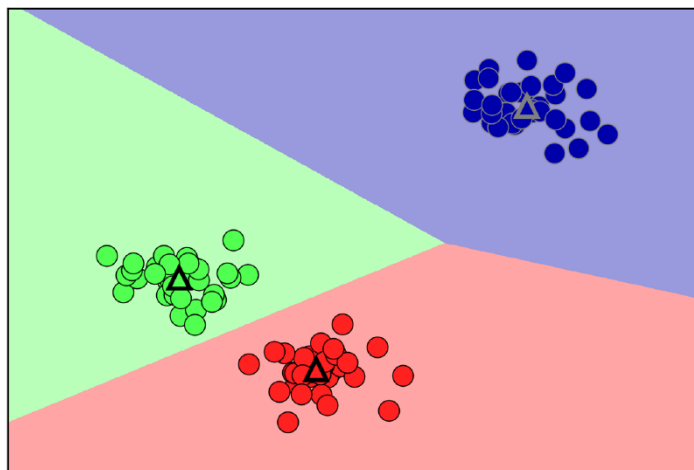


Fig 3: Cluster centre and cluster boundaries found by the k-means algorithm (Muller, A C., Guido, S. 2017. P172).

Dimensionality Reduction

Similarly to classification algorithms, clustering algorithms assign (or predict) a number to each data point, indicating which cluster a particular point belongs to (Muller, A C., Guido, S. 2017. P170).

As we discussed earlier, transforming data using unsupervised learning can have many motivations. The most common motivations are visualization, compressing the data, and finding a representation that is more informative for further processing (Muller, A C., Guido, S. 2017. P142).

For compressing the data the important features should be selected. This task usually is done by decision tree algorithms. Then the process continues and it is called Principal Component Analysis (PCA). It is now important to have got an insight of how much and how these algorithms are being used in the different fields of urban design.

STATISTICAL INFORMATION ABOUT THE USE OF MACHINE LEARNING SCIENCE IN THE FIELD OF URBAN DESIGN

Observing, analyzing and reviewing the available statistics on the number of scientific articles in the field of urban design linking data science and machine learning, in the last 5 years and extracted from the Scopus scientific data base, will give a good insight of the trend towards this topic in urban design. Of course, as is clear, the science of urban design, like an interdisciplinary science, has a broad relationship with other sciences. The results of many scientific articles that have been done in this field and do not directly refer to the topics of urban design, may be very useful in this field, but in this statistical extraction, the researches which have a direct reference to the urban design process and its components have been reviewed.

More than 180 scientific articles extracted in csv format from the Scopus database, which have been found by the urban design and machine learning science keywords, have been reviewed specifically in the abstract section. Then, they were categorized by title and year of publication, in a table containing columns that refer to different important fields in urban design and rows that show the categories of machine learning science.

A Detailed table including the titles of the articles and the year of their publication is also provided by author, which you can refer to if you wish. Finally, the results were counted as shown in the Table 1 and presented according to the following pie chart(Fig 2).

	Sustainable Development	Safety	Walkability	Place Making	urban behavioral	Transportation	Urban Health	Public Space	Economics	Urban Green Space	Land Use	physical environment	Urban management
sum(count)	67	10	2	6	2	43	13	8	7	5	15	4	1

Table 1: Number of urban design articles related to the field of data in the recent 5 years (author data collection and analysis from Scopus Science Database).

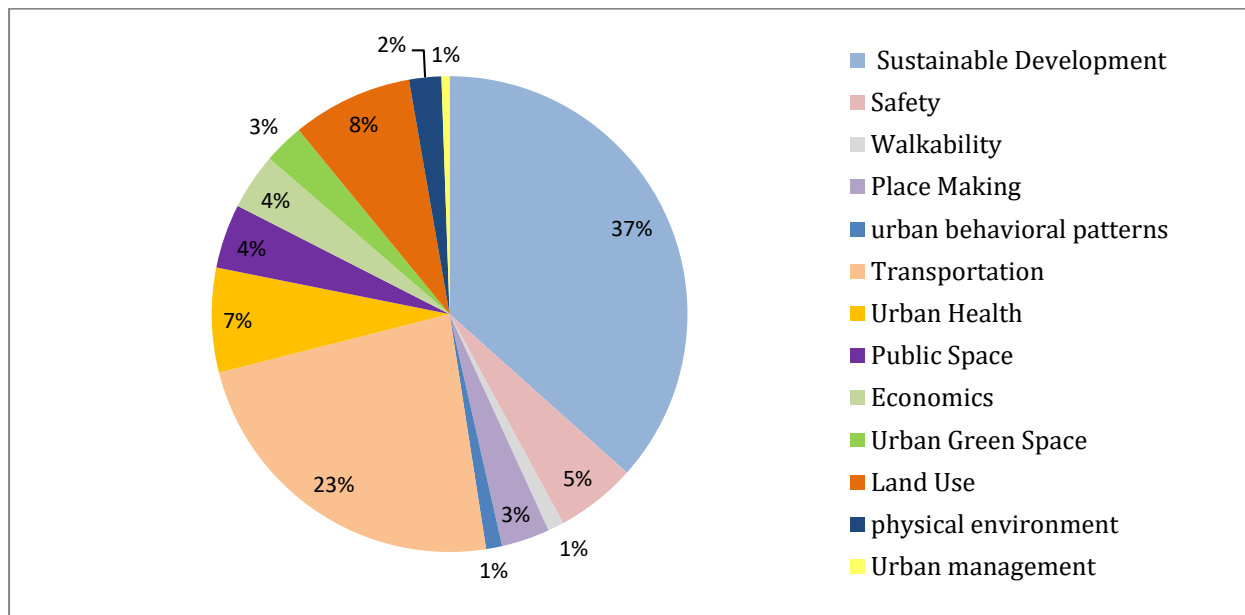


Fig 2: The Share and trend of urban design fields in the big data analytics in recent 5 years (author data collection and analysis from Scopus Science Database).

According to the chart, sustainable development has the largest share among the articles in the field of data science with a big difference. Transportation and accessibility also ranks second among urban design concerns, which has been made great use of big data analysis.

Among these, Land use, Health and Safety can be mentioned as fields with significant.

Another result extracted from the mentioned table is the share of each machine learning algorithms in different fields of urban design. Fig 3 illustrates this result well visually. Such results will give future researchers a great insight into big data analysis and urban design science.

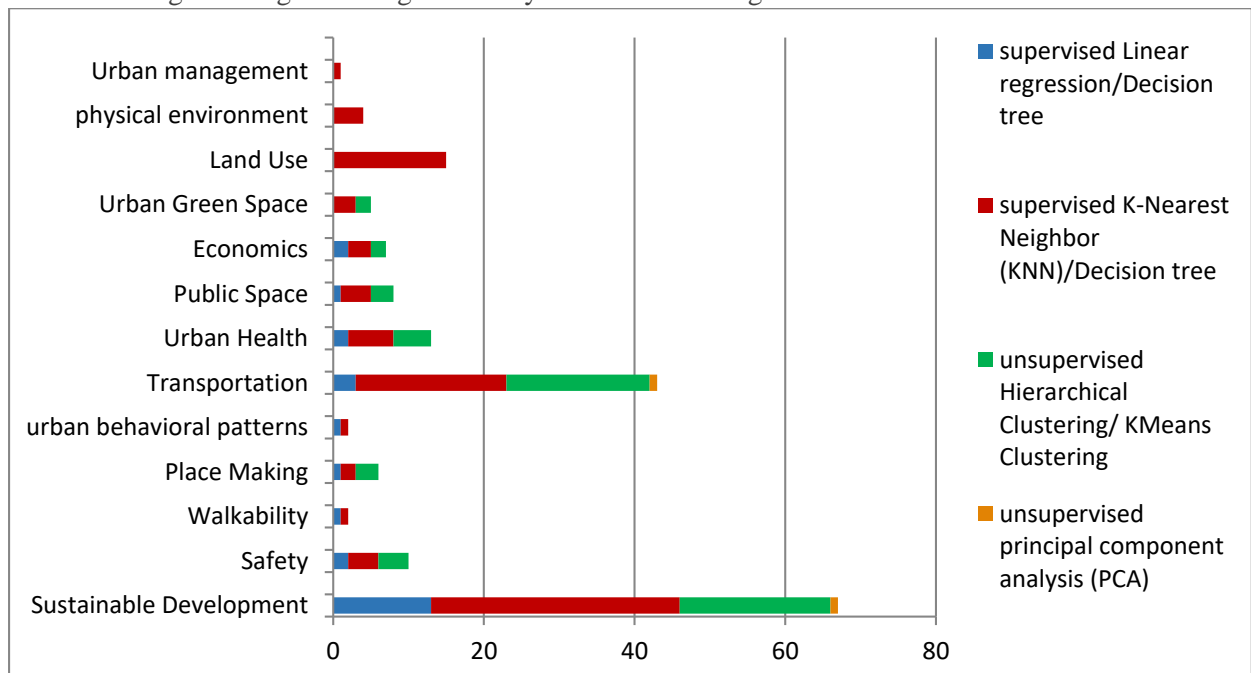


Fig 3: The Share Machine Learning fields in urban design different subjects in recent 5 years (author data collection and analysis from Scopus Science Database).

In order to clarify the process of searching for articles and extracting their numbers, it should be noted that despite the maximum effort to review all scientific articles in the last 5 years, in this study, after proving the trend of statistical results and repeating previous results at each category, the searching process stopped. In fact, after reviewing more than 180 scientific articles, we witnessed the growth of each category of urban design titles with a certain ratio. Therefore, it was preferable to stop the process of searching and dealing with case studies.

REVIEW CASE STUDIES

In the following, some cases that have used machine learning science in the field of urban issues will be introduced briefly.

Hu.N, Legara.E, Lee.k & others / 2016

The title of the research is "Impacts of land use and amenities on public transport use, urban planning and design"

The primary objective of the researchers in this article is to illustrate the ability of predicting public transport ridership across the day using various land-use features and amenities.

This paper focuses on the relationship between land use and transportation and the effort is to provide an innovative approach in order to solve public transportation problems.

In this study, according to the current trend of the relationship between land use and transportation data, modeling has been done by the decision tree and according to the discovered relationship between the impact of land use dispersion and crowding of important transportation points, suggestions for the Singapore development plan in the field of land use and the uniform distribution of public transport use and reduction of pressure on this system has been presented to strategic urban planners.

Another study in Belgium used clustering algorithms to categorize color palettes in urban spaces.

Nguyen.L, Teller.J / 2015

The title of the research is " Color in the Urban Environment: A User-Oriented Protocol for Chromatic Characterization and the Development of a Parametric Typology"

In this study, due to the importance of color in urban space, 18 urban areas and 1952 facades which are classified among four main classes: historic center, housing districts, working-class neighborhoods, and commercial zones were selected to be analyzed.



1



2



3



4

Fig 3: 1:historic center, 2:housing districts, 3:working-class neighborhoods, and 4:commercial zones (Hu, N & others. 2016).

According to this study, recognizing the dominant color palette in a region or a city is valuable for new developments. However, the laws related to the use of materials in the construction of buildings have a significant impact on the formation of a color palette in an area.

This study follows the following steps of Data collection and analysis, and finally presents the color palettes categories in the form of pie chart, which also shows the percentage distribution of four clusters in k-mean algorithm.

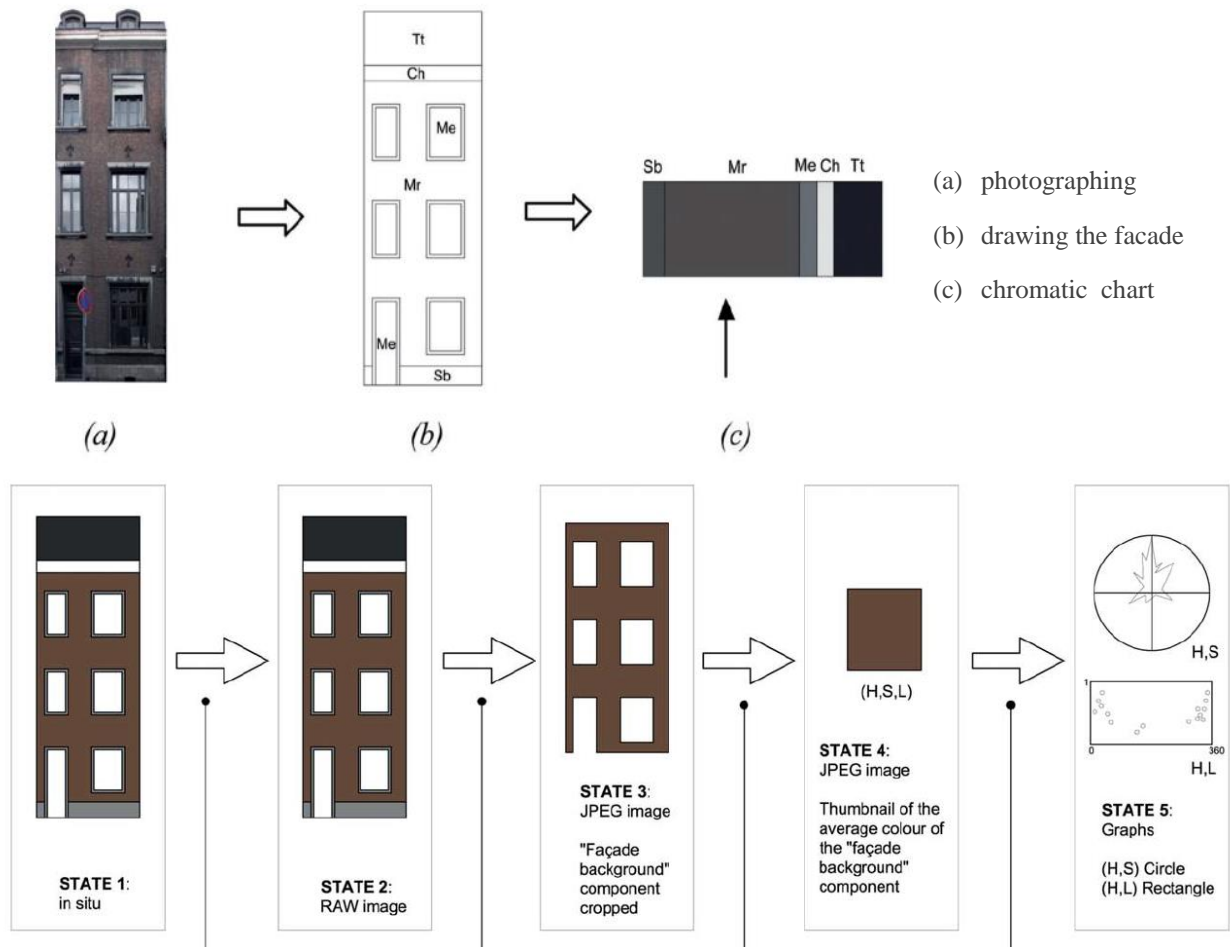


Fig 4: Data collection and analysis phases (Hu, N & others. 2016).

Operations:

- 1: shooting with a digital camera
 - 2: converting the image into JPEG high resolution
 - 3: cropping the components of the façade
 - 4: obtaining the average color through an algorithm which dissolves the pixels of the cropped image then filter them
 - 5: distribution of average color values through graphs.
- Then color clustering is done by k-means algorithm in four clusters, results are the four colors in Fig 5:



Fig 5: Four clusters of colors (Hu, N & others. 2016).

Eventually the pie charts in Fig 6 show the proportion of four clusters in 18 areas.

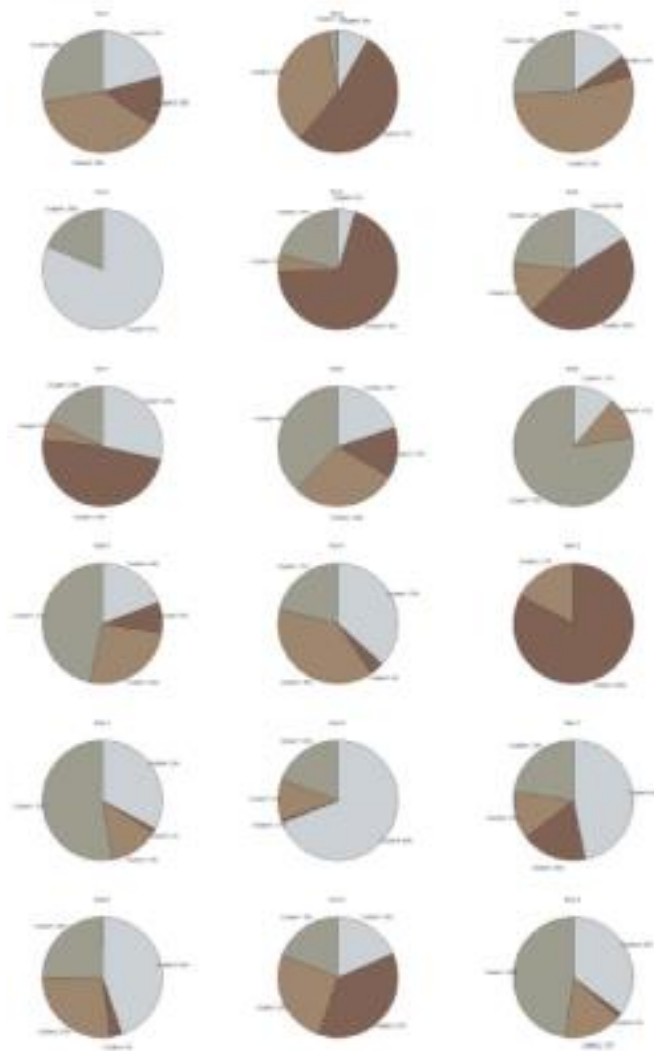


Fig 6: Proportion of four clusters in 18 areas (Hu, N & others. 2016)

But are all urban issues and complexities always easily identifiable? This issue will be discussed in the following.

HIDDEN NEEDS

All of the urban issues could not be easily identified, and sometimes data observation about the behavior and performance of citizens, can clarify new issues. It helps to take our steps for improving urban issues in advance.

The theory of different types of human beings needs, according to Mr. Cutler in the field of marketing, clarifies this issue.

He emphasizes the classification of human needs into four categories

Obvious, hidden, misleading and blind needs

Obvious (real) need: What people say is what they need.

Hidden need (unexpressed): A need that is not said but exists.

Misleading (ceremonial) needs: They demand something else instead of addressing the real needs.

Blind (secret) need: a need that people themselves are not aware of (1393.p15).

It is very important to recognize what kind of need lies behind the request of the people.

For example, after examining time series algorithm in a database, a data scientist may notice a fixed movement pattern at a particular time of year and on certain days. This could indicate an accident in different weather conditions or a change in the movement pattern of vehicles depending on specific days and hours. Traffic data analytics with time series algorithms could give us a good insight in such a situation.

Even examining the behavioral and movement patterns of citizens, which sometimes indicate hidden issues in the city, or some information about construction patterns in the city same as the study of a city in Belgium that could be so helpful for future development.

All these examples show the importance of big data analysis use at the level of urban issues.

CONCLUSION

After checking more than 180 researches in the field of urban design and machine learning science, significant statistics were obtained from these studies in the field of sustainable development. The same was true about transportation.

With a closer look at the year of publication of the articles, we can see the hypothesis that there is a tendency towards different topics in different time periods all over the world, which naturally has also penetrated in the field of research and urban projects.

On the comparison of big data analysis and human observation data analysis in urban projects, the two methods complement each other well in urban project, and our focus between these methods depends on the case in urban issues.

However, sometimes when no problem has been identified yet, the data scientist can identify hidden problems and provide solutions by studying and analyzing big data.

Further there is a question for future researches that whether big data analysis is also helpful in identifying and predicting human experience and sense of space?

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Chapter 8

Public Space and Urban Mobility

From the Felds to the Concrete: Urban Development of Campo Mourão

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ABSTRACT

Campo Mourão is one of the medium-sized Brazilian cities that suffer from urban mobility, due to a policy aimed at real estate speculation and priority use of the automobile, to the detriment of the vitality of the public space, quality of life and the economy of the municipality. This practice stems from a series of mistakes from the past that are reflected today. The article aims to search and identify the problems, from a historical, bibliographic, and field research, in such a way that it develops a path to be followed for the solution of these impasses in this municipality in the interior of Paraná. The city is the result of human organization that should be modeled to the needs of the authors by providing fair and equal environment for all people irrespective of their multiplicities.

Keywords: Mobility, Pedestrian, Social Inequality, Urban Development.

INTRODUCTION

From the second half of the twentieth century, developing countries around the world showed a great urban and population growth, with Brazil being one of those, mainly in large and medium-sized cities. This rapid urban growth coupled with a policy of encouraging the use of cars and the lack of planning for urban integration in Brazilian cities in the 1960s and 1970s, was responsible for problems such as urban mobility, degradation of urban areas and economic and spatial segregation (Carvalho, Maziviero, Imbronito, 2019). Thus, the population was induced to adopt the automobile as a form of urban locomotion, causing damage not only to the quality of life, but also problems such as air pollution and the decrease in public spaces, with the extinction of collective spaces, designated for use vehicles (Boareto, 2008). Brazil arrives in the 1990s with cities showing a severe case of social inequality and lack of urban planning, aggravated by the adoption of neoliberal policies that quickly developed specific regions within urban centers, matching them to international standards and at the same time impoverishing others regions, especially the peripheries, consequently creating a concentration of income in the hands of a minority, developing an urban division due to social imbalance (Carvalho, Maziviero, Imbronito, 2019). In search of social equity, the policy of the 2000s was aimed at bringing the lower-class population closer to public services, making various investments in the entire urban sphere. For the Brazilian cities, the statute of cities was proposed, a legislation made for municipal governments to have greater support from the law to a project aimed at the collective and urban restructuring.

Then we arrived at Campo Mourão, which is one of the many Brazilian cities that has these urban deficiencies, which for a few years guided its planning in a rational model, following the project carried out by the Companhia de Melhoramentos do Paraná, a model that prioritizes the car in relation to other modes. However, the city had a range of public spaces and a small urban area, but it was designed to be dense, but gradually it was carried away by the power of capital, expanding horizontally and replacing its public spaces with the need for the automobile fleet to grow in the municipality, in a promise of progress that costs to reach the municipality (Onofre, 2005).

The progress proposal aimed at expanding the urban area of the municipality connected by high-speed roads, being a great incentive for the use of the car, the main means of transport in this project. Then a vicious cycle was created: neighborhoods increasingly distant from each other, the increase in the use

of cars and the incentive to urban territorial expansion. It was a great opportunity for private capital to enter

the municipality, releasing it from public urban mobility policies, with a view to the financial economy (Bueno, 2006).

For many years, this cycle was repeated, but as was already predicted, it collapsed, resulting in negative effects on the quality of life of the people of Mourão, mainly affecting urban mobility. The difficulty in getting around the city is clear, which intensifies the number of traffic accidents, leaving the municipality in a critical situation. All of this slows down the potential for urban mobility in Campo Mourão, as predicted in the initial planning of the municipality (Bueno, 2006).

According to reports, the Ministry of the City recorded that only 6% of Brazilian cities have an urban mobility plan (G1, 2018). The urban mobility plan is a federal law 12,587, which instituted the guidelines of the National Urban Mobility Policy, which requires municipalities with more than 20 thousand inhabitants to elaborate their mobility plans, thus seeking a development in Brazilian cities based on transportation oriented, TOD. Campo Mourão is part of most cities that do not have the same, showing really that the focus of urban mobility in the municipality is the opposite presented by the law, thus favoring automobiles again and ignoring other modes, even with potential in the urban area of the municipality.

The development of this research is based on the diagnosis made in the city from a historical, bibliographic, and field research, raising the urban deficiencies, giving rise to the hypothesis of when and what were the errors in the urban policy of the city of Campo Mourão, which brought the current problems and what the effects of these decisions have been over the years.

CLEARANCE OF THE URBAN PROBLEM

Historical survey of urban development

Campo Mourão is a city in the state of Paraná (Figure 1), which began to be colonized in 1903, with the encouragement of the state government and built from the Companhia de Melhoramentos do Paraná which arrived in the city in the mid-1930s, investing in construction from the city, some villages and dividing land for coffee plantation in the 1930s and 1940s (Miranda, Larocca, 2017).



Fig. 1 Location map of the Municipality of Campo Mourão. Own elaboration based on data from the Paraná State Government.

The initial plan consisted of four avenues in the southwest-northeast direction, seven streets in the north-east direction and the São José and Getúlio Vargas squares occupying two central blocks of the plan, for a total of 36 blocks. Soon after the construction of the initial plan, in 1953, expansion was

ordered, going from 36 blocks to more than 200, expanding the urban area of Campo Mourão (Figure 2).

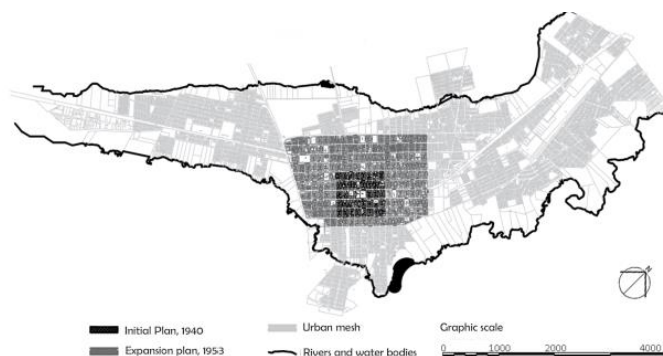


Fig. 2 Map of the foreground of Colônia Mourão. Own elaboration based on data from the city hall.

Six years after the expansion of the city in 1953, the construction of a new neighborhood with large dimensions for a newborn city was started. Called Jardim Lar Paraná, the largest neighborhood ever built in the city, it is in the region called the west wing (Bueno 2016). Then the first neighborhood was born away from the central area, causing a problem to bring the urban infrastructure to the place.

As mentioned in the introduction, the problems in Brazilian cities worsen in those of the 1960s and 1970s, the growth of the urban area of Campo Mourão had its rise in this decade and the city suffered from a wide expansion of the urban area, jumping from 247 intersections, in the 1950s, to 1009 (Bueno, 2016). Soon, poor planning led to the creation of neighborhoods increasingly distant from each other, creating areas of urban voids. Neighborhoods with four and five kilometers from the city center were implemented, namely Jardim Santa Cruz and Jardim Aeroporto (Figure 3).

This expansion of the territory brings terrible living conditions for citizens, due to the long distances that the population needs to travel, in addition to the difficulty of bringing public facilities to these neighborhoods (Gehl 2010). The fragmentation of the urban environment, in addition to aggravating the supply of public services and displacement, uses a pretext, the removal of the poorest population to areas of less interest in the municipality (Carvalho, Mazaviero, Imbronito, 2019).

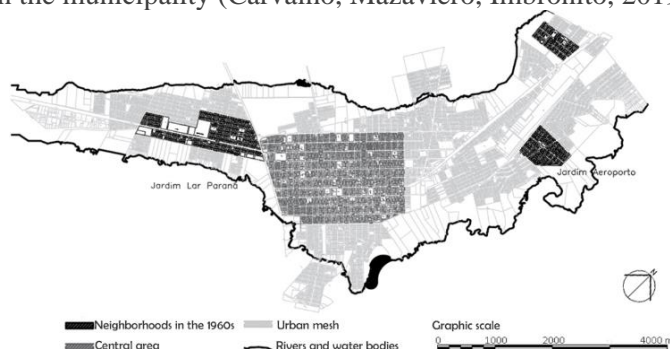


Fig. 3 Location map of neighborhoods built up to the 1960s. Adapted from Bueno, Emanuely.

In the 1970s, after the great territorial expansion, the city suffered a population retraction. Because of this, the city ended up losing financial resources in the way that it had no more capital for investments in public equipment. In the following years, the municipality grew little, passing an average of 200 intersections (Bueno, 2016), where the city was occupying its urban voids and at a slow pace structuring itself, with the creation and or modernization of its few existing public facilities.

Between the 1970s and 2000s, the municipality sought to structure and create its major roads connecting the neighborhoods, and to adapt the city to the needs of the automobile, causing the city to dedicate a good part of its capital to this infrastructure work. Some of the roads still have the same characteristics as their initial planning, with a large part dedicated to paving and the smallest part to the road. The standard of the streets in the central area is 20 meters wide, with 13 meters of pavement spreading on both sides of the road, and a 7-meter carriage bed, after the reform of the roads, now has 3 meters of pavement. and 14 of a beddable bed (Figure 4).

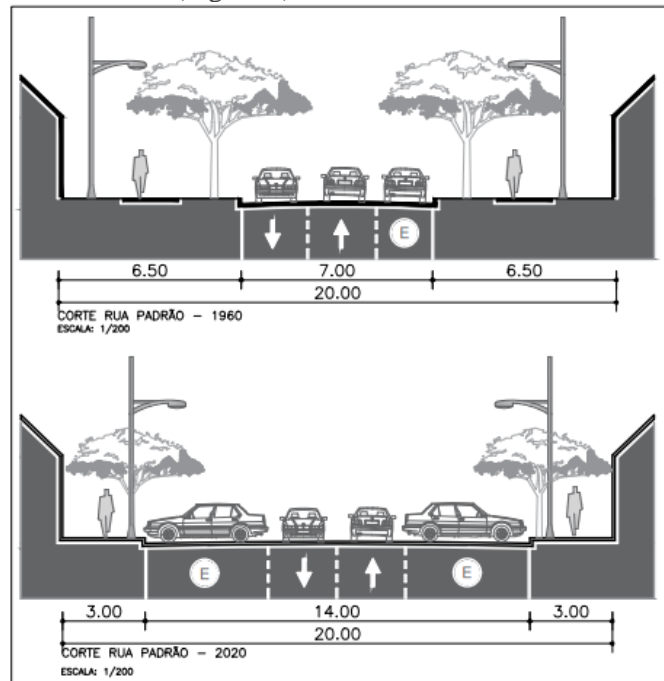


Fig. 4 Standard 1960 and 2020 street section. Own elaboration based on field research.

Already the avenues are between 25 and 30 meters, where the 30-meter-wide lanes held between 5 and 7 meters of central construction site, which were intended for parking, one of the avenues that underwent a major change was Avenida Irmãos Pereira, important avenue of the city, which reduced its median and deployed parking on site the side (Figure 5).

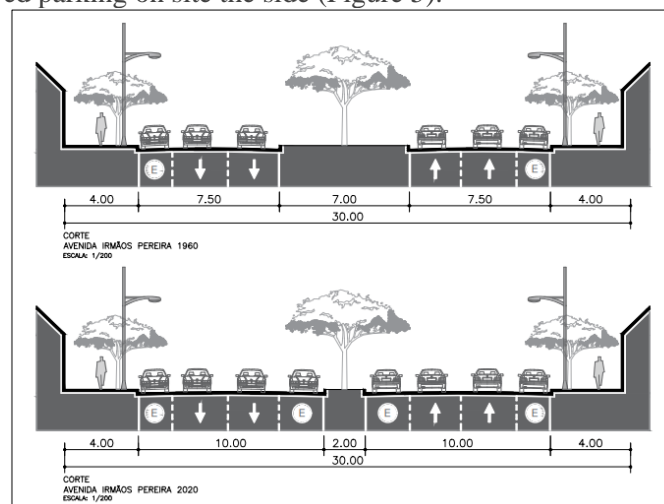


Fig. 5 Standard street section 1960 and 2020. Own elaboration based on field research.

Structural survey of urban mobility.

Despite all these changes in the structure of urban roads, the city has done little for other modes, such as public transport, cycling and walking. In such a way that today we do not find bike lanes or bike lanes in the central area, only in some disconnected areas of the city (Figure 6). The urban cycle network is just over 4 km long, despite a road structure with the potential for implantation of the modal over a large urban area, due to the slope of the municipality ranging from 1% to 8% in some points, and maintaining an average of 3.5%, according to research surveys.

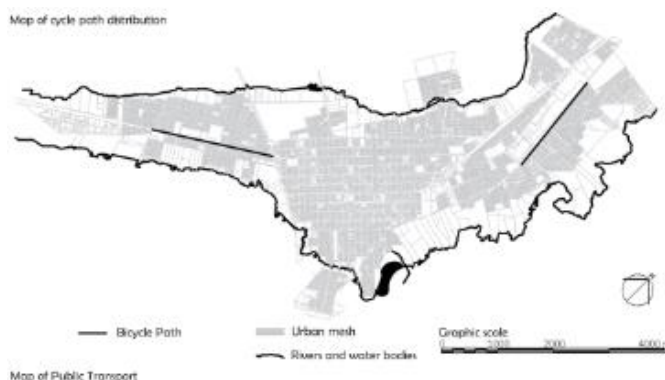


Fig. 6: Cycle map of Campo Mourão. Own elaboration based on field research.

Public transport, on the other hand, has had the same characteristics since its implantation in 1969, with an average of only 11 thousand people using transport daily, about 11% of its inhabitants, as reported in 2019 (Tribuna do Interior, 2019). The system has 13 lines distributed throughout the municipality, with a major problem; the passage interval between buses, with most lines having a 40-minute hiatus at one hour and twenty minutes of waiting, reaching in the worst cases, 6 to 8 hours of interval between vehicles, during the day. Looking at figure 8 below, a satisfactory distribution of the public transport network is notable, but, as mentioned above, the waiting time between vehicles causes a lack of interest in the population, away from the use of the modal.

The time that these lines take to complete the journey, from the starting point to the terminal located in the central area or the opposite, is just over an hour, (Olá Bus, 2019) which makes the car even more interesting to local inhabitants, as they make the same distances between 15 and 25 minutes, according to information obtained from the Google Maps platform.

It is notable the poor distribution of bus stops, with the distance of up to 600 meters between stops, in some regions (Figure 7). This distance creates difficulties for the user who needs access to the modal. The indicated bus stops are every 150 or 250 meters linear, so that the passenger could access it by walking and / or using other urban modes such as cycling (Gehl, 2010). These bus stops are mostly abandoned or simply a signpost with no structure at all to users and often not noticeable to the population.

The modal is not competitive with the car, given that it is slow, expensive, poorly distributed and with severe deficiencies for access, resulting in a loss to the municipality, accentuating its mobility problems, even though it is a small to medium-sized city.

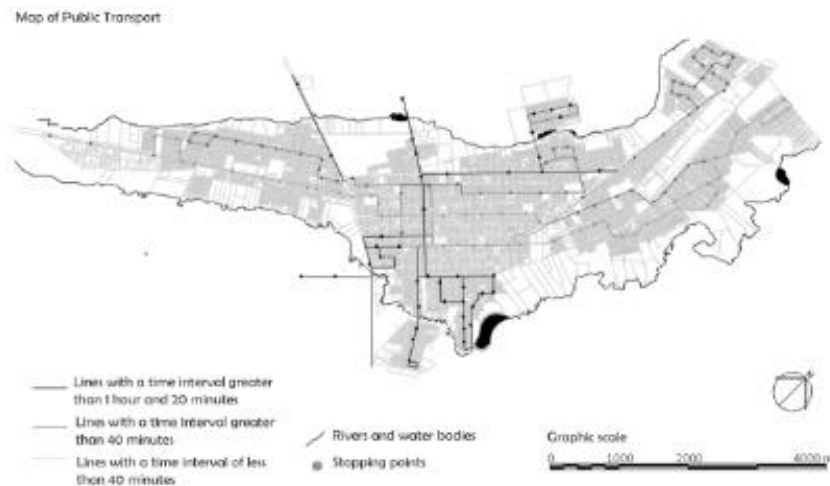


Fig. 7 Campo Mourão public transport map. Adapted from the Olâ Onibus platform, 2019.

Over the years, the pedestrian has been losing space for automobiles, the sidewalks have been getting smaller and smaller, halving their sizes, while the rolling lanes and parking lots have doubled, and the act of walking is not treated with its due importance, having difficulties and severe obstacles, due to the state of conservation of the sidewalks, lack of afforestation, dangerousness, forcing the pedestrian many times to walk on the roads, mainly in the neighborhoods.

The region with the highest concentration of pedestrians is the central region of the municipality, due to the structures that improve and encourage the walking of the Moorish people, such as the Avenida Capitão Índio Bandeira boardwalk and the Getúlio Vargas and São José squares, where they have a satisfactory state of conservation, good urban furniture and beautiful afforestation, however, this region is only about 300 meters, being just an "island" in the middle of a city that focuses entirely on the car. The right to the city when it is granted to people, and made from public facilities, becomes the fundamental key to urban vitality, because with the lack of population in the place, the area is abandoned and deteriorates, losing not only market, but its use as an area of common good.

THE PUBLIC ADMINISTRATION

According to the guide "DOTS nos planos diretores" of 2018, we have two types of urban formation, the 3D city and the 3C city, these models are forms of simplified classification of the city. So that the 3D model is the representation of most Brazilian cities, in which they are dispersed, disconnected and distant cities, that is, cities that did not institute an urban planning focused on the right to the city, but rather promoting the use of the urban environment focused on individualities, such as private space and real estate speculation. In the opposite direction, we have the 3C model, where we see compact, connected, and coordinated cities, in other words, cities with planning focused on the rational use of the soil, ordered by urban mobility, seeking a more compact city with a healthy density, offering greater opportunity for its inhabitants, in addition to a fair and egalitarian development, that is, a more humane city.

We then arrived in a city of about 94 thousand inhabitants (IBGE, 2019), where mobility problems are recurrent in the urban environment, in a way that influences the entire urban sphere. The city is perfectly an example of a 3D city, dispersed, disconnected and distant cities, so that it has only a central nucleus and a dispersed and low-density urban area, an insufficient infrastructure in several regions of the municipality, forcing residents to move around.

The urban development policy supported by the territorial expansion and privatization of the urban space, which the city appropriates and employs, primarily results in the majority of investments in public works destined to the needs of the automobile (Boareto, 2008; Gehl, 2010), and this is visible

in the figure below (Figure 08), where public expenditures of the Municipal government of Campo Mourão were surveyed, in the period from 2018 to June 2020, which are available on the municipality's transparency portal, and thus separated into four categories ; Road System, Education, Health and Public Spaces.

Graphic - Spending on Public Works in Campo Mourão

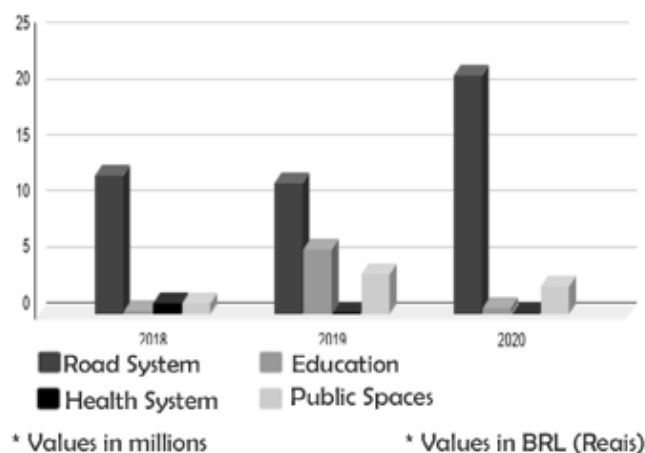


Fig. 8 Spending on public works by the municipality of Campo Mourão 2018, 2019 and 2020. Own preparation, based on research on the Transparency Portal of Campo Mourão.

Then, after the high investments in the road network added with a policy that despises alternative urban modes, we have therefore, an exponential increase in the number of vehicles (Figure 9). Currently Campo Mourão has 70,359 registered vehicles (DETRAN PR, 2020), showing a 63.41% growth in the fleet in the last 10 years, which is extremely disproportionate compared to the population growth in the same period, from 87,194 inhabitants, for 94,859 inhabitants (IBGE, 2019), an increase of 8.7% over a period of ten years.

Today the city has 1 car for every 7 inhabitants, almost double the Brazilian average, 1 car for every 4 inhabitants (DENATRAN, 2017), where the city is unable to accommodate this growing amount of vehicles, and adding to a classification and deficient road signage, as mentioned above, and which does not match the actual municipal situation, results in a high number of accidents, thus in the five-year period, between 2014 - 2018, 2838 accidents were recorded in the municipality (DETRAN PR, 2018), that is, an average of more than 560 accidents per year, which directly affects the quality of life of the Moorish population, causing consequences not only for those who suffered from these accidents, but also for all their residents.

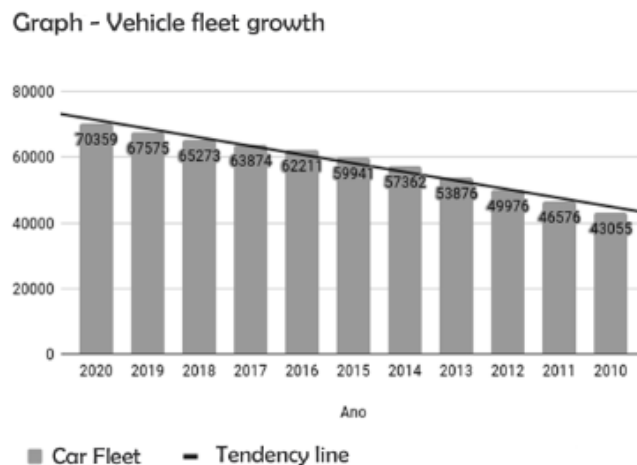


Figure 9 Growth of the Vehicle Fleet. Own elaboration, based on the statistics presented by DETRAN PR.

THE INVERSION OF VALUES

And as mentioned above, from the premise that “cities have the capacity to provide something for everyone, just because, and only when, they are created by everyone” as Jack Jacobs says in his book in 1961, we realize that the way of political and social urban organization, not only of the city of study, but as of most of the Brazilian cities, they need to undergo an alteration, proposing to its residents, a real insertion to the right of urban use.

And for this use to be effective, an inversion of values is necessary, where human beings are once again the protagonist of the city, and the car returns to its assistant function, reconfiguring the mobility system in force in urban centers, in this way we arrive at a another premise, widely used in Brazil in the groups of protests of 2013, in favor of the free pass, that “a city exists only for those who can move through it”, where it is necessary new means of transportation, which are accessible, comfortable and fast, in addition to urban planning integrated with mobility (DOTS in the master plans, 2018), reducing inequalities in the displacement of the population, which is most felt by the class with the lowest income power, in which, it is obliged to reside in places far from the central urban centers, building a new form of urban misery, where the resident has no space for leisure or creativity, due to the loss of time on the way between home and work (Lefebvre, 1968).

Although Brazilian cities present critical frameworks on the right to urban use, in 2001 Brazil took an important step towards better quality of its cities, the approval of the Statute of Cities, which guarantees the right to urban use of land, housing, infrastructure, urban transport, public services and regulates fiscal inspection and regulation practices. And in 2012, the country took another big step towards the approval of the National Urban Mobility Policy, which establishes a series of guidelines, regulations and guidelines for the development of mobility in Brazilian cities with more than 60 thousand inhabitants (Rubin & Leitão, 2013).

Anyway, the question on this occasion is how we can verify the consequences in a small / medium sized municipality, which is located in the Brazilian countryside, where urban deficiencies and the results of an individualist policy are less visible, due to the fact having a relatively low number of inhabitants and a small territorial extension, compared to large municipalities, consecutively, it has a smaller population in a state of fragility, which makes it less expressive, but no less important.

So, we asked, is it possible to reverse the current situation found in Campo Mourão? It is like? Firstly, the inversion of values, where the human being becomes the key part of the city, in which the right to

the urban environment ceases to be theoretical and begins to be practiced, using the premise of Jacke Jacobs in 1961 that “cities have the ability to provide something for everyone, just because, and only when, they are created by everyone”, with a focus on equality, not only financial, social, but also urban. The public and shared space must be adopted as a place of comfort, leisure, and fun for the inhabitants, promoting the social relationship of individuals, in addition to a sustainable culture from a greater number of squares, parks and green areas distributed by the local urban network.

As there is no city without transport, fair and sustainable urban mobility is necessary for an urban environment that wants to offer opportunities to everyone. Looking for the incentive of pedestrians to travel short distances, cycling for medium distances and for long public transport, such as buses or urban trains, however implementing a system that covers the municipality, encourages urban and social development.

And today we have great possibilities for that to happen, because we have the support of the law, both City Statute, as well as of the National Urban Mobility Policy, making it not just a distant dream, but a close reality, and that we can experience in a few years.

CONCLUSION

From the concept that the ideal city to live in is a compact, connected and coordinated city (DOT'S in the master plans, 2018; Gehl, 2010), we realize that the city of study, Campo Mourão, is far from this model, as shown in research, made from bibliographic studies on municipal, regional, and national history, in addition to a deepening in the topic of study. This leads to a diagnosis of the planning policies used in the municipality since its planning in 1940, and a possible elucidation of a guideline for a more humane urban planning policy, aimed at all classes and types of people living in the city today.

We found that the municipality is just one of the Brazilian municipalities that have the same urban failures, caused due to decisions that disadvantage living in the urban environment, in addition to the right to use the city. But also, the possibility of a reversal of this situation through a change in the measures taken not only at the national level, but also at the municipal level.

A city made of people for people (Gehl, 2010) is what we need for social welfare and the advancement of our society. Thus, the research seeks a result for the urban problems presented today, based on a historical, structural, and social diagnosis portrayed in the city of study, aimed at improving the quality of social life in Campo Mourão.

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Evaluation of the Walkability of Urban Streets; Case study: Ma'aliabad Street, Shiraz, Iran.

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ABSTRACT

Streets have had different functions during different historical periods. In recent years, car-oriented policies have decreased the walkability of the streets and increased the adverse socio-economic and environmental consequences. In this research, the walkability of Ma'aliabad Street in Shiraz is evaluated; This street is one of the city's main streets containing different types of activities. Therefore, questionnaires were distributed among the people living in different parts of the city. The data was analyzed using the exploratory factor analysis method, and eight factors were extracted, including comfort, permeability, security, legibility, furniture suitability, cleanliness, vitality, and adaptation to the climate, with factor scores of 0.669, 0.451, 0.572, 0.411, 0.645, 0.316, 0.717 and 0.739. Overall, the results show that the street's walkability is relatively acceptable; and finally, some guidelines are proposed to increase the street's walkability.

Keywords: Walkability, Street, Urban Space, Shiraz.

INTRODUCTION

Walking is the oldest form of human movement throughout history (Pourmokhtar, 2013). However, modernism led to the prevalence of car use worldwide so that urban environments, dominated by humans before the Industrial Revolution, became spaces with priority for car use (Kaghzlu et al., 2020). With the expansion of car use and the increase of traffic on the streets in the last century, unfortunately, traffic accidents have increased. Moreover, the loss of life caused by these accidents imposes a heavy burden on human society.

Although developing countries have only one-third of the world's vehicles, more than two-thirds of the victims of accidents can be seen in these countries (Hassanpour et al., 2012). Increasing population growth in urban areas has created adverse socio-economic, environmental, and physical consequences for cities (environmental pollution, difficulty of movement, unsafe roads, declining quality of urban spaces). There has also been the development of wide streets dominated by cars and the neglect of public open spaces so that these spaces have severely lost their functional quality as a space supporting social interactions. The lack of pedestrian-oriented open spaces and the poor existing spaces have weakened citizens' social interactions (Zouqdar and Nazemi, 2019). Therefore, urban planners and designers have considered the priority of human movement in urban spaces in recent years.

Urban walkways are considered one of the most vibrant urban spaces in many countries. These walkways encourage citizens to walk and use private cars less (Jahangir et al., 2019). Pedestrianization has had many benefits, including economic benefits, social benefits, and environmental benefits. From an economic point of view, pedestrianization can improve accessibility, especially for pedestrians, thus reducing transportation costs. In terms of social benefits, pedestrianization can increase neighborhood interaction and community integration. It is also an opportunity to preserve the cultural resources and

the aesthetics of an area. In addition, pedestrianization can benefit the environment by reducing land needed for roads, parking and reducing energy consumption and pollution (Noriza et al, 2013).

In this research, Ma'aliabad Street, one of the main streets of Shiraz, is studied. This street has a significant percentage of commercial activities which absorb a huge population daily. Therefore, evaluating the walkability of this street can help planners improve the walkability of the street.

PUBLIC INTERIOR

According to Madanipour (2003), the term public space and public place refer to that part of the physical environment, which is associated with public meanings and functions. Public space is generally understood as the place where socio-spatial transformations become obvious and the culture of a city is being formed (Harteveld, 2014). In this context, there are many ways to define public space, however most agree that public space includes all areas that are open and accessible to all members of the public in a society. So, public spaces are publicly-used, publicly-owned and publicly-known. However, as Harteveld (2014) claims that no place in the world is used, owned, and known by all; public spaces have always been as specific and relative as are the people, who use, own, and know the place (Harteveld, 2014). The presence of other people, activities, events, inspiration, and stimulation comprise one of the most important qualities of public spaces altogether which is considered when theorists refer to public space (Gehl, 1996). To sum up, the arguments to define public space, it can be expressed as follows: Public space relates to all those parts of the built and natural environment, public and private, internal and external, urban and rural, where the public have free access, although it is not necessarily unrestricted.

In every city, many interiors are referred to as public, because in everyday life they are of or pertain to the people, in the sense that they belong to people with or without relating to the government affecting laws and regulations. In today's cities, the traditional dichotomy between the public and private domain is shifting radically. Greater number of buildings possess conditions that allow them to be claimed as internal public spaces. Interior public space shows that the boundary of public space is not always sharply defined. That is to say that private buildings can be public by their social meaning and value.

BACKGROUND

Walkability is a measure of an area's pedestrian friendliness. The quality of pedestrian facilities, land use patterns, community support, safety, and comfort for walking improves walkability, which is a fundamental concept in sustainable urban design (Noriza et al., 2013). The Bruntland Commission first published the concept of sustainable development in 1987 in the report "Our Common Future". The concept of sustainable development, which is important in various domains of human life, is classified into three broad areas: social development, economic development, and environmental development. Therefore, sustainable development achieves its comprehensive meaning when the concept of development in all three social, economic, and environmental domains is realized (Kazeruni and Mahdavi, 2017).

The first experiments in creating a car-free zone took place in the cities of Rotterdam and Stockholm. In the late '50s, the private cars in the central and historic areas of the cities caused traffic and destruction of the valuable urban fabrics of Europe. Therefore, until 1975, almost all major and historic cities in Europe restricted the entry of cars to their historic districts. Moreover, historical commercial walkways led to the establishment of continuous social life, the improvement of the quality of social life, and the expansion of a sense of civic responsibility. In North America, in the early 1960s, urban walkways received more attention, and over ten years, 150 pedestrian streets were built in American cities (Mousavi et al., 2018). The first research that focused on the movement of pedestrians in urban spaces is done by Jacobs (1961), *The Death and Life of Great American Cities*, which introduced

different functions for streets. Jacobs also addresses the needs of mixed land uses, small blocks, historic buildings, and urban diversity (Jacobs, 1961). In the mid-1960s, car-restricted areas became popular, and all downtown areas were redesigned with priority to pedestrians and public transportation. At the same time, in examining the evolution of sidewalks globally, it is possible to observe a change in approach from economic and physical goals to welfare and social goals over time (Akbarzadeh and Nadomi, 2013).

Sustainable transportation means developing the human ability to meet the current generation's transportation needs without compromising the ability of the next generation to meet their needs (Sajjadi and Taqvaei, 2015). The transportation system becomes sustainable when it comprehensively considers all social, economic, and environmental aspects. The use of transportation modes with the least adverse environmental effects and the minimum use of financial and human resources have been proposed as different aspects of a sustainable urban transportation system (Jahangir and Saremi, 2019). According to Rappaport (1980), pedestrian movement and behavior are generally influenced by both physical and socio-cultural parameters. Physical and socio-cultural factors (such as safety, security, comfort, weather and climate, cost, physical, visual, social, and cultural barriers), quality of the environment, types of pollution (air, sound, and vision), the health status of the pedestrians (including women, men, children, young adults, elderly, physically disabled) and the beauty and attractiveness of the walkway can affect peoples' mobility (Bahramnia and Malekhosseini, 2018). Walkways are urban spaces that are completely closed to the movement of vehicles during all or some hours of the day and night. Moreover, they are completely dedicated to the movement of pedestrians (Haghi et al., 2017). Frank summarizes the factors influencing pedestrianization: street continuity, land use mix, residential density, frequency and variety of buildings, entrances along the street, transparency (including the number of windows and doors and the orientation of the buildings to the street), the street design that works for people, not just cars, and the amount of retail space on the first floor of buildings (Frank et al., 2006).

Bill Hillier is a recent scholar who has paid attention to the relationship between spatial status and the movement and analysis of public networks, leading to practical results in better urban space design. In his opinion, the presence of people increases the sense of security in public spaces (Seghatoleslami and Rahmani, 2015). Kouhsari et al. (2019) suggested that the theory of spatial composition uses natural motion that affects street layout significantly (Kouhsari et al., 2019).

According to Park (2014), the quality of sidewalks and people's willingness to walk depends on factors such as a sense of safety and security, presence, visual and physical access, night vision, scale and sense of confinement, visual diversity, ease of movement, and attractiveness of the sidewalk (Park et al., 2014). Moreover, Dumbaugh (2009) states that many of the safety hypotheses embedded in the contemporary design of society have not been substantiated by empirical evidence. While cutting off local street networks and relocating non-residential uses on arterial thoroughfares can reduce neighborhood traffic volume, it does not appear to improve safety but replaces one set of safety issues (Dumbaugh and Rae, 2009).

According to Pakzad, the pedestrian space can bring vitality to urban areas and encourage people to volunteer in the city's activities, improving the economic and social level and the environmental quality of the region or city. Walkability is the degree of desirability of the artificial environment for people to live, shop, meet each other, and spend time (Mousavi et al., 2018). Safaei Rineh et al. (2016) state that the walkability criteria are land use, physical quality, landscape, socio-cultural factors and accessibility, and criteria for measuring vitality, comfort, safety and security, diversity and attractiveness, leisure and recreation (Safaei Rineh et al., 2016).

METHODS

Case study

Ma'ali Abad Street is located in District 6 of Shiraz Municipality and is one of the most popular urban spaces in Shiraz. There are various land uses in this street, including commercial complexes, office centers, coffee shops and restaurants, cinemas and other entertainment uses. On one side it leads to Ehsan Bridge and on the other side to Ma'ali Abad Bridge and its main and important streets from Ehsan Bridge to Ma'ali Abad Bridge are Pahlavan Norouzi St., Baharan, Dena, Pezeshkan, Dustan, Khalabanan, Kasaei, Golha and Rahbarmah. Figure 1 shows the Ma'ali Abad Street location in Shiraz.



Fig. 1: Ma'aliabad Street Location in Shiraz



Fig. 2 and Fig.3: Ma'aliabad Street

Research design and data collection

After extracting the walkability criteria, a questionnaire was designed. Due to the prevalence of coronavirus, the questionnaire was completed online by 242 people living in different parts of Shiraz. Table 1 shows the respondents' characteristics.

Characteristics	Groups	Total	Percent
Age	18-30	146	60.3%
	31-40	53	21.9%
	41-60	36	14.9%
	Above 60	7	2.9%
Gender	Female	155	64%
	Male	86	35.5%
	Others	1	0.4%
Education	Under diploma	3	1.2%
	Diploma	44	18.2%
	Bachelor	149	61.6%
	Master	38	15.7%
	Doctoral and higher	8	3.3%

Table 10: The respondents' characteristics

Data analysis

In order to analyze the data obtained from the questionnaire, the exploratory factor analysis method was used. This method was first proposed by Pearson (1901) and Spearman (1904) to measure intelligence and is used to determine the most influential variables when the number of variables studied, and the relationships between them are unknown. Factor analysis summarizes the data and turns them into critical factors to avoid losing the original data (Zebardast and Ghanooni, 2019). The EFA process involves clear, linear steps in which the researcher must make several important decisions. Therefore, determining the direction of the decision is very important in the EFA process. Six steps of EFA include identifying variables/indicators explaining the subject, controlling the proportionality of data for factor analysis, determining the method and number of factors to be extracted, selecting the method of rotation, interpreting and naming factors, and calculating the factor scores. (Zebardast, 2017).

Finally, according to the respondents' opinions and the SWOT technique, the street's strengths, weaknesses, opportunities, and threats were examined based on walkability indicators. SWOT is one of the most appropriate techniques for planning and analyzing the situation. This technique aims to maximize strengths and opportunities, minimize external threats, turn weaknesses into strengths, and take advantage of opportunities while minimizing internal weaknesses and external threats (Sarai and Shamshiri, 2013).

RESULTS

In order to perform factor analysis, in the first stage, the adequacy of the data was examined. Table 2 shows the results of the KMO and Bartlett test. According to statistical rules, the value 0/ 835 is acceptable for the KMO test, and factor analysis can be used to measure the data. Also, the significance of the Bartlett test is equal to 0.000, which rejects the assumption that the variables are uncorrelated. As a result, the variables are correlated, and factor analysis can be used.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.835
Bartlett's Test of Sphericity	Approx. Chi-Square	2265.353
	Df	435
	Sig.	0.000

Table 2: The results of the KMO and Bartlett test

The factor analysis results led to the extraction of eight factors of comfort, permeability, security, legibility, furniture suitability, cleanliness, vitality, and adaptation to climate, the average of which are 0.669, 0.451, 0.572, 0.411, 0.645, 0.316, 0.717 and 0.739 respectively. **Comfort** accounts for 23.036% of the variance. It relates to the existence of awnings and suitable equipment to protect against various weather conditions (heat, rain) in sufficient numbers and appropriate distances along the street, shading trees, places to sit and relax, good parking, and green space quality. With 9.718% of the total variance, **permeability** relates to the active presence of women, shopping complexes, catering uses (restaurants, cafes and fast foods), finding directions quickly, and access to various forms of public transport. **Security** accounts for 5.481% of the variance and relates to the quality of pavement, security, and the quality of street lights. **Legibility** accounts for 4.891% of the variance and relates to facades, flooring, and inclusiveness. **Furniture suitability** accounts for 4.539% of the variance and relates to the quality of metro stations, buses, and billboards on Ma'aliabad Street. **Cleanliness** accounts for 4.262% of the variance and relates to the cleanliness of the street. **Vitality** accounts for 3.874% of the variance and relates to the various activities. **Climate adaptation** accounts for 5.481% of the variance and relates to the resiliency of the street to different weather conditions.

Table 3 shows the SWOT analysis for Ma'ali abad street based on the walkability criteria.

Strengths	Weaknesses	Opportunities	Threats
One of the most important commercial streets of the city	Heavy traffic	Creating cohesion through the flooring	Increasing constructions
Ease of access to the surrounding streets	Lack of suitable green space	Organizing street vendors	Street widening
Multiple commercial uses	Weakness of urban infrastructure	Leveling the sidewalk	Flood risk in some months of the year
The proper width of the street	Lack of suitable furniture	Improving artistic activities	Increasing environmental pollution

Proper access to public transportation	The protrusion of the buildings into the street	Enhancing the culture of walking	Decreasing residential land use
Suitable width of the street	Improper pavement	Building neighborhood parks	Decreasing street security during the day
Suitable access to public transport	Existence of empty lands in the northern part of the street	Increasing the quality of public transportation	
The strong presence of women and children on the street	Lack of parking		
Acceptable lighting of the street	Lack of street inclusiveness		
The suitable slope of the street	Lack of shading along the street		
	Low quality of the bus stations		
	Lack of daily necessities stores		

Table 3: SWOT analysis

CONCLUSIONS

Ma'aliabad Street is one of the important centers of activity and service in Shiraz. This study aimed to evaluate the walkability of this street from the citizens' point of view. The results of factor analysis showed that the total factors affecting walkability include comfort, permeability, security, legibility, furniture suitability, cleanliness, vitality, and climate adaptation, which averaged 0.669, 0.451, 0.572, 0.411, 0.645, 0.316, 0.717, and 0.739. According to the results, the following guidelines can be proposed to improve the walkability of the street.



Reducing the driving speed at the intersections

www.nacto.org



Suitable flooring for sidewalks

www.smithgroup.com



Preventing construction stockpile

www.mehrnews.com



Considering suitable furniture

www.pinterest.com



Organising the parking spaces

www.uknow.uky.edu



Converting linear green spaces to point green spaces

www.afar.com



Provision of suitable urban spaces for holding different cultural and artistic celebrations and festivals

www.cincinnatimagazine.com



Leveling the sidewalk

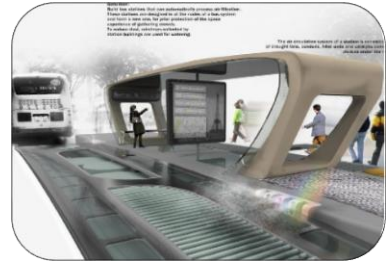
www.cyclestreets.net



Considering the disabled people
in the streets' design
www.dreamstime.com



Increasing the green space
www.2018-2019.nclurbandesign.org



Improving bus and metro
stations
www.ifworldldesignguide.com



Using suitable colors in
furniture design
www.oneonwhiteley.co.za



Design of benches made of
wood and stone with a 60 cm
height
www.architectureau.com



Using metal, brick and stone
grids leveling with the sidewalk
for trees with dimensions of 90
by 90 cm
www.shomalema.com



Traffic calming in the northern
area



Using plant species such as
paper flowers, ivy, and grape
vines to cover canopies, yard
walls and buildings
www.golabtun.ir

Fig. 4: Suggestions for improving walkability

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Covid-19 Virus Outbreak and Mobility Patterns of People in Urban Spaces

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ABSTRACT

Covid-19 has become a global problem and affected many cities. One of the sectors that is most affected by the virus outbreak is the urban transport sector. The prevalence of the virus has dramatically affected the mobility patterns of people in urban spaces. In this study, the effect of virus prevalence on the mobility patterns of people living in Shiraz is investigated.

For this purpose, 32 people living in different parts of the city were interviewed, and the effect of virus prevalence on their mobility was investigated. Content analysis was then used to analyze the data. Findings show that the prevalence of the virus has had a significant impact on travel purpose, travel time, travel distance, and travel mode of people. In addition, due to the inefficiency of public transportation, people do not like to use public transportation and prefer to use other available modes of mobility such as private cars and internet taxis as much as possible. It should be noted that these potential new trends in the use of different modes of mobility must be adapted to the new demand to meet the needs of transportation and population movement.

Keywords: Covid-19, Mobility, Urban Spaces

INTRODUCTION

COVID-19, caused by the acute respiratory syndrome of coronavirus 2, has disrupted communities around the world to such an extent that it has not been seen since the influenza epidemic of 1918. As of April 23, 2021, there have been at least 145 million cases and 3.1 million deaths worldwide (Glodeanu et al., 2021). Regarding the human-to-human transmission of the virus, urban quarantine and travel restrictions have been the key policies to control its spread (Li et al., 2021). Dalkman and Turner (2020) state that the transportation challenge is at the center of the Covid-19. Due to the lack of widespread access to vaccines, strict transport control remains key to defeating the disease.

While there are regional differences in how restrictions are enforced, they have generally had the effect of reducing inter-regional and international travel, increasing home-based businesses, and reducing close contact with others, especially those outside the family (Long and Ren, 2022). Restrictions imposed by governments because of COVID-19 have caused people to change their daily lives and social habits, including the mode of mobility chosen for travel. However, some sectors of the economy cannot operate remotely, like those in public safety, health care, and manual workers. Some of these jobs are low-wage jobs with low bargaining power and are done by minorities and migrants (Shadmi et al., 2020).

Many researchers have examined the changes in travel behavior during and after the Covid-19 pandemic. Glodeanu et al. (2021) found that pre-COVID-19 mobility levels were slightly higher in less deprived areas. The hibernation period resulted in a very severe decrease in mobility, severely in low-deprivation areas. These differences weakened during re-opening, and mobility levels were similar due to deprivation after complete quarantine removal. However, Long and Ren (2022) state that Covid 19 non-pharmacological interventions have led to different geographic reactions to mobility, and

quantifying mobility changes at good geographic scales is essential to understanding the effects of Covid-19. Li et al. (2021) reported that COVID-19, directly and indirectly, reduced intercity travels in China by affecting transportation and industry connectivity. In addition, they emphasize that with the expansion of COVID-19 and the change in control measures, the link between intercity travel and COVID-19 is not linear.

Molloy et al. (2021) state that there was a decrease of about 60% in the average daily distance in Switzerland, with a decrease of more than 90% for public transport, and cycling has increased dramatically. Thombre and Agarwal (2021) report an increase in car travel in India during the crises. They state that most of the people who used to walk are using cars during the crises. Zhang et al. (2020) conclude that the frequency of air travel and high-speed trains outside Wuhan is significantly correlated with the number of infected people in the destinations. Zhang and Hayashi (2020) report a significant shift from public transportation to other modes worldwide, with the most significant shifts to the car followed by walking, cycling, and motorcycles.

Some researchers have focused on women's mobility behavior change. Porter et al. (2021) suggest that due to the problems women in Africa have for mobility, particular interventions should be done to encourage women to use active mobility modes such as walking. Rajan et al. (2020) observe that information related to social groups' lived experiences and daily challenges are ignored during forced isolation. This includes considering women as users (actual or potential) of transportation as well as women who are employees of the transportation sector.

Like many countries in the world, Iran was affected by the Coronavirus outbreak and became the second country to report two cases of corona deaths on February 18, 2020, 50 days after China. Due to the restrictions imposed, the transportation sector in Iran is greatly affected by the outbreak of the virus. This study aims to investigate the effect of the virus outbreak on the mobility patterns of citizens in Shiraz, Iran.

METHOD

Case study

Shiraz is the fourth most populous city in Iran and the capital of Fars province. The city is divided into 11 municipal districts and has an area of 217 square kilometers. The population of this city has increased from 170659 people in 1956 to 1565572 people in 2016 (Statistical Center of Iran, 2016). That is, there has been an increase in the population of about 1394913 people. In addition, an average of 23248 people has been added to the city's population each year over the past 60 years.

Shiraz is located in the central part of Fars province, at an altitude of 1486 meters above sea level in the mountainous region of Zagros, and has a temperate climate. The city is bounded on the west by Mountain Drak, on the north by the mountains of Bamo, Sabzpooshan, Chehel Magham, and Baba Koohi (from the Zagros Mountains). Figure 1 shows the location of Shiraz in Iran.



Fig.1: Shiraz Location in Iran

In Shiraz, various mobility modes such as private cars, buses, metro, and taxis are observed. According to Shiraz household travel statistics, the share of different modes in the city includes 50% private car, 25% taxis, 12% public transportation, and 13% other modes. Therefore, the use of private cars in the city is high; One of the reasons for this is the low quality of public transportation.

Mohammadi et al. (2017) state that in Shiraz, appearance criteria, amenities and reliability are the most important factors from the perspective of bus passengers. On the other hand, sub-criteria of bus safety, safety at stations, providing appropriate services in the late hours of the night, access to terminals, passenger congestion on the bus, the existence of good routes of special bus lines in the city have had the most significant impact on passenger satisfaction. Figure 2 and Figure 3 show Namazi bus station and Namazi metro station.



Fig. 2: Namazi bus station



Fig. 3: Namazi metro station

Research design and data collection

In order to investigate the effect of virus prevalence on the mobility patterns of individuals, a qualitative method was used to collect data. Using the qualitative methods is very effective in studying mobility factors because it allows people to express the factors influencing their mobility in their own words. For this purpose, semi-structured interviews were conducted with people living in Shiraz. The purposeful sampling method was applied to choose the interviewees. Thirty-two interviews were conducted in different parts of the city between November 1 to November 4, 2021. After conducting these interviews, theoretical saturation was obtained. In the first part of the interview, questions were asked about the respondents' characteristics such as age, education, and occupation. Table 1 shows the respondents' characteristics. In the second part, questions were asked about the effect of the virus outbreak on people's mobility behavior.

Characteristics	Groups	Total	Percent
Age	18-30	15	47
	31-40	9	28
	41-60	5	16
	Above 60	3	9
Gender	Male	11	34
	Female	21	66
Education	Under diploma	4	13

Diploma	5	16
Bachelor	9	28
Master	11	34
Doctoral and higher	3	9

Table 11: Respondents characteristics

Data analysis

Content analysis is a systematic and purposeful way of describing events with the aim of providing information, new insights, and representations of facts. In other words, this method analyzes textual data that converts scattered and diverse data into rich and detailed data and recognizes, analyzes, and reports patterns in qualitative data. This method consists of three main stages of preparation, organization, and reporting (Elo and Kyngäs, 2008). Figure 4 shows the content analysis process.



Fig. 4: Content analysis process

In this study, in the preparation stage, the interviews were transcribed. After that, in the organizing stage, the data were organized and categorized by the researchers. In the last stage, the findings of the research were reported.

FINDINGS

We asked people to comment on the impact of the Covid-19 Pandemic on their mobility behavior. People's opinions can be divided into four categories: changes in travel purpose, travel time, travel distance, and travel mode, which are stated below.

Travel purpose

Most of the respondents stated that before the virus outbreak, they traveled for various purposes such as work, education, shopping, visiting medical centers, religious centers, and relatives. After the virus outbreak, the number of voluntary trips had significantly reduced, and they mostly made mandatory trips such as shopping and visiting health centers.

"The outbreak of the virus disrupted my life. ... I miss meeting my relatives."

Many respondents stated that after the virus outbreak, they combined many of their trips into one trip.

"I prefer to do all my work once I leave the house so that I do not have to leave the house frequently."

Most of the interviewees were forced to do most of their activities indoors after the virus outbreak.

"Before the outbreak of the virus, I used to go to the mosque in our neighborhood every day, but now I have to pray at home."

However, some respondents stated that the virus disrupted their lives only in the first few months, and then they resumed their previous activities according to the hygiene protocols.

"By following the protocols, I go to many centers during the day and do my work."

Meanwhile, some respondents stated that they had no fear of the virus spreading and continued their former lives.

"The spread of the virus has not had such an impact on my life, and since I have been infected with the virus twice before, I have no fear anymore."

Some of the respondents, who were students, mentioned that one of their favorite destinations before the outbreak of the virus was their universities, but with the outbreak of Covid-19, all classes became virtual, and students were forced to stay at home.

"Unfortunately, we can no longer have face-to-face classes at the university as before. I hope the situation improves fast and we can go to university like before."

Some respondents mentioned that they participated in various sports and art classes before the virus outbreak, but many gyms and art classes were closed after the outbreak.

"One of my favorite activities was going to yoga classes, but many classes closed after the virus broke out, and I had to do yoga at home. It feels better to be in the gym and do sports in a group."

Some of the respondents also mentioned that they had to go to medical centers during the virus outbreak due to their physical problems, which caused them a lot of fear and anxiety. However, two respondents mentioned that despite their numerous physical problems, they preferred not to go to medical centers and recover at home using herbal remedies.

"I have to visit my doctor regularly because of my heart problem, and that is really stressful. Because, unfortunately, some people do not follow the hygiene protocols, and I am worried after each visit that I may be infected with the virus."

Travel time

Some respondents stated that before the pandemic, they usually traveled in the evenings, but after that, they chose hours of the day to travel when there was less crowding.

"After the virus spread, I prefer to do all my work early in the morning when there is less congestion such as going to the bank".

Some respondents mentioned that Corona Virus did not affect their travel time because they had to do certain activities at certain times, such as going to work in the morning or shopping in the evening.

"In any case, I have to go to work in the morning, either before or after the outbreak."

Some also stressed that the best time to walk is late at night when no one is on the streets.

"I go out every night for a walk when the shops are closed, and no one is on the streets."

Many also pointed out that due to the restrictions imposed on car use at night, they had to do all their work before 9 pm so that they no longer had to leave the house after 9.

"If we drive after 9 pm, we will be fined, so I try to get out of the house in the afternoon and complete my daily tasks faster."

However, several people pointed out that the fine was not enough to prevent people from traveling at night and believed that the fine should be increased.

"Many people travel around the city in their private cars at night because the fine is very low, and they are not afraid of being fined."

In addition, the travel duration of people had changed. Respondents noted that they tried to complete their daily tasks as soon as possible so that they did not have to be present in urban spaces and offices for a long time.

"The longer we stay in urban areas, the more likely we are to get the virus; So, I try to do all my work in the blink of an eye and then get in my car and go home."

"I think we should not be in urban spaces for more than an hour because the urban spaces are infected, and there is a high probability of getting the virus."

Travel distance

Many respondents noted that after the virus outbreak, they tried to travel as short distances as possible. They stressed that the virus outbreak caused them to go to the nearest shopping malls to get the items they needed.

"After the outbreak of the virus, I prefer to make many of my daily purchases from the nearest supermarket."

Some respondents also mentioned that they have been doing their work online since the virus outbreak instead of traveling long distances. Interestingly, some middle-aged and older adults said that the outbreak of the virus had made them more familiar with online shopping and online payment.

"Instead of going to the bank and waiting in long queues to pay the bills. I can easily pay my bills from home."

Some respondents were so concerned about their health and the health of others that they even encouraged their relatives to stay at home.

"Not only do I stay home, but I always encourage the rest of the family to stay home."

Some respondents also mentioned that they were so worried about their health that they preferred to stay home instead of going out.

"When I go out, I always have to worry about getting infected, so I prefer not to leave the house as much as possible and keep myself safe at home."

Also, two of the respondents who were health staff mentioned that they tried to reduce their unnecessary trips as much as possible because they had felt the severity of the virus.

"Since I am a nurse myself and I know how difficult it is to get this disease, I do not go anywhere, except for the hospital where I work, and I do not allow my family members to go anywhere. We make all our purchases online."

Travel mode

Most of the respondents stated that after the outbreak of the virus, they became very dependent on their cars or other family members' cars and preferred to travel all the time by car.

"A private car is the safest mode in this situation because we do not come into direct contact with other people, and we feel relaxed."

Many of the respondents stated that the bus system in Shiraz is inefficient, and they preferred not to use it as much as possible. People who did not have access to a car stated that they preferred to travel on foot or by internet taxi because some passengers do not follow the health protocols on buses and the metro.

"Unfortunately, some people do not take the virus seriously. They do not even wear masks on the bus."

"I like to walk for hours but do not use the bus at all. Especially now that the weather is cold and it is impossible to open the bus window, it is really dangerous to use the bus. One of my friends, who was constantly traveling by bus, contracted the coronavirus because, unfortunately, many people are not hygienic. There is also no proper ventilation system in the buses."

Some respondents said the pandemic had drawn their attention to walking and cycling. They stated that they liked to take short trips on foot or by bicycle because they thought walking and cycling were safe modes.

"After the virus broke out and my workplace was closed, I had plenty of free time. So I repaired my old bike and rode it every evening in our neighborhood park."

Some of them also mentioned that after the virus outbreak, they preferred to stay in their cars and stay away from the urban spaces as much as possible.

"I do not dare to get out of my car, I drive around the city for hours in my car. Because in cafes, restaurants and shopping malls the risk of getting infected is high."

CONCLUSION

Transportation systems contribute to the economy and society at various levels by promoting economic growth and employment and providing sustainable urban development. However, unlike other systems, transportation provides services that cannot be stored. Because of this, the Covid-19 pandemic significantly affected the transportation sector. During the quarantine period, interventions to curb the spread of the virus led to a sharp decline in travel and limited public transport capacity.

In this study, the effect of virus prevalence on the mobility of people in Shiraz was investigated. Data collected through interviews showed that the prevalence of the virus was very effective in four domains of travel purposes, travel distance, travel time, and travel mode. In terms of travel purposes, many of

the interviewees had reduced their leisure trips and made mandatory trips. Regarding travel time, many interviewees stated that they preferred to travel at times of the day when there was less crowding. Regarding travel distance, most respondents mentioned that they often traveled short distances, and if they had to travel long distances, they preferred to use a car because of its safety. The virus outbreak has also led some people to pay more attention to sustainable modes of mobility, such as cycling and walking. However, regarding the public transportation system, people pointed out that since health protocols were less considered in the public transportation system, they preferred not to use it as much as possible and used other modes such as private cars or Internet taxis. These potential new trends in the use of different modes of transportation must be adapted to the new demand to meet the needs of transportation and population movement.

We hope that this study's results can help policymakers increase the efficiency of the public transport system in the face of the virus outbreak, which has created a public fear of public transport among citizens. Meanwhile, equipping public transportation with a proper ventilation system and considering regulations to comply with protocols can be very effective. Also, since some citizens have become interested in walking and cycling, promoting these modes by improving the walking and cycling routes is necessary.

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Chapter 9

Public Space and Urban Tourism

The walking tourist: An investigation of people's perceptions when walking

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ABSTRACT

City streets are the most extensive and potentially congested public spaces that provide opportunities for meetings and activities for groups of people of various ages and backgrounds. Amongst the wide range of activities, one of the most common for tourists is to walk around, experiencing the diverse streetscape that cities have to offer. An empirical pilot study in Wellington, New Zealand investigated the perception of walkers towards streetscape elements and their features, with a focus on differences that may exist between local and tourist experiences. The results indicate that residents' satisfaction with their walking experiences was highly influenced by built features, such as the scale and proportion of buildings and their appearance, something which was overlooked by both domestic and international tourists. Similar differences were found for other streetscape elements such as greenery and the presence of street activities. The intention is to repeat this study with a wider sample once Covid restrictions are lifted. Insights from this study could be a useful tool for planners and urban designers in providing guidance for streetscape projects that aim to create an attractive and pleasurable walking experience for tourists

INTRODUCTION

The streetscape plays an important role in forming the visual image of cities, and is one of the most important factors in the success of a city and its tourist attractions. The latter are often more enjoyable when walking. As Solnit stated, "walkers are practitioners of the city, for the city is made to be walked. A city is a language, a repository of possibilities, and walking is the act of speaking that language, of selecting from those possibilities" (Solnit, 2001).

Southworth (2005) noted that while the concept of walkability remains elusive, notions of walkability are situated in the realm of the streetscape where people saunter. In Sitte's 19th century view, a desirable street, is a confined unit that, if it is straight, is building-like and if it has a maze-like form, is drawing-like. This gives the possibility for the pedestrian to encounter a different image at any moment, with the abrupt emergence of the monuments and buildings (Sitte, 1889), a view similar to that of Lynch (1960). Jane Jacobs believed that streets as public spaces are the vital organs of the city and for a better streetscape design there needs to be an appropriate density of active urban streets. Also important is the placement of land uses beside each other, the necessity of maintaining old buildings beside new buildings, adjusting the plan of buildings adjacent to the street in a way that their residents can have the possibility of seeing the street, and the continuous presence of an acceptable density of pedestrians (Jacobs, 1993).

The definition of a sustainable streetscape and what it constitutes has evolved and several scholars had studied streetscape through the eyes of pedestrians. Cullen (1961; 2006) referred to streetscapes as the "outdoor rooms" encountered when turning a corner, or stepping out of a door into the street. Rapoport (1987) remarked that walking is supported by the urban environment and its perceptual characteristics

increase the pleasures of walking. Jan Gehl's works (Gehl 1980; 2010) are amongst the most cited concerning designing for pedestrians. Gehl described how urban edges and the lower floors of buildings, which he refers to as soft edges, have a strong influence on life in the city. In fact, the components of a sustainable streetscape are also the main components of urban street design and include sidewalks, street corners, trees and green strips, street furniture such as benches, lighting, trashbins, signs, bus stops, bicycle facilities, pedestrian passageways, public art and café spaces (Rehan, 2013).

Most journeys start and end with a walk and places and streetscape elements are chosen to be gazed upon, and it is possible that the gazes of residents and tourists might differ. For residents these views might be customary, whereas for tourists John Urry noted that these might arise and be reinforced through anticipation, especially through fantasy constructed and sustained through a variety of tourist media such as film, TV, and magazines (Urry, 1990).

To date, several studies have examined the influence of streetscape elements for residents and more recent attention has been given to streetscape influence on tourist walking. Samarasekara et al. (2011) discovered that activity potential and exploration made a lesser contribution to the experience of visitors than safety and comfort. This study, however, used pseudo tourists, these being students from the authors' university. Mansouri & Ujang (2016) had similar findings where the image and social aspects of a place had a higher influence on the visitor walking experience than the quality of the walkways, safety, and degree of comfort. In another study, Sarmento (2017) shadowed 32 tourist parties at a distance and observed their routes, stops, where they gazed and their interactions, and discovered that the culture and traditions of local people are sought by tourists, and that the presence of people was a measure of their feeling of safety. Ram & Hall (2018) highlighted the importance of studying tourist walkability and that the walking behaviour of residents is not a substitute for understanding the patterns and behaviour of tourists. Findings from studies on tourist walkability and their limitations thus point to a need to study the impact of streetscapes on tourist walkability and to understand their perceptions of walkability and what environmental and psychological attributes affect these.

Attributes selected for the study

Based on a systematic literature review, the walkability assessment criteria selected for comprehending tourists' perceptions of streetscape elements on walkability were Accessibility, Safety, Comfort and Pleasantness (based on activities and built environment) (Table 1). These attributes have varied definitions, so in this study, accessibility refers to how a person is able to access the destination and the physical and perceived barriers of walking to a place. Safety refers to the feeling of being safe from traffic and other unwanted happenings along the route. Comfort is the level of ease and contentment felt in walking and was measured by the terrain, signage, and presence of facilities such as benches and trash cans. Pleasantness refers to the level of aesthetic appeal, and having attractive destinations along the route and was measured on the basis of activities such as restaurants and cafes along a street, street entertainment and a lively environment. It was also measured by building appearance and the presence of soft landscape elements such as trees and flowers.

Table 1: Review of assessment criteria in literature on walkability and tourist walkability

References	Walkability Assessment Criteria			
	Streetscape influence on walkability			
	Accessibility	Safety	Comfort	Pleasantness
Ackerson (2005)	*			
Ewing, et al. (2006)	*	*	*	*
Adkins, Luhr and Neal (2012)	*	*		
Rehan (2013)	*	*	*	*
Agampatian, (2014)	*			

Cain, et al. (2014)	*			*
Ferrer, Ruiz and Mars (2015)	*			*
Ewing, et al. (2016)				*
Balsas, (2017)	*	*		
Brookfield (2017)	*			*
Harun & Nashar (2017)	*	*	*	
Yin (2017)				*
Li, et al. (2018)				*
Nagata, et al. (2020)	*	*		*
Odat & Kurdi (2021)	*	*	*	*
Yang, et al. (2021)				*
Streetscape influence on tourist walkability				
Samarasekara, et al. (2011)		*	*	*
Mansouri & Ujang (2016)	*			*
Sarmiento (2017)				*
Gorrini & Bertini (2018)	*	*	*	*

METHOD AND CASE STUDY

Study Objective

This study of tourist walkability to identify the perception of streetscape elements was conducted through means of an A5 booklet called the Walk Diary (14 pages). This Walk Diary was approved by the VUW Ethics committee at Victoria University of Wellington on the 22nd of March 2021 (Application No 0000029143). The overall concept of the Walk Diary was similar to a travel diary. It was based on a single walk trip and hence, it was expected to be filled out by one person for his or her walking trip either during the trip or very soon after it. Based on the literature review it is clear that the assessment of tourist walkability should comprise the evaluation of structured indicators. These are related to the urban area's topographical, infrastructural, streetscape, and architectural elements, as well as the demographics, and travelling characteristics of the tourists. Behavioural indicators relate to how the spatial features of the area influence the behaviour of the tourist while walking (e.g. pedestrian exposure to risks), and subjective indicators, which focus on the evaluation of the tourist of the level of walkability of the area (e.g. perceived accessibility, comfort, safety, pleasantness accruing from activities and the built environment) were also included.

Data Collection Procedure and Analysis

The Walk Diary collected both quantitative and qualitative data regarding the walking routes undertaken. The structured walking assessment criteria were designed in five-point agreement Likert Scale choice questions. The questions and responses were framed so as to achieve distinct responses from a specific set of questions by allocating a value to each response (1-5). Then the average scores for each classification of response for each measured item was calculated. The qualitative part of the data was obtained from the A3 map of Wellington (folded to A5 format), where the visitors were required to mark the places on their route that they liked or stopped to appreciate or photograph and the places they disliked or that made them feel disoriented. The quantitative data were analysed using RStudio, an open source programming language for statistical computing and graphics developed by JJ Allaire (RStudio Team, 2021) and the qualitative by using NVivo, a qualitative data analysis software package developed by QSR International (QSR International Ptv Ltd, 2020).

For this research, a pilot survey was conducted for a period of five weeks from the 16th of April to the 21st of May, 2021 in the capital city of New Zealand, Wellington. This time frame was aligned with the opening of the Trans-Tasman travel bubble with the intention of capturing Australian tourists, which proved useful. Further surveys are to be conducted at other times as the current situation with Covid-

19 eases. In this research, given the scale of Wellington, the tourist map of Wellington provided by the Wellington City Council was used as it is publicly and easily available. The map area includes the compact city centre that covers the central business district, major public spaces and tourist attractions, a lively retail area, a number of educational and cultural institutions, the Parliamentary Precinct, and the waterfront area (*Figure 3*).

These booklets were placed on the front desk of 11 places in Wellington: 4 hotels, 2 hostels, 3 cafes, a restaurant and a university accommodation hall and 37 booklets were returned giving a response rate of 30%.

FINDINGS AND DISCUSSIONS

The sample consisted of 37 participants, 29 residents and 8 tourists (both domestic and Australian tourists). The percentage of females was slightly higher than males and the maximum group of participants were males aged 25-39 years followed by females under 25 years. There was no-one of 70 years and above (Table 2).

Route expectation and satisfaction

The participants were asked to rate what they expected or considered important while walking and the level of satisfaction they felt in their walking trip. According to a definition provided by Edwards, et al. (2009), in tourism, expectation has been described as a presumption that in an imaginary setting a specific action will be followed by a specific outcome. This allows understanding of which attributes walkers in the city consider important in their walks.

Satisfaction in tourism studies often consists of satisfying and positive emotions (Aho, 2001; McIntosh & Siggs, 2005; Hosany & Prayag, 2013). As stated by Xia, et al. (2009) tourist satisfaction is highly influenced by a number of factors such as expectations and the images of the destinations that the tourist holds, which is why it is important to understand the expectations tourists bring to the walking experience.

Figure 1 and Figure 2 present the ratings of the participants regarding their expectation and satisfaction with the route they took based on the original Likert scale used in the pilot survey and using "Neutral" as the baseline. The percentages on the left and righthand sides portray the percentage of negative and positive responses to the attributes. For example, in the case of satisfaction with accessibility (Figure 2), 22% of the participants responded negatively (Disagree and Strongly Disagree) and 35% responded positively (Agree and Strongly Agree). It seems most participants, residents and tourists combined, had high expectations regarding accessibility, safety, and comfort. Some participants expected walkways to be more accessible and in better condition than they were, to feel safe from traffic, people and crime, and to contain soft landscape elements such as trees and flowers. Some participants noted that they did not like the presence of high-rise buildings during their walk.

Table 2: Respondent information

Variable	N = 37	
	Frequency	Share
Gender		
Male	17	45.95%
Female	20	54.05%
Age		
Less than 25 years	12	32.43%
25-39 years	18	48.65%
40-54 years	4	10.81%
55-69 years	3	8.11%
70 years and above	0	0.00

Type of visitor		
Living in NZ (More than 6 years)	15	40.54%
Living in NZ (Less than 6 years)	18	48.65%
Visiting New Zealand (International Tourist)	4	10.81%
Resident in Wellington		
Yes	29	78.38%
No	8	21.62%

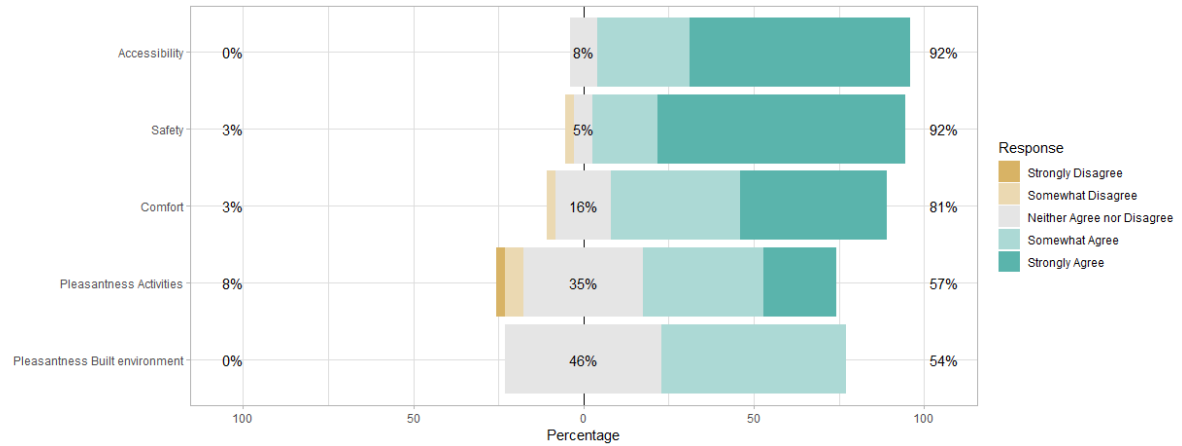


Figure 1: Expectation from the route

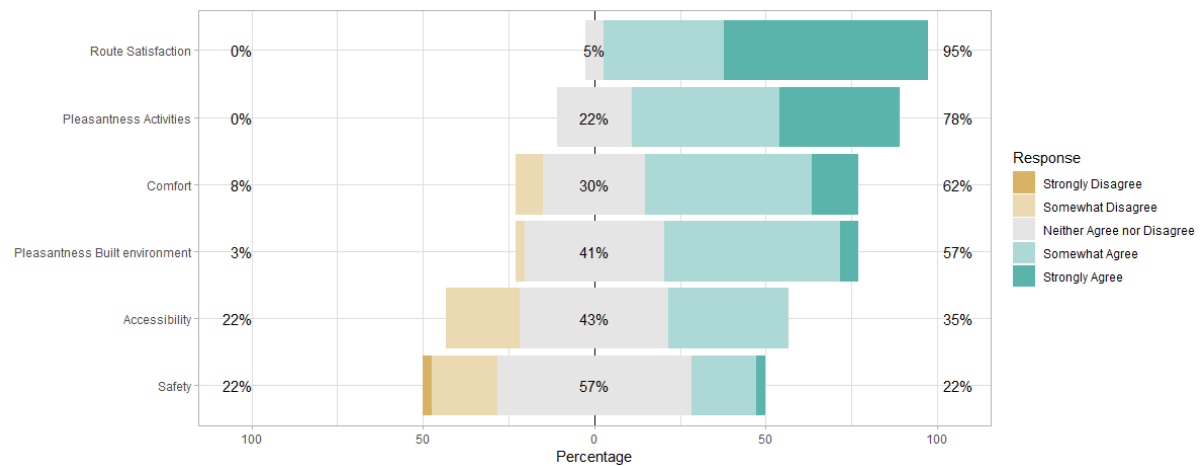


Figure 2: Satisfaction with the route

When it came to satisfaction, participants seemed to be most satisfied with comfort, pleasantness of activities and the built environment. The majority were overall satisfied with their route, with 5% stating that they felt neutral towards it and no negative responses.

To better understand the reasons for the differences that exists between expectation and satisfaction, the participants were asked to mark on the map places along their route they liked or stopped to appreciate or photograph, and the places they disliked or that made them feel disoriented (Section 3). These spots of likes and dislikes in Wellington were represented as a thematic map, which focuses on the spatial variability of a specific theme with locational or reference information. All thematic maps are composed of the two important elements of a base map and statistical data. In this study, the map

of Wellington and the number of liked and disliked spots (the larger the circle, the higher the number of likes/dislikes), were done separately for residents and tourists (*Figures 3 and 7*).

The pilot study results found the most liked spots for residents were concentrated in the main Central Business District (CBD). This was supported by reasons such as the lively and active environment around the mostly pedestrianised Cuba Street (*Figure 4*), which is well recognized for it being a bohemian creative area, boasting copious cafés, op-shops, pubs and bars with live music, restaurants, record shops, bookshops, heritage architecture of various styles, and a general feeling of "quirkiness" that has made it one of the city's most popular tourist destinations (The Guardian, 2015; Clark, 2016; ScreenWellington, 2021; WellingtonNZ, 2021). The residents commented that the central waterfront area was desirable to saunter along mainly because cars are banned from most of it, and footpaths are wide where cars do share the road, opinions which match those observed by Armstrong (2016). Most residents admired the views along their routes, mentioning greenery, the presence of fountains and pools, and colourful boat sheds in the waterfront area. The beautiful views from the various lookouts of Mt Victoria, whose summit is just over 1000m above sea level, and which is easily accessible from the CBD, was mentioned by the residents. The lively environment including children playing in the central waterfront area and Cuba Street had the highest mentions. Most residents appreciated old and interesting architecture as well as the presence of abundant shopping opportunities, including window shopping. Seats in public spaces and beautiful and busy cafes were appreciated on a sunny day.

The common dislikes for residents were the presence of narrow streets, distress from running into cyclists and scooters in the waterfront area, and unpleasant crossings with little time to cross the road in the CBD, with a special mention of Vivian Street. This is a one-way arterial road through Cuba Street that is the route to the airport, and is frequently walked by students due to the presence of the university. Sharp street corners with tall buildings that block the view were mentioned in areas such as Victoria Street and Manners Street in the CBD. According to some residents, this gave a feeling of being unsafe as their line of visibility was obstructed.

Overcrowding was another issue in areas such as the waterfront and Cuba Street (*Figures 4 and 6*). This overcrowding was attributed to excessive cars and people. The presence of construction areas in Lambton Quay, near the Old Bank Arcade, and in Wakefield Street in front of the Michael Fowler Centre were also noted by a few residents and corresponded to disliked spots. Civic Square was another disliked spot for some, also due to ongoing construction obstructing the paths. The Oriental Parade area that forms the western part of the waterfront had some disliked spots due to the presence of cycling on the walk way, reducing the sense of safety. Uphill routes were also disliked including Salamanca Road, Kelburn near the cable car. This road is commonly used by students as it connects the main campus of Victoria University of Wellington to the central area. Wellington is well known for its steep topography and strong winds, although most of the central area is relatively flat around the harbour with roads and walking tracks rising steeply toward the inner suburbs, and the greenbelt and viewing areas.

A few points to be noted were that no tourist destinations were marked as liked or disliked spots by the residents whereas some unlikely streets were mentioned as liked spots, such as Panama Street, a tiny stretch connecting Lambton Quay to Customhouse Quay, for its graffiti and lovely cafes and book stores. In contrast, Victoria Street was disliked for the presence of tall buildings creating sharp unpleasant street corners. Areas with a lively environment with people and children were one of the most common liked spots, although, in a few cases, a lively environment with people was considered a disturbance by a few residents. In such cases, understanding when a like may turn to a dislike is one of the key insights to be gained.

When it came to tourists, most of their liked and disliked spots were tourist destinations. The liked spots included the Beehive to the north, Wellington Botanical gardens to the west, and the city views from the various lookouts of Mt Victoria. Public spaces such as Te Ngākau Civic Square at the Victoria Street and Wakefield Street intersection near the waterfront, that at Grey Street intersecting with Lambton Quay, Oriental Parade and the hustle bustle of the Courtenay Place intersection at Cambridge Terrace were well appreciated. Te Ngākau Civic square forms the highly-connected 'heart of the city'

where people can walk between Wellington's waterfront and important arts, cultural and performance venues such as the Wellington Town Hall and council offices, the Central Library, and City Gallery (Figure 8). It is surrounded by buildings, each with a distinctive architectural style (Wellington City Council, 2021). The public space in Grey Street is a tiny space with trees and benches (Figure 9). Its prime location at Lambton Quay makes it welcoming.

Following up the disliked spots of tourists showed these were unappealing sights such as construction sites and narrow streets and sharp ends. The former were at Brandon Street connecting Lambton Quay and Customhouse Quay and Whitmore Street connecting Lambton Quay. The sharp ends were mostly towards Mt Victoria to the east.

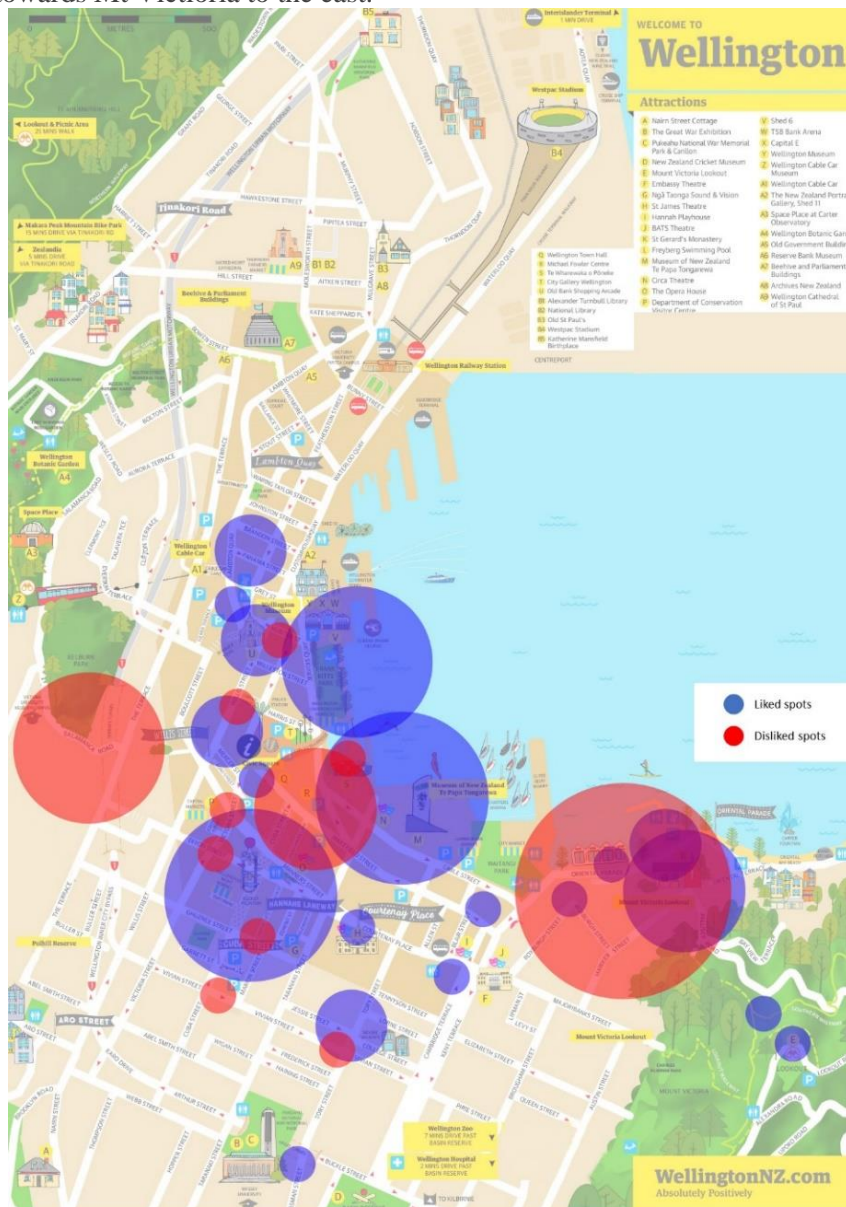


Figure 3: Thematic maps of most liked and disliked spots by residents in Wellington



Figure 4: Cuba Street



Figure 5: Lambton Quay



Figure 6: Waterfront



Figure 7: Thematic maps of most liked and disliked spots by tourists in Wellington



Figure 8: Civic Square



Figure 9: Grey Street



Figure 10: Lambton Quay

Even though the sample size of tourists to residents was small, it is clear tourists preferred public spaces with seats and greenery. No tourist marked any liked or disliked spots in the main lively CBD area unlike residents, whereas the area near Lambton Quay was used by both. At the same time, tourists mentioned more liked than disliked spots and the former were widely dispersed. This dispersal might be based on the locations where the Walk Diary was picked up as the liked and disliked spots are concentrated in the areas where the hotels are located. This pointed towards reconsidering the Walk Diary distribution locations for the main survey. An incentive, such as a coffee voucher, might attract more tourist involvement.

For both residents and tourists, sensory pleasures attracted respondents. This refers back to the contributions of scholars like Lynch (1960), Jacobs (1961), Certeau (1984), Appleyard (1987), Gehl (1980; 2010) who have highlighted the importance of visual features on pleasurable through concepts like “*eyes on the street*” and “*image of the city*”.

Interestingly, a study conducted by Gehl Architects for Wellington City Council in 2004 to understand how people used public spaces and moved in the central city also identified that the main pedestrian activities occurred along Lambton Quay through to Courtenay Place, known as Golden Mile, along with Cuba Street. This study was an observational study and issues such as narrow pedestrian spaces and long waiting times for road crossing were noted. The report also highlighted places of stationary activities which were mainly concentrated in the CBD (Gehl Architects, 2004).

CONCLUSION

The pilot study conducted proved to be helpful for improving the main survey that is to be conducted in Wellington, New Zealand. Particular improvements to be initiated are reframing some questions to make them clearer and more case study specific, rethinking the Walk Diary distribution and providing an incentive in the form of a coffee voucher for each completed diary to raise tourist participation. However, the results from this limited pilot study do corroborate those of the observational study by Gehl Architects.

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As noted above, this paper reports on a pilot study with the intention of carrying out the main study during January, which is the holiday season in New Zealand. It seems the current situation with Covid-19 in New Zealand should make this possible. The results of this wider study will then be presented to local planners and urban designers.

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Chapter 10

Public Space and Pandemic

Explanation of the perceptual-physical interaction between pandemics and resilience of urban communities

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ABSTRACT

In the discourse of urban planning, construction and policy-making, the concept of community resilience as an analytical tool for understanding the balanced relationship between the society, the built environment and the ecosystem has been neglected. At the same time, the urban community has a great responsibility in preparing the basis of urban planning with the aim of maximizing the capacity of the system in the face of disruption and maintaining vital functions at various spatial scales. In the recent pandemic and its far-reaching effects on citizens and the urban environment, the theoretical and methodological gap in this field has become more and more prominent. The present study aims to explore, interpret and explain how urban neighborhoods are exposed to global pandemics with an emphasis on Covid-19, examining the structural and functional aspects of reality as a fundamental qualitative research using interpretive and descriptive survey studies, including research method, context analysis, according to the criteria. In order to extract and compile the components of resilient neighborhoods in the face of pandemics, the methods of reviewing documents in the context of library studies, a systematic review of 78 selected studies were used. Findings show that 1) spatial configuration aspect of neighborhoods including density, connectivity, main structure and boundaries and width of sidewalks, 2) functional configuration aspect including public spaces, green spaces, cycling policies, recreational uses and leisure, functional mixing and also 3) social and psychological configuration aspect including integrated management system, social sense and sense of belonging, social mixing and interactions, independence of local governments, voluntary programs and social participation, mental health and well-being and social support and cohesion of neighborhood relations have made the communities more resilient against Covid-19.

INTRODUCTION

Nowadays, planning cities containing a high "resilience" in the face of threatening phenomena is felt more than ever. Because over time, the feeling of uncertainty and insecurity from being safe from events and happenings is increasing (Christopherson et al., 2010). This issue has caused human beings to always think about predicting these events and being prepared to deal with them properly. In recent months, there has been a significant outbreak of COVID-19 as a "wicked problem" (Cankurtaran and Beverland, 2020), officially recognized by the World Health Organization on March 11, 2020 (Djalante et al., 2020), posed a serious challenge to the health systems of countries (Abbasi et al., 2020) and proved the vulnerability, weakness and fragility of urban systems, and indicated that the city should be more prepared and accountable for such issues (Shamsuddin, 2020).

How to deal with previous epidemics shows the attention to the "principles of sustainable development" in such encounters. For example, in August 2014, the World Health Organization outlined a number of key strategies to combat Ebola, including; safe isolation and treatment of infected people, setting up laboratories to test and identify infected people, identifying infected people through contact monitoring and tracking, safe burial and management of the dead, and social mobilization to train people about the prevention of the disease (WHO, 2014a). In addition, creating "social mobilization" by considering the main strategies, including trying to inform the community, changing some behavioural patterns to deal

with the epidemic, interacting with local leaders, as well as creating radio shows, City Hall meetings as well as satires performed by members of the community were also effective (WHO, 2014b).

In the case of the COVID-19 Pandemic, it is believed that the cooperation and assistance of various actors and sectors is essential in preventing confusion, conflict and controversy, and ensures the effective and efficient use of limited resources. According to various studies, controversy between different levels of government, each with its own unique priorities, as well as strong dependence on the central government in the United States and Australia, has led to an increasing prevalence of the virus (Connolly et al., 2020a; Steele, 2020). While "top-down management" in multilevel governance systems is necessary to direct activities, some "local leadership levels" need to take swift and agile action. In Australia, for example, such institutions are taking a useful step in reducing epidemic pressures on the economic dimension, along with the central government, which seeks to reduce pressures on hospitals and ensure the safety of teachers and students through quarantine, facing the outbreak of the disease (Steele, 2020). Therefore, in the principles of effective and positive coping with epidemics, much emphasis has been placed on local micro-level measures.

On the other hand, we know that in the intellectual system of the traditional city, neighborhoods were based on a kind of socialism; In this situation, social unity and integration made sense, and the spirit of the residents of the neighborhood, who were in an intertwined and complex system of neighborhood and its relations, also ruled the physical space of the neighborhood. Considering the principle that the concept of urban neighborhoods has a system of unique values and norms, including the embodiment of local culture and the spirit of micro-communities and integrated, the existence of long-standing neighborhood relationships, a clear structural-physical system, organization formal and informal neighborhoods, and so on, the effects of physical-spatial components of urban neighborhoods on the prevalence of epidemics have not been systematically studied. Awareness and understanding of these factors is very important in controlling the prevalence of epidemics not only in different parts of the city and plans to organize and build new settlements or areas, but also in organizing plans with the approach of resilience of existing areas. Therefore, this study aims to identify the components and criteria for creating resilient urban neighborhoods in the face of epidemics with emphasis on Covid-19.

BACKGROUND

A few studies have directly or indirectly studied the effect of the perceptual-physical system of urban neighborhoods on preventing the outbreak of Covid-19, some of which will be discussed in this section. "Wang" (2016) in his dissertation aims to examine the concept of flexibility at the regional and neighborhood level. Neighborhoods with racial diversity, education, and high incomes are more resilient. Conversely, neighborhoods with a higher percentage of minorities, the elderly, young workers, and the educated groups are less resilient; since their low endowments, in socio-economic, economic and economic-political terms, expose them to more severe damage due to the recession (Wang, 2016).

"Lai et al." (2019) state that in accordance with the quarantine protocol, with the population limited to the closed space of the house, the role of the physical environment of the neighborhood becomes more important. The restorative potential of neighborhoods in maintaining emotional resilience and mental and psychological well-being, as well as providing a sufficient level of physical activity and mobility, among all residents, especially among the elderly to maintain their perceptual, cognitive and physical capacities plays a key role. Future research should focus on the interior design of small residential environments and the design of small public spaces to optimize mixing between age groups with different levels of vulnerability to minimize pandemic transition (Lai et al., 2019).

"De Vos" (2020) states that the demand for travel can be expected to decrease and people travel less by public transport. As a result of the social distance policy, travel demand may decrease due to increased work at home, E-learning and a decrease in the number of public activities and events. Social distance may negatively affect mental well-being and health status, as it can lead to social isolation and limited physical

activity. As a result, walking and cycling, recreational or practical, can be important ways to maintain a satisfactory level of health and well-being. As a result, policymakers and planners should try to encourage active travel, while public transport operators should focus on creating ways to use public transportation safely (De Vos, 2020).

Findings of "Mitra et al." (2020) show that for children, cottages (in contrast apartments) were positively associated with an increase in outdoor physical activity, while proximity to main thoroughfares and roads was considered a barrier to such activities. For young people, densely populated neighborhoods with good access to local parks are more likely to increase their outdoor physical activity during epidemic. These findings can make people more aware of the future urban crisis by providing new insights into desirable public health messaging and information and the characteristics of healthy and resilient communities (Mitra et al., 2020).

"Bhagra et al." (2020) state that the promotion of community-wide measures to increase the mental well-being of individuals leading to an emotionally and mentally healthy society. Adaptable and resilient, is an essential approach to overcoming the epidemic. The cornerstone of a comprehensive community response should be to mobilize all age groups to support vulnerable groups through age-appropriate tasks such as helping with daily life and connecting and interacting. With the potential to create innovative and powerful movements in the community, young people are unique in serving in a variety of roles from helping neighbors to coordinating large community movements. Across China, there are significant examples of these young people providing services to child health workers, shopping for the elderly, facilitating access to remote health centers for the elderly, and providing education for remote peers have provided the production of masks and other items to foster emotional and mental health (Bhagra et al., 2020).

The results of "Ugolini et al." (2020) show that urban residents usually need accessible urban green space for sports, rest and nature visiting. The reduction in the possibility of observing urban green space during the period of pandemic has led to distinct changes in the motivations of those who have visited these spaces; In a way, we were faced with a relative increase in essential activities such as taking out dogs and a decrease in activities that are unnecessary or high-risk, such as meeting people or observing nature. The results show that adults not only need to be present in urban green space, but also generally want to travel long distances inside or outside the city to access these spaces. Therefore, urban green spaces should be created and maintained in the urban context and available to the public. In order to create flexible cities, urban planning and urban design must consider a diverse mix of large parks, sidewalks, and tree-lined bike paths that can accommodate large green spaces and open spaces. Provide for visiting during an epidemic. These urban green spaces can, as far as possible, ensure that all residents have access to them within walking distance of their homes (Ugolini et al., 2020).

"Megahed and Ghoneim" (2020) seeks to answer the question of whether we can design and build our cities to prevent the spread of the virus? If so, can we provide an anti-virus environment to help protect against the COVID-19 or other pandemic diseases? They state that before producing an effective drug for the epidemic, a solution is to return to the physical environment to reduce the negative effects. We can imagine all residential buildings as self-sufficient, independent and healthy neighborhoods and use existing technologies intelligently. To create more flexibility in urban areas in response to emergencies, it is important to deal with epidemics and other potential emergencies of any kind. Their findings show policies to step into nature, expand horizontally, sparsely populated cities, decentralized, urban agriculture, fewer cars, more cycling and walking, refocus on spaces green, adaptive reuse, sanitary building materials, digital transformation, artificial intelligence and touch technologies will be effective in controlling future epidemics (Megahed and Ghoneim, 2020).

LITERATURE REVIEW

Neighbourhoods as communities with potential

Local community potential is based on the belief in discovering potential assets and capacities in any community and is influenced by a community's commitments, resources, and skills that can be used to build local community strengths and identify problems and opportunities (Rafieian et al., 2016: 168-171). The potential of local communities is more in the effort to compensate, promote health, improve urban and social life and strengthen the goals of social change and is related to a set of techniques and practices in different ways with concepts such as social capital, empowerment of local communities program and social inclusion is the basis of assets and social participation (Verity, 2007: 10).

The potential of local communities can be considered on the basis of the sum of financial, physical and social assets, and the assets of local communities typically include social and physical capital at the same time, which is referred to as "basic asset development". It is called "local communities" and is based on the belief in discovering the assets, potentials and opportunities of the local community and includes the identification and exploitation of all potential assets in the neighborhood. Neighborhood assets include the skills and talents of individuals, organizational potential, political communications, buildings, facilities, and financial resources.

In community potential, there are many experiences of executive models and strategies that are used in issues such as social planning, needs assessment, formation and participation and development of local communities, creating social and human capital. Among these, social potential with emphasis on "social capital" in the form of components of trust and cohesion and social participation and spatial capacity with emphasis on "quality of physical environment" is a mental evaluation of their quality by examining the objective features of the residential environment. Refers to the effective response to the places that people deal with on a daily basis and the activities that take place in urban environments, and includes the five components of local facilities, environmental features, disturbing activities and uses, and the perception of the environment and the characteristics of the residential environment (Arefi, 2008).

Resilience of urban neighbourhoods

Among the definitions, types and aspects of resilience, the concept of "neighborhood resilience", although it has long been in the field of urban planning, has not come much closer to practice in theory. Breton (2001) defines a "resilient neighborhood" as the ability of that neighborhood to return to its original equilibrium after a shock: Return to your original balance. This capacity depends on the stability of the initial state of equilibrium. "A neighborhood with large shares of social and physical capital does not easily go out of balance." Neighborhood resilience can be increased by adding one of the components of capital characteristics, including: 1) neighborhood networks and social trust, 2) active local volunteer organizations, 3) organizational networks compatible location and 4) appropriate social infrastructure.

In a similar approach to Breton, Adgar (2000) defines social resilience at the neighborhood level as "the ability of groups or communities to cope with external irregularities resulting from social, political, and social change, "different environments are created." According to him, resilience is characterized by demographic and economic changes, social networks and institutional resources (Wang, 2016). Galster et al. (2007) also attempted to empirically demonstrate the existence of "threshold effects". They claim that the threshold effect enables researchers to analyze how neighborhoods respond endogenously to shocks or transient and external changes. Therefore, defining and discovering the effects of thresholds at the level of urban neighborhoods can be helpful in redefining their resilience to crises.

According to some experts, the discussion of "self-sufficient neighborhoods" used in the field of urban resilience is another key and basic concept in this field that has historical roots in the culture of Iranian urbanization. Self-sufficient neighborhoods include general features, the most important of which are pedestrianization and mixing of uses so that the services required by the neighborhood are available in

a standard walking time (5 minutes) (Mirkatoli, 1394). Also, self-sufficient neighborhoods in the traditional urban system of Iran are not only based on physical characteristics, but also have social entanglement and communication between homogeneous groups of people in their hearts (Hosseini and Soltani, 1397).

Thus, these neighborhoods both physically and spatially provide the characteristics of a resilient community, as well as social and economic characteristics such as "local identity". Neighborhood self-sufficiency, as mentioned, is not a new issue in urban planning. In particular, modern urban planning theories that place a strong emphasis on the development of suburbs provide features for these suburbs that previously existed in the traditional neighborhoods of the country's cities. Therefore, there are the necessary grounds for the implementation of this policy in the country's metropolises, and the answer to many issues and problems can be solved by referring to these neighborhoods. This principle is that there should be groups within metropolises that with full institutional and managerial authority can manage resources and threats in times of emergency in accordance with their internal characteristics (Alidadi, 1398).

Lipsitch et al.'s (2011) observations suggest that in order to prepare for future epidemics, decision-makers need to consider the limitations of local data and the quality of the benefits of collecting high-quality data, be trained at the "local level" (Lipsitch et al., 2011). As mentioned, despite the large volume of research on resilience, only a small number of studies have considered it on a smaller scale, such as cities and neighborhoods. Therefore, restrictions on the use of public places and social distance are considered as the most effective urban planning strategies to prevent the spread of this disease (Honey-Rosés et al., 2020).

RESEARCH METHODOLOGY

In order to achieve the main purpose of the research, using a systematic review of available resources in the field of study, the qualitative method of content analysis has been used to identify the aspects and components affecting the creation of resilient areas against epidemics. Because elective studies can be from published and unpublished journals and reports, books, dissertations, technical reports, conference presentations, etc., so the researcher has a limit on the choice of sources. Therefore, inclusion criteria are theoretical and practical research related to the searched keywords, and exclusion criteria include publications that do not have a valid and academic database, such as some news, period articles and the non-English language publications. In addition, articles with bias was observed, and those which did not use comprehensive and up-to-date data were removed too.

In the next step, in valid databases, all researches related to the subject were searched in this way; In this regard, search terms including: "Neighborhood Resilience" or "Urban Resilience" or "Urban Design" or "Urban Studies" or "COVID-19" or "Communities" were used. Then, their "titles" were reviewed and articles that were not related to the fields of urban planning and design in terms of urban neighborhood resilience were excluded from the sample (a total of 209 studies). In the next step, studies that do not have the full text available are also separated and a number of articles are dropped, leaving a smaller number of articles (164 studies). After that, abstracts of articles were studied and among them, articles that did not have the necessary validity were excluded (91 studies). The final selection of articles was done by studying the full text of selected sources (78 studies), which then discusses the most important achievements of these studies with emphasis on the findings and results (Fig. 1).

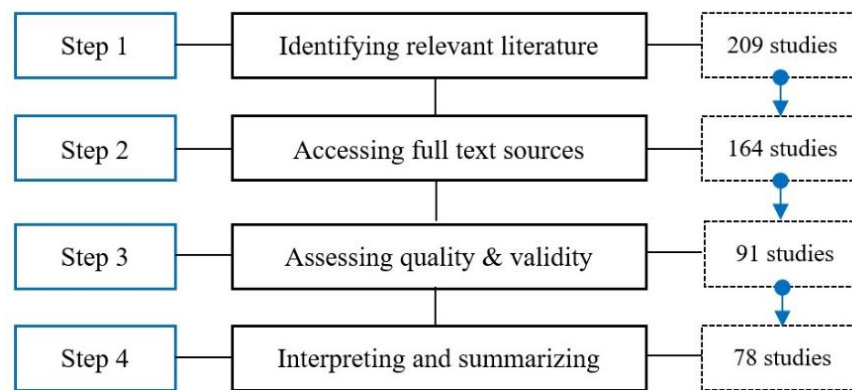


Fig. 1: Systematic Review Strategy and Study Selection Criteria, Source: Authors

DISCUSSION AND FINDINGS

Spatial configuration of neighbourhoods

Today, the impact of physical components in cities, including urban density, on the public health of residents has become a challenging issue in various communities. Urban areas are generally the place where people interact socially, communicate and live close to each other (Carozzi et al., 2020). Demographic and construction density of urban neighborhoods directly and indirectly changes the social capital of neighborhood residents, their level of mental health and environmental sustainability of the area. Considering that according to the reports of the World Health Organization, the amount of distance between people in space has an effect on controlling or intensifying the outbreak of Corona virus, study this issue as closely as possible and reach the desired population density. And building in urban areas can be effective in improving current and future conditions.

According to the quarantine protocol, the role of the physical environment of the neighborhood becomes more important as the population is limited to the closed space of the house. The "restorative potential" of neighborhoods in maintaining emotional resilience and mental and psychological well-being, as well as providing a sufficient level of physical activity and mobility, among all residents of the neighborhood, especially the elderly to maintain its perceptual, cognitive and physical capacities plays a key role (Galea et al., 2020; Holmes et al., 2020). Spatial configuration and design of indoor public spaces (shopping malls, mass transit stations, and indoor corridors) require special focus, especially flexible design with an innate ability to limit interpersonal interactions. There is overcrowding and mixing in various epidemic scenarios (Kembel et al., 2014).

Neighborhood transport networks and configurations that are compatible with human interactions have the potential to reduce or intensify the transmission of infection and affect their frequency and severity. The "configuration of built environments" in the city before (prevention), during (containment and mitigation through segregation) and after (possible planning and countermeasures to compensate for future risks) plays a key role (Dietz et al., 2019). Therefore, considering the signs of the history of science, in addition to clinical interventions for the prevention and treatment of epidemic diseases, the value of "non-pharmacological interventions" related to the design and planning of built environments in the city, plays an essential role. In the prevention and management of epidemic and global diseases. Key features of the built urban environment include the type and quality of housing and physical morphology, including density, land use heterogeneity, configuration and design, destination locations, and accessibility (Megahed and Ghoneim, 2020) (Fig. 2).



Fig. 2: New cycling path (current and project), Source: <http://comune.milano.it>

Functional configuration of neighbourhoods

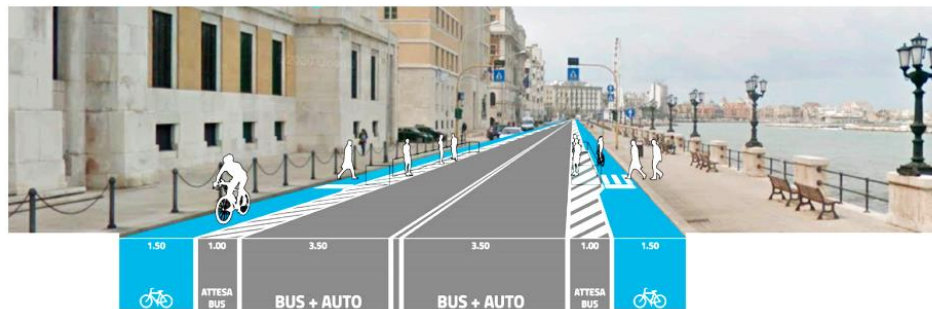
Given that the COVID-19 is primarily transmitted through respiratory droplets and contact pathways (Xu et al., 2020), its prevalence has led to the development of policies and guidelines for the implementation of physical distance that it has significantly affected the way children and young people spend their leisure time outside the home. With the closure of indoor and outdoor public spaces for children and young people to engage in physical activity such as schools, playgrounds and recreational facilities, it is not surprising that a recent Canadian study found that COVID-19 prevalence was at its peak. On average, less than 3% of children and adolescents followed movement instructions (Moore et al., 2020). The physical environment of neighborhoods where children and young people spend hours of their day affects the amount and type of physical activity and motor behaviors (Mitra et al., 2017). For this reason, it is important to explore the characteristics and contexts of the environment in which healthy physical behaviors can develop and can therefore be considered more resilient to public health emergencies (Mitra et al., 2020). Today, socioecological models of behavioral health emphasize the importance of social and environmental contexts in which healthy behaviors may grow (Mitra and Manaugh, 2020; Rhodes et al., 2019).

While there have been many opportunities to engage in physical activity and outdoor play until a few months ago, there may be patterns in the participation of children and young people in various other physical behaviors. It is possible that some children and young people may increase their participation in a combination of different healthy behaviors, while others may become less active in general, indicating an increase in a combination of behaviors, which do not include physical activity. During COVID-19 epidemic limitations, outdoor areas such as backyards or front yards, sidewalks, quiet streets, and local parks or walkways, are important places for physical activity of children and young people during the day. Lack of access or limited access to these environments (for example, when living in an apartment or in a crowded neighborhood) can lead to a significant reduction in healthy mobility in children and adolescents (Mitra et al., 2020) (Fig. 3-4).

Also the quality of infrastructure (public transport, parks, sidewalks and boulevards) and the level of services supported (leisure facilities, health care, food outlets, pubs and restaurants, supermarkets and fastfoods, places of worship, etc.) manage places related to housing, businesses, and services, and mobility at the community level forms social mixing networks (Megahed and Ghoneim, 2020).



(a)



(b)

Fig. 3: Redesign pedestrian and cyclist friendly space (current and project), Source: <http://comune.bari.it>

(c)



(d)

Fig. 4: Redesign the space with functional mixing (current and project), Source: <http://comune.bari.it>

Social and psychological configuration of neighbourhood residents

Sociologists are increasingly convinced that social needs must also be provided to meet the needs of people in their neighborhoods. The scope and dimensions of these social needs are complex and often difficult to determine. Although relationships with neighbors affect neighborhood satisfaction (Woldoff, 2002), people are not passive recipients of their social order. The social life of the neighborhood is actively built by the residents. Therefore, it should be concluded that people who play a greater role in their communities will be more satisfied with those communities, especially when they consider their neighborhood to have strong social cohesion, support and control (Dassopoulos, and Monnat, 2011). In addition, the connections that people make with their neighbors can create a system of social support in which neighbors communicate with other neighbors solely on the basis of social relationships and not in direct exchange with those who have received support in the past (Wellman & Wortley, 1990).

Putnam (2000) argued that participation in local organizations creates social capital and social cohesion among neighbors and thus creates a positive resource for participants. Research shows that people who participate in groups that deal with neighborhood problems report a greater degree of attachment to their place (Taylor, 1996). Local participation creates a sense of control among participants and reduces feelings of vulnerability (Crank et al., 2003; Donnelly, 1998; Hale, 1996; Lindstrom et al., 2003).

Emerging evidence points to an association between individual activities related to urban characteristics and the risks of infection (Hayward et al., 2020). The constructed environment configures the "social environment" and controls the extent of environmental and social differences and the association with health inequality (Raisi-Estabragh et al., 2020). Countries and ethnic communities where intergenerational habitation and association are common (such as Italy) experience transmission of epidemics sooner (Liotta et al., 2020). Therefore, future research should focus on the interior design of small residential environments and the design of micro-public spaces with the aim of optimizing mixing between age groups with different levels of vulnerability to minimize pandemic time transitions (Lai et al., 2019).

Promoting community-wide measures to increase the mental well-being of individuals that lead to an emotionally and mentally healthy, adaptive and resilient society is an essential approach to overcoming the epidemic. Communities that use their "emotional health" are more likely to be adaptable and willing to participate in health advice such as quarantine and social distance. As "neighborhoods as centers of interaction" have become an environment of social isolation during this period, the focus of efforts in these places has become doubly important. Over the past few months, associations have come together in a variety of ways to improve communication and mental well-being. Across China, children and adults are finding ways to "rejuvenate their neighborhoods" with positive messages, posters in support of health workers (HCW), and other virtual communities (Bhagra et al., 2020).

The summary of the systematic review indicates that in general, the three spatial, functional, social and psychological configuration of urban neighborhoods are particularly effective in promoting their resilience in the face of epidemics and COVID-19 disease. However, according to some, previous research has generally focused on urban inequality and the increasing vulnerability of low-income and marginalized groups to epidemics (Wade, 2020), and on behalf of furthermore, just as Jabarin (2013) uses the lack of governance in literature reviews to conceptualize the neighborhood-level resilience framework, this can be addressed in relation to global epidemics and systematic study of their effects on the built environment and vice versa, the study of the potential effects of the artificial environment on the prevention of urban epidemics was also discussed. Thus, given the mutual understanding between "environment" and "health", this view converges towards an urgent need for new paradigms for research and education (Chin et al., 2020).

Based on what has been discussed about the fields of study extracted from the collection of researches conducted in the field of combating epidemic diseases, the thematic subcategories of each of the three fields can be identified according to the table below (Table 1).

Thematic Classification	Sub Thematic Classification	Researcher(s)/ Year	No.
Spatial Configuration Aspect	Density	Anderson et al., 2020; Phelan et al., 2020; Wu and McGoogan, 2020; Leonard, 2020; Shoichet & Jones, 2020; Stier et al., 2020; Boterman, 2020; Spencer et al., 2020; Wheaton and Kinsella Thompson, 2020; Hamidi et al., 2020; Mizumoto & Chowell, 2020	12
	Connectivity	Lin et al., 2020; Xie and Zhu, 2020; Wu et al., 2020; Ghosh et al., 2020	4
	Main structure and boundaries	Dietz et al., 2019; Megahed and Ghoneim, 2020	2
	Width of sidewalks	Alter, 2020; EFE, 2020	2
Functional Configuration Aspect	Public spaces	Sandford, 2020; Honey-Rosés et al., 2020; Alter, 2020; Florida, 2020; Null and Smith, 2020; Roberts, 2020; van der Berg, 2020; Nieuwenhuijsen, 2020; Honey-Rosés et al., 2020	9
	Green spaces	Booth et al., 2020; Samuelsson et al., 2020; Sharifi, 2019c	3
	Cycling policies	Hawkins, 2020; Topham, 2020; Bliss, 2020; Teixeira and Lopes, 2020; Bucky, 2020	5
	Recreational uses and leisure	Moore et al., 2020; Mitra et al., 2017; Mitra et al., 2020; Mitra and Manaugh, 2020; Rhodes et al., 2019	5
	Functional mixing	Nguyen et al., 2020	1
Social and Psychological Configuration Aspect	Integrated management system	Sharifi and Khavarian-Garmsir, 2020; Wilkinson et al., 2020; Steele, 2020; Shammi et al., 2020; Shammi et al., 2020; Kunzmann, 2020	6
	Social sense and sense of belonging	Thoi, 2020; Sharifi and Khavarian-Garmsir, 2020; Taylor, 1996; Raisi-Estabragh et al., 2020; Dassopoulos and Monnat, 2011; Kasarda & Janowitz 1974; Williams, et al., 1992; Woldoff 2002	8
	Social mixing and interactions	Mafessoli, 2016; Benjamin et al., 2020; Liotta et al., 2020; Bhagra et al., 2020; Brehm et al., 2004	5
	Independence of local governments	Connolly et al., 2020a; Steele, 2020; Woldoff, 2002	3
	Voluntary programs and social participation	Cattivelli and Rusciano, 2020; Mendes, 2020; Crank et al., 2003; Donnelly, 1998; Hale, 1996; Lindstrom et al., 2003	6
	Mental health and well-being and social support	De Vos, 2020; Budd and Ison, 2020; Wellman & Wortley, 1990	3
	Cohesion of neighborhood relations	Galea et al., 2020; Holmes et al., 2020; Woldoff, 2002; Dassopoulos and Monnat, 2011	4

Table 1: Thematic classification of studies conducted in the field of neighbourhood resilience in the face of epidemics,

Source: Authors

Findings show that 1) spatial configuration aspect of neighborhoods including density, connectivity, main structure and boundaries and width of sidewalks, 2) functional configuration aspect including public spaces, green spaces, cycling policies, recreational uses and leisure, functional mixing and also 3) social and psychological configuration aspect including integrated management system, social sense and sense of belonging, social mixing and interactions, independence of local governments, voluntary programs and social participation, mental health and well-being and social support and cohesion of neighborhood relations have made these communities more resilient against Covid-19 (Fig. 5).

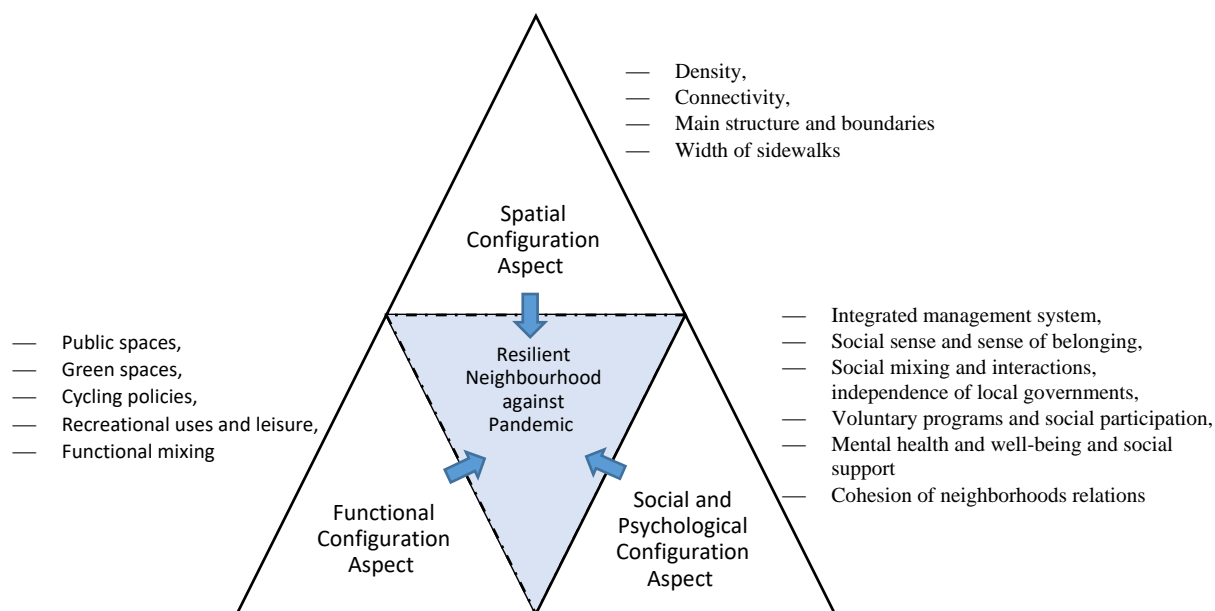


Fig. 5: Conceptual framework of the resilient neighbourhoods against pandemic, Source: Authors

As shown in the chart below, the percentage of each of the study areas are: spatial configuration 26%, functional configuration 29% and social and psychological configuration 45%. In addition, charts 2 to 4 show the share of subclasses related to each of these configurations.

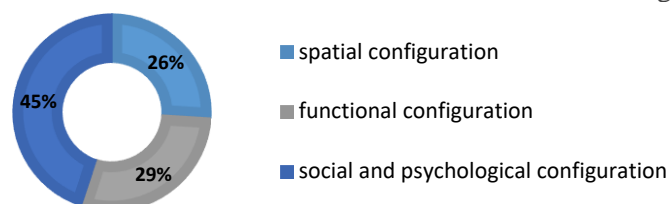


Chart 1: Percentage of each thematic classifications, Source: Authors

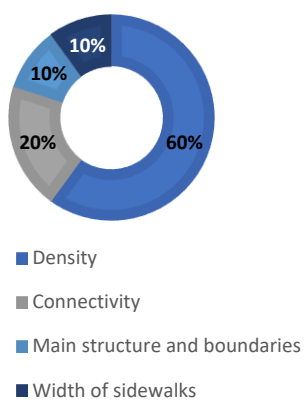


Chart 2: Percentage of each spatial configuration sub thematic classifications

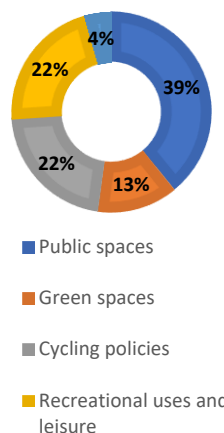


Chart 3: Percentage of each functional configuration sub thematic classifications



Chart 4: Percentage of each Social and psychological configuration sub thematic classifications, Source: Authors

CONCLUSION

With the advent of resilient thinking, the strategy of cities in the face of disasters and crises from passive resistance with the relief approach became active adaptation and the approach of risk assessment, preparedness and equipping with warning systems. Cities are integrated socio-ecological systems in which social systems and ecosystems are identified as intertwined, conjugated, interdependent, and cohesive. In the discourse of urban planning, construction and policy-making, flexibility and urban resilience refers to the comprehensive capacity of urban environmental-social systems, which are intertwined by different subsystems in a city. They are also integrated by ecosystems and individuals. As mentioned, in the discourse of urban planning, construction and policy-making, the concept of neighborhood resilience as an analytical tool for understanding the balanced relationship between society, the built environment and the ecosystem has been neglected. At the same time, the urban community has a great responsibility in preparing the basis of urban planning with the aim of maximizing the capacity of the system in the face of disruption and maintaining vital functions at various spatial scales, including urban neighborhoods.

In the recent epidemic and its far-reaching and comprehensive effects on citizens and the urban environment, the theoretical and methodological gap in this field has become more and more prominent. If it is assumed that the socio-cultural and physical conditions of the neighborhood are related to issues and problems affecting the prevalence of the epidemic, policies and interventions should affect this approach. A better understanding of how the social and physical conditions of neighborhoods directly and indirectly contribute to physical and mental health enhances our ability to increase evidence-based interventions. Many neighborhoods today suffer from significant discrepancies between the physical environment and the health of residents as one aspect of social life.

Utilizing the existing capacities in local communities in the face of epidemics has the following benefits: 1- Empowering individuals and groups in specific local communities, 2- Developing skills, knowledge and confidence, 3- Increasing social ties and communication, 4- Distribution of effective services and policies based on the needs of local communities and its solutions, 5- Discussions and group discussions in local communities, 6- Participation and involvement of stakeholders in local communities, 7- Effective and accountable decision makers, 8- Mobilization resources for the needs of local communities and 9- Acceptance of programs that lead to the development of local communities. It seems that creating a clear and precise framework for the emergence of all these dimensions and components will play a significant role in promoting neighborhood resilience in possible future pandemics.

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Evolution of Pandemic (COVID-19) Impact on Urban Public Spaces Based on Existing Literature

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ABSTRACT

With the pandemic of COVID-19 spreading around the world, we have witnessed that the lives of citizens have changed in various dimensions, such as social, cultural, economic, and communication. Urban public spaces were the main context for these changes. Pandemic transformations, in addition to content, changed the function of modern urban spaces. Many of these changes are permanent or will return to normal over the years. But this is not the first time the world has been exposed to infectious diseases. At various points in history, pandemics transformed cities and made them what they are today. Many large-scale parks, long boulevards, modern housing schemes, and hospital collections have been pandemic policies and initiatives throughout history. Pandemics changed the main structure of cities step by step to achieve modern cities today. In this article, first by studying the past literature, the evolution of different stages of infectious disease and its transformation into a pandemic has been analyzed. In addition, another aim of this article is to analyze the effective pandemics of history such as COVID-19 and analyze their effect on cities and urban public space. The findings of this article in predicting the structure and function of public urban spaces Post-COVID-19 may be effective.

Keywords: Pandemic - Urban Public Spaces - Transformation - COVID-19

INTRODUCTION

Based on Maslow's Pyramid social interaction and social needs are one of the basic human needs (Desmet, 2020). With the unification and creation of different cities, urban public spaces became the place to provide for these needs. On the other hand, at different times in history, epidemic diseases have challenged urban public spaces at different scales, the main reason for which is that these diseases are contagious from human to human. Urban public spaces are a platform for human communication, this principle makes these spaces the main place that is affected by infectious diseases. Urban public space is a place where human commercial, economic and recreational activities take place (Rahnamaie, Ashrafi 2007; Cohen 2004). When a disease becomes epidemic, the urban public space, which catalyzes human interactions and activities, is disrupted in many ways. These disorders can have permanent and temporary negative and positive effects on public urban spaces.

One of the reasons that urban public spaces have been challenged during the COVID-19 pandemic is the high rate of virus transmission between humans (Rajiv 2020). This has led to the presence of human beings and social interactions in the public spaces of various cities around the world to a minimum level (Alfaro et al. 2020). On the other hand, one of the important policies to control this pandemic is to isolate and quarantine, which is contrary to the principle of public spaces and social interactions. But this is not the first time that urban public spaces have been affected by a pandemic. These spaces have undergone physical, conceptual changes at different times under the influence of pandemics such as

COVID-19. Recognizing and evolving the changes caused by pandemics requires analysis and research. Even the different stages of turning an infectious disease into a pandemic disease, different stages of this development can have different effects on public and urban spaces.

In this study, by reviewing the existing literature on the introduction of various pandemic diseases throughout history, an attempt has been made to identify the evolution of their effects on urban public spaces. Analyzing these effects and recognizing them can be an important step in identifying the strengths and weaknesses of the current urban public spaces involved in the COVID-19 pandemic. Briefly analyzes the evolution of the contagious disease and its transformation into a pandemic and its effects and points of difference and commonality.

ANALYSIS OF THE EVOLUTION OF INFECTIOUS DISEASE AND ITS TRANSFORMATION INTO A PANDEMIC

Throughout history, many people have died from pandemics and epidemics. Infectious diseases spread very quickly because they are caused by the virus in the air, insect bites, sexual intercourse, and skin contact with a person who has already had the disease (Garg, 2020).

The development of a pandemic disease itself has a certain evolution (figure 1). This process begins with the smallest scale of the disease, the "outbreak," and it develops to the next scale called "Pandemic." "Endemic" and "Epidemic" are other stages of this evolution. Figure 1 shows that each of these stages of the disease covers a different scale of the city and urban spaces. In Figure 1 and the "Outbreak" stage of the contagious disease, as can be seen, neighborhood centers, especially existing health centers, can be directly affected by the disease and be considered as the starting point of the outbreak or the highest rate of disease registration and diagnosis. At this stage, the main urban spaces such as main streets, main squares, parks, and mosques, etc. have not been affected yet. At this scale, the disease is still somewhat unknown, and no measures have been taken to protect people from the disease in urban public spaces.

The "Outbreak" stage can be considered the smallest stage of a pandemic. It has the lowest mortality rate compared to other stages. However, the "Outbreak" is a critical stage in this process. Because the population and the small scale are still affected by the disease and the mortality rate is somehow low.

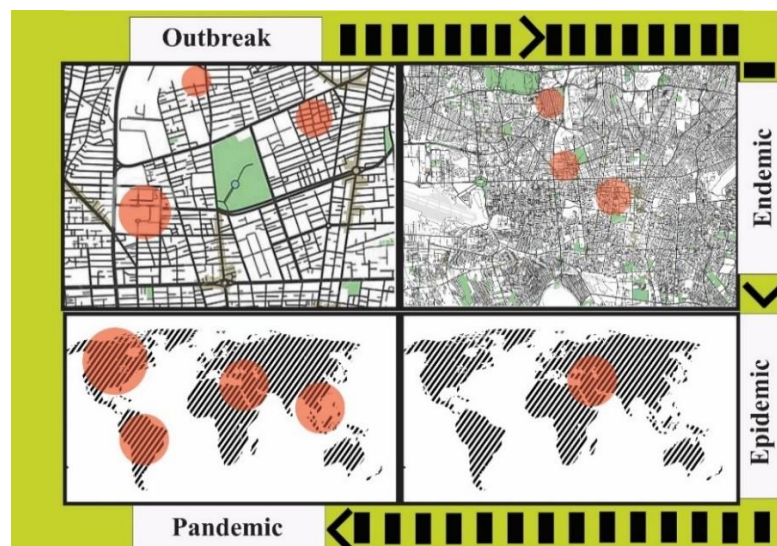


Figure (1): Pandemic evolution

The stage after "Outbreak" is called "Endemic". This stage occurs when the infectious disease spreads in a neighborhood, urban area, or even a small part of the province. As can be seen in Figure (1), neighborhood centers and urban areas are generally affected by infectious diseases (Kalra, 2015).

According to the general definitions given in Table (1), "Endemic" can be considered an infectious disease specific to a neighborhood that may turn into an epidemic under certain conditions. Examples include Malaria in Africa, Coccidioidomycosis in the southwestern United States and northern Mexico, Dengue fever in tropical and subtropical regions, and Hepatitis B worldwide, although in Asia and Africa (high endemic) is higher than Europe and North America (low endemic) (Grennan, 2019). An endemic can exist in a specific population that all live in the same city and neighborhood. An endemic disease can affect the city and its spaces on a larger scale than an "Outbreak". A neighborhood with all its components can be endemic and endangered, including main and side streets, parks, service centers, and religious places (especially in Iranian-Islamic cities).

After the endemic, the first global dimension of infectious diseases, the "Epidemic", appears. Table (1) lists the different definitions of the epidemic. Most of these definitions can be summarized in the sentence that an epidemic occurs when the disease has spread widely or throughout the country and has even affected neighboring countries. The epidemic scale is well illustrated in Figure (1). When a disease reaches the epidemic level, all urban spaces of the country are affected by the disease. This is especially true in enclosed public spaces. This is where the role of urban green spaces in the physical and mental health of citizens in urban design becomes important (Sun, et al, 2020). In general, epidemics cause more changes and deaths in different urban dimensions than outbreaks and endemics.

Eventually, a "Pandemic" occurs when an infectious disease spreads in different ways around the world. Like other stages, the pandemic has several definitions. Table (1) lists the important pandemic definitions. A pandemic is generally an epidemic that has spread to several countries or continents (<https://intermountainhealthcare.org>, 2020). the pandemic is an epidemic that covers a larger scale (figure 1). The effects on the city and urban public spaces are much greater during the pandemic than the epidemic. Unlike endemic and outbreak, these effects are not specific to one country or region, they are the same for different countries. Because a type of disease with specific characteristics is spreading worldwide, its effects on cities as well as coping policies can be common and similar.

	Disease	Definitions	Common characteristics
1	Outbreak	<ul style="list-style-type: none"> AN OUTBREAK is a greater-than-anticipated increase in the number of endemic cases. It can also be a single case in a new area. If it's not quickly controlled, an outbreak can become an epidemic (2020, https://intermountainhealthcare.org). Outbreaks are known as cases of more than one disease in a particular place in a given period of time (Houlihan, 2019). "Outbreak" has the same definition as epidemic, but is often used for a more limited geographical area (2012, https://www.cdc.gov). <p>The "outbreak" of a disease is limited to very small areas (JAMA March 5, 2019 Volume 321, Number).</p>	<p>Society</p> <p>Disease</p>
		<ul style="list-style-type: none"> ENDEMIC is something that belongs to a particular people or country (2020, https://intermountainhealthcare.org). According to the US Centers for Disease Control and Prevention (CDC), it is a endemic disease whose presence or prevalence is 	Infection

2	Endemic	<p>common in the general population (https://indianexpress.com/article/explained/coronavirus-endemic-disease-meaning-6411740/ , 2020).</p> <ul style="list-style-type: none"> The persistent presence of a disease or infectious agent in a specific geographical area or a population group; It may also indicate the usual prevalence of a particular disease in such a group area. "https://indianexpress.com/article/explained/coronavirus-endemic-disease-meaning-6411740/,2020). Endemic is currently used only as an adjective to describe a disease area. The size of an area and how long a disease is endemic may vary (Kalra, 2015). There is an endemic in a relatively stable and predictable group - the number of cases observed is almost what is expected at that time. A group of people may be all residents of a city or town, or larger areas such as countries or continents (JAMA, March 5, 2019 Volume 321, Number). 	Sudden occurrence
3	Epidemic	<ul style="list-style-type: none"> An epidemic is a disease that affects a large number of people in a community, population or region (https://intermountainhealthcare.org, 2020). The Greek physicist Hippocrates also referred to the word in his books. He uses the term to describe the seasonal prevalence of infectious diseases, although little was known about the cause of the infection. For more than two thousand years, the term continued to denote a sudden increase in disease or disease symptoms in a population (Anomaly, 2014). In a more specialized document called the Oxford Physician's Prescription, an epidemic is defined as an "outbreak" in which a significant number of people in a community or region suffer from it for a limited period of time (Anomaly, 2014). The Dictionary of Epidemiology defines an epidemic as "the occurrence in a community or region of cases of illness, specific health-related behaviors, or other health-related events beyond normal expectation." Accordingly, diabetes is certainly an epidemic in most countries (Kalra, 2015). Epidemics are made up of the two Greek words Epi meaning plague and demos meaning people and population. An epidemic is any disease that spreads rapidly in a very short period of time in terms of population and number of humans or animals (Shashwat Garg-2020). 	Population Excessive disease
4	Pandemic	<ul style="list-style-type: none"> A pandemic is an epidemic that has spread to several countries or continents (https://intermountainhealthcare.org,2020). Fauci et al. (2009) define pandemics as diseases with very different causes that show different types of epidemiological features. Common characteristics are: spread in a wide geographical environment, spreadability, high risk of death, minimal community immunity, novelty, infection, contagion, severity and symptoms (Morens, Folkers, Fauci, 2009). According to the WHO, the global epidemic is defined as the "outbreak of a new disease worldwide" (https://www.who.int,2020). An epidemic that spreads globally is called a pandemic (Grennan, 2019). Pandemic is described in Greek by the two words pan meaning "all" and demos meaning "people". A pandemic is a disease that affects an entire country or world (Garg, 2020). <p>It is quickly transferred from one country to another. Pandemics have occurred throughout history, and their numbers appear to be increasing, especially due to the increasing incidence of viral disease in animals (Garg, 2020).</p>	Special duration Spreadability

			<p>Specific places or areas</p>
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Table (1): Different definitions of pandemic stages

THE EFFECTS OF VARIOUS PANDEMICS ON THE CITY AND URBAN PUBLIC SPACES THROUGHOUT HISTORY

Since the COVID-19 Spared throws the entire world, cities and especially urban public spaces have been affected by this pandemic. But this is a repetitive event human beings have always faced various epidemics and pandemics in their history. In every period of deadly pandemics throughout history of the city and urban life have been invaded and changed. Whether this change is physical or has been applied to the city and urban public spaces in terms of content and application. Some of these changes occurred during pandemics, and some have been applied in the post-pandemic period by policymakers and rulers of the time to prevent recurrence of the pandemic.

Behind every widespread pandemic, construction and urban development thrive, respectively, and the promotion of the public health system and the awareness of the public environment increase (Liu& Wang 2021). In fact, after each pandemic, the structure of cities undergoes changes in order to control the problems during the pandemic and solve the problems of possible pandemics. The pandemics of plague, cholera, influenza and the COVID-19 virus have been among the most important and dangerous pandemics in history.

Black Death

The bubonic plague, known as Black Death, is one of the diseases that provoked our curiosity and imagination. This infectious disease passes from rodents to other animals and humans through flea bites. The flea acquires the bacteria known as *Yersinia Pestis* that lives on the skin of the rodent and passes it to humans. The name of the disease comes from its symptoms of painful swelling of the lymph nodes. During the Middle Ages, the bubonic plague was referred to as the Black Death, because it causes blood to accumulate and dry under the skin and blackens the skin (Dugassa, 2020). The Black Death was the largest population shock in European history, killing almost 40 percent of the population of the Robin region between 1347 and 1352. Some areas and cities were safe, but others were hard hit: England, France, Italy, and Spain between 50% and 60% of their population in two years (voxeu.org 2019; Jedwab, Johnson & Koyama, 2019). Due to the high volume of deaths and the devastating effects of the plague, cities and urban areas changed, and many of them even became uninhabited. During research by Kuyoma et al., They found that rural areas close to cities with higher mortality rates regained their population about a century after urban populations recovered. Data from abandoned medieval villages in the United Kingdom show that more settlements have been abandoned in areas

with low mortality than in areas with high mortality - especially in remote areas. This means that recovery in high-mortality areas is accelerated by migration from low-mortality areas, not by higher fertility and lower mortality (voxeu.org 2019; Jedwab, Johnson & Koyama, 2019).

In particular, those standard textbook accounts of European urban history, such as Morris' History of Urban Form, and Hohenberg and Hollen Lees's Making of Urban Europe, promote an impression that while through the period 1350–1550 Europe witnessed an 'urban renaissance (Lilley 2014). They represent the changes that the plague has brought to Europe in all its dimensions. In a series of events, the crisis of the effects of the plague can be considered the initial spark for the renaissance.

Although people were not aware of the nature of the plague at the time, they were still able to portray its contagious behavior; so the new concept of quarantine became the only proven way to escape the plague. Human isolation and distancing fundamentally changed the urban approach of the 14th century Renaissance. European cities were very crowded at the time, and architects soon realized that to survive, city density had to be solved. Hence, medieval cities grew their borders to create larger spaces for their populations; thus, the most desirable environments for the prosperity of the disease, such as slums and very crowded neighborhoods, were removed from the cities. Because natural ventilation has become so important, streets and buildings are designed to be less crowded and more open to public green spaces. In addition, a new function is being introduced into the urban fabric: quarantine facilities. These buildings, which were the original form of modern hospitals, challenged the common architectural practices of the time in scale and time of construction. (Abou Mrad, 2021).



Fig.1. Quarantine facilities in the medieval cities (<https://www.re-thinkingthefuture.com/>).

The Black Death crisis affected the urban design of European societies by calling for opening larger public spaces which provide a greater opportunity to attach to nature and reduce the feeling of isolation. Furthermore, pandemics helped planners to improve the radical urban of the renaissance, expanded their cities to prevent overcrowding (Eltarabily & Elgheznavy 2020). The policy of dealing with the plague pandemic or Black Death in the city and urban spaces of that time is very close to the current era and dealing with the COVID-19 pandemic. As mentioned, quarantine and social isolation should be mentioned at the top of these policies. Implementing these policies required more public space and traffic, as dense medieval cities with narrow streets and alleys were not responsive, and this led to the better and faster spread of the disease; Therefore, new cities changed their strategy towards expanding public and open spaces, and the importance of green spaces and ventilation doubled.

Although isolation is one of the oldest and most effective human-developed health measures, the rapid development of cities has not been able to solve all epidemiological problems. Medieval society, based on previous experiences with infectious diseases, observed a link between the time and onset of the disease and noted that if no disease appeared after a period of isolation, it would not be infectious. This method was called quarantine. The word "quarantine" is derived from the Italian word "Quarantino", meaning the days of quarantine (Liu & Hwang 2021). Liu and Wang (2021) continue their research by aiming at the first systematic possibilities of quarantine and isolation in Italy in the 14th century. This system was designed to prevent the spread of the plague from foreign nationals intending to enter Venice, Italy. Caravans, ships, and passengers were quarantined for a month on nearby islands at a pre-designed location. It can be said that this was the first semi-public space for the implementation of quarantine policy in history. It should be noted that the quarantine spaces (Figure 2) created under the name of Lazaretto in the post-Black Age period were of great importance to the public and open space and the interaction with the environment in their design. Something that later became popular in post-plague cities.



Figure (2): Lazaretto quarantine facility (Liu & Hwang,2021).

First of all, the design focuses on the location layout, close to the gate entrance and close to the port pier, to facilitate the flow of merchants and travelers from the epidemic area at the source, and protect the health of the residents in the city. Secondly, because the high walls in the city are easy to cause disease transmission, multiple spacious courtyards will connect the isolation rooms in series (Figure 2) to facilitate the airflow and circulation inside the building. In addition, the design takes into account the decontamination site of the cargo rather than being used solely for medical and quarantine purposes (Liu & Hwang 2021).



Figure (3): Lazaretto quarantine facility (Liu & Hwang 2021).

Cholera

There have been a total of seven cholera pandemics in the last 200 years, the first of which was in India in 1817. In addition, a high number of cholera outbreaks have been recorded, such as the 1991-1994 outbreak in South America, the 1850 outbreak in the United Kingdom and London, the 1832 outbreak in New York, and most recently, the 2016-2021 outbreak of cholera in Yemen (Wikipedia.org, 2021). But the epidemics of the early nineteenth century changed the city in many ways. The high death rate and the rapid spread of the disease have had a profound effect on the city and the lives of its citizens. This epidemic coincided with the beginning of the Industrial Revolution, where urbanization was at its peak and we were witnessing an increase in population and the streets were crowded and full of garbage. However, researchers have implicated these factors in the repeated outbreaks of cholera.

As cholera broke out in London in 1854, killing about 10,000 people, British physician John Snow drew the first epidemic map to identify the source of the disease, which was caused by sewage-contaminated drinking water wells. In terms of promoting the urban design field; the disease had a major impact on managing waste in the streets, supporting a strong feeling of wanting to have ventilation and daylight in open spaces through which people can move. On the other hand; the infrastructure design field had a great chance to handle the cholera crisis. When it was realized that infection resulted from a mixture of wastewater and drinking water in river Thames, Sir Joseph Bazalgette brought an end to the cholera outbreak; he constructed the Victoria embankment along river Thames in central London and implemented the main sewage system downriver to safely separate wastewater away from clean water supply (Eltarabily& Elgheznawy 2020).

Eventually, the epidemic was successfully controlled by changing the community's water supply system. As a classic example of comprehensive disciplinary research methods, this epidemic has become a turning point in modern urban design. This law created the first public health law in human history, the Public Health Law of 1848, which clarified the close link between public health and urban design (Liu & Hwang.2021).

Cholera spread to New York City in the summer of 1832. When cholera returned for the second round in 1849, the death toll in the city exceeded 5,000. Frequent outbreaks throughout the 1800s left a lasting impression not only on the number of deaths but on urban design elements such as the boulevards and vast parks that made New York and other major cities the iconic metropolises we know today (Klein 2021). Public health officials adhered to an idea dating back to the Middle Ages that infectious diseases were primarily caused by noxious vapors known as "Miasma" emitted from rotting organic matter. Miasma theory proponents advocated for better ventilation, drainage, and sanitary practices to rid cities of foul-smelling, malevolent air. City leaders in New York, for instance, responded to cholera outbreaks by banishing 20,000 pigs from the heart of the city and constructing a 41-mile aqueduct system that delivered clean drinking water from north of the city. The policies adopted to reduce bad odors and the disposal of water and sewage, as well as ventilation, caused the width and surface of the streets to expand, and by paving the streets, the possibility of washing and disposal was much greater.

Another proponent of the Miasma theory, landscape architect Frederic LaOlmsted, advocated the healing power of parks, which he believed could act as urban lungs as "clean air outlets and inlets for fresh air." Planning for Central Park, designed by Olmsted and Calvert Vaux, began shortly after the cholera outbreak in New York. Thanks to the success of that project, Olmsted, his first child who died of cholera, designed more than 100 public parks and amusement parks, including Boston, Buffalo, Chicago, and Detroit. In addition to Napoleon's war and political goals, Hausmann's corrective actions against other possible pandemics should be considered. Because these measures were taken right after the cholera outbreak in Paris. Under Hausmann, French authorities demolished 12,000 buildings, built tree-lined boulevards and parks, installed fountains, and installed an elaborate sewer system that made Paris the "City of Light" today. Hausmann's plans were designed in part to bring fresh air and light into the dense urban network (Klein, 2021).

Two important pandemics occurred during the turn of the century that changed the design of the cities involved to some extent. Between 1918-1919; the deadliest respiratory virus pandemic in history “The Spanish Flu pandemic” killed more than 50 million people worldwide, which had a clear impact on slowing down urban growth and limiting public life for a period to slow the spread of disease. For example, public transportation had been replaced by walking in uncrowded streets, most of the population were staying at home, and sidewalks at night were unusually clear, which is similarly related to the current pandemic situation (Eltarabily & Elgheznawy 2020). The Spanish flu in the early twentieth century was a strong impetus for the development of new types of housing. Completely new standards were created and implemented, each apartment had a reasonable amount of sunlight, fresh space, and air that combined beauty with everyday function. A huge public budget was invested to support the builder of massive public housing that could be bought or rented (Mir 2020).

In Philadelphia 1908; a typhoid fever and cholera outbreak and caused by mixing sewer and the water source in the Schuylkill River. The early preventive phase was to move homes and businesses away from the riverbank to be replaced by a massive Fairmount park (Eltarabily & Elgheznawy 2020).

COVID-19 virus pandemic

The sudden corona pandemic caused irreparable damage in various aspects of life, economy, and culture to people around the world. Many people lost their lives, and many small businesses suffered financial losses due to quarantine policies and social isolation. If we consider what has been said as a negative aspect of the corona pandemic, this pandemic, like what has happened in the past, has had positive effects on human life, and especially on the environment.

Our cities had different experiences during the pandemic. Particularly in cities with severe lockdown, residents have noticed major reductions in noise and air pollution and even a return of wildlife these temporary changes have allowed residents to re-imagine their city as a place that smells better sounds more peaceful and permits better sleep. Satellite data show massive reductions in air pollution across China when restrictions were in effect. While the links between urban air pollution and premature death are well established, if these are extended to higher mortality rates in cases of COVID-19, cities will have strong arguments to make these temporary changes permanent, with far-reaching positive effects on health at both ends of the age scale (Honey-Rosés et al., 2020).

Cities such as Vienna, Boston, Oakland, Philadelphia, and Minneapolis have closed roads to give more space to pedestrians and cyclists. These temporary road closures and other short-term measures are serving as testing grounds for changes that may eventually become permanent. Bogota has widened bike lanes and added 76 km of the temporary bike, Milan has added 35 km, and Mexico City has a plan for something similar. Researchers in the United States is building a database of cities that have implemented cycling and pedestrianization projects in response to COVID-19, even cities that are more car-dependent such as Oakland or Minneapolis. Many are arguing that the temporary road closures will catalyze embarking on more ambitious projects in cycle paths, pedestrianization, and public space enhancement that citizens have demanded for years. Australia and many other governments have made funding available for temporary projects (widening walkways) and more permanent, long-term projects (added crossing points) towards public space intervention projects (Honey-Rosés et al., 2020).

It is at this point that the resemblance between the plague pandemic in the Middle Ages and the corona pandemic doubles in the 21st century. Where both brought about far-reaching changes in the areas of social, economic, urban, and public health, as well as urban design. Of course, the pavilion changes of COVID-19 are in the early stages, but given the scale of the change, we can predict a renaissance like the one that took place in the 15th and 16th centuries. The pandemic could force planners and designers to create a new vocabulary or typology to describe places in terms of social density, distances, crowding, or public health risks. The pandemic will create a new lens through which to consider public space, and this new conversation will need a new vocabulary to help organize our ideas and analyze spaces (Honey-Rosés et al., 2020).

In general, it cannot be said that new public spaces were created during the Corona pandemic. But use and function inside space have changed. As Eltarabily (2020) and Honey-Rosés (2020) point out, the first change is pedestrianization and greater use of bicycles. This could encourage designers and policymakers to give more space to pedestrians and cyclists. Many developed cities have almost implemented this policy.

Another function Pandemic COVID-19 has imposed on urban public spaces is the construction of temporary hospitals and clinics in open urban spaces or at concert venues, stadiums, and even parks. This has made the lack of adequate health facilities during the epidemic particularly noticeable, especially in developing countries. On the other hand, it causes the resilience of public spaces to be challenged, and new policies and designs must be considered to improve it. As Eltarabily (2020) and Sun (2020) point out the high importance of safe and high per capita green spaces, especially during the epidemic, can be very effective in increasing the mental and physical health of people. Changes in the design of the park and their increase, as well as the creation of an interconnected network of green spaces throughout the city, are among the policies of this period. On the other hand, we are witnessing a change in the performance of the park towards a sports venue. Especially large-scale parks that are much more suitable for maintaining social and physical distance during sports activities (Honey-Rosés et al., 2020)

But these were not the only changes caused by the pandemic COVID-19 in the scale, function, and per capita of public spaces. This pandemic once again redefined public and private spaces and the boundaries between the two dimensions and areas. Something unprecedented in history. This pandemic caused the boundaries of some public or private spaces to expand, or even some semi-public spaces to become private, and vice versa. On the other hand, this pandemic coincided with the peak use of cyberspace and social networks. Due to quarantine policies and social isolation, people continued their social interactions and activities in cyberspace to satisfy their need to be social and connect with others. Ülkeryıldız and et al (2020) address these new aspects in detail in his paper; Flat roofs have become the main space of social interaction of people in the days of the epidemic. It was like an anti-utopian version of Le Corbusier's utopia, proposing to give the ceilings a new function and to consider them as part of a life scenario. The main idea was to refuse to interpret ceilings as a structural element. In the twentieth century, Le Corbusier integrated ceilings as a form of contact between people and nature. Social isolation orders have led city residents to engage in solitary outdoor activities such as walking and running, and separate back-to-back sports. Additionally, this has led to the recovery of outdoor needs by changing the initial use of roof spaces. The apparent limitations of outdoor activity spaces have challenged the concepts of social interaction. Residents gather in public spaces where their function has changed, like a roof. In addition to the roofs, other private spaces became semi-private; Tamborrino (2020) explicitly states that society has shifted from street-level locations to balconies, and windows are now become a buffer zone between intimate spaces of isolation and the public realm, as in Figure 4 (Ülkeryıldız et al. 2020).

Before**After**



Figure (4): Transformation of the boundary between public and private space during the Covid-19 pandemic period (Ülkeryıldız 2020; Xinhua 2108; Holmquist 2017; Smith 2015) .

After the imposition of restrictions on the usage of outdoor spaces as public, balconies have been symbolized new kinds of freedom while supporting social isolation without feeling trapped, and to get fresh air without worrying about the contamination of the virus. While everyday life takes place in a mixture of public and private spaces the confinement has led to blurring them in one interior space. In this confinement way of habitation, the relationship between the house and outside has lost a sense of differentiation. This kind of change in the experience of space is new (Ülkeryıldız et al. 2020).

But the most important transformation of the COVID-19 pandemic is about the transformation of the relationship between real and virtual public space. Quarantine restrictions make cyberspace "normal" and allow people to use public technologies to perform public responsibilities. Understanding cyberspace as a public domain is the most plausible point when it coincides with the possible effects of the COVID-19 crisis on the social and political environment. In addition, it has led to the transfer of existing daily social programs such as online courses, meetings, friend and family celebrations, cooking and painting classes, and social gatherings. This unprecedented digitalization of everyday life reveals that it has increased our dependence on a range of services, telecommunications, information, and networks. Social life has atomized in a cyber environment. The private living space has suddenly opened to the world and has transposed itself into cyberspace by blurring dimensions of inside and out, here and there. In this relationship turning private personal spaces into virtual public spaces means losing the privacy of intimate spaces. (Ülkeryıldız, 2020).

RESULTS AD CONCLUSIONS

The COVID-19 virus pandemic has brought back various topics that have long been neglected. One of these is the evolution of infectious diseases into a pandemic. As mentioned, a pandemic occurs in four stages. These stages, while having different commonalities in characteristics such as mortality rate, the scale of affected space and type of space, etc., had differences that were described in detail. Accurate knowledge of each of these steps is critical for any researcher. On the other hand, understanding this field is very effective for designers and policymakers to better advance the goals and policies of society.

Generally, all four stages of the pandemic evolution have their characteristics, especially in the area of scale and impact, which were described in detail above. However, by examining 12 sources to identify the definition and characteristics of each of "Outbreak", "Endemic", "Epidemic" and "Pandemic", common components and words were extracted and described below:

- **Community, population**

The community affected by infectious disease is found in most definitions. One of the conditions of infectious disease is to endanger society and the people. Now the amount and number of this community and the extent of damage depends on the type of disease and its stage. The population has been used to define the different dimensions of infectious diseases too. The specific population involved in the disease who are at risk of death or serious injury is one of the main elements of this definition.

- **Disease, Infection**

Disease and Infection are considered as one of the components of pandemic definition and their different stages. Illness and death are some of the conditions of infectious diseases. Therefore, these two components are used in most definitions

- **Sudden occurrence, Excessive disease**

This feature is especially used to express the definition of "Outbreak" and "Endemic", which have a smaller scale. In general, one of the characteristics of an epidemic at any scale and stage is its suddenness and surprise. An infectious disease is out of the ordinary and, more than expected, carries a variety of life-threatening problems and problems (Brachman n.d; CDC.gov 2012; CDC.gov 2015). Therefore, one of the conditions of different stages of pandemic evolution is the overflow of contagious disease beyond expectations.

This makes the need for urban planning and design in the field of urban Flexibility and Resilience in the face of epidemic conditions at different scales, is doubly important.

- **Specific time, place, or area**

Numerous definitions in the field of epidemics and pandemics often emphasize the two principles of time and place. In general, a pandemic or any of the different stages of its evolution have occurred at a certain time. So that an epidemic in a place or area that can be defined and diagnosed causes the disease of people living. The boundaries of the contagious disease area are quite clear and only its scale is different in different stages.

- **Spreadability**

But one of the common features in all stages of the pandemic evolution is the spread of the disease. This spread can be through water, food, and air. The rate of spread can vary depending on the type and characteristics of the pathogen.

In the other part of the article, the previous two pandemics (plague, cholera) and the new COVID-19 pandemic were discussed. Each of them especially changed cities and transformed urban public spaces. The plague was the cause of the first large-scale urban reform, with the addition of hospital-type structures to the urban space and the expansion of public thoroughfares and open spaces; Cholera was the cause of modern sewage systems, large-scale urban parks, boulevards, and so on. Both of these pandemics expanded urban public spaces and can be said to have been followed by historical changes.

It was after the plague pandemic that the Renaissance occurred in Europe, and it was after the cholera pandemic that the Industrial Revolution took place and the modern world took shape. It can be said that the important pandemics of history, in addition to changing the spatial and functional structure of cities, later established important social and economic changes in the world. The same is true of the COVID-19 pandemic.

COVID-19 underwent many changes to the city and its various dimensions. But unlike the previous two pandemics, these changes were more functional than structural. Public spaces were taken from personal vehicles and allocated to bicycles and pedestrians. Or the boundaries between public and private spaces changed and semi-public-semi-private spaces were redefined due to quarantine conditions and meeting daily needs. During this period, we were perhaps doubly important in green spaces, and in many cities, per capita urban green spaces, which are considered a public urban space, expanded. Another transformation mentioned was the virtualization of social interactions and daily activities. Urban public spaces and their functions and content were transferred to the virtual world due to pandemic conditions. This begs the question: will the COVID-19 pandemic, like what happened after the plague and cholera pandemic, be a prelude to a new renaissance in human life? This is a question that may be answered soon.

In general, the structure of cities and public spaces changed during the three pandemics of Plague, Cholera, and COVID-19. Figures 5,6,7,8 and 9 tries to summarize the mentioned changes in a default medieval city. This table illustrates well how, over the course of history, the structure of cities and, consequently, urban spaces have been gradually transformed by various pandemics.

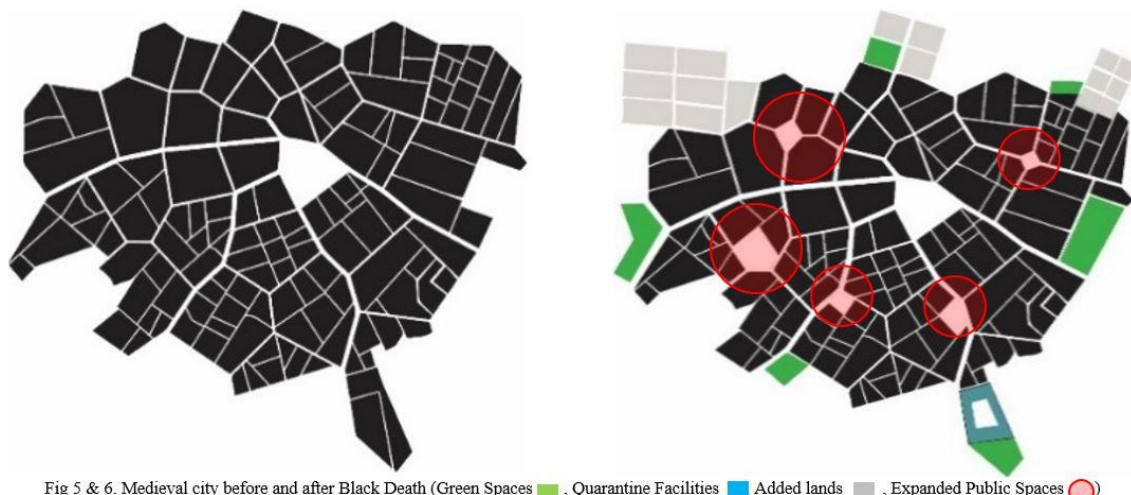


Fig 5 & 6. Medieval city before and after Black Death (Green Spaces ■, Quarantine Facilities ■, Added lands ■, Expanded Public Spaces ○)

Figure 5 is the structure of a default medieval city during and before Black Death (14 Century). And figure 6 shows the medieval city after Black Death. After the plague, more green spaces were built, the width of the main streets increased, quarantine facilities were built next to the city gate, public spaces such as squares were expanded and more land was added to the city for construction and agriculture.

Figure 7 shows cities and public spaces changes after Cholera (18&19 century). During this period, residential and commercial complexes were added to the city, boulevards changed the old structure of the city and large-scale parks appeared in the city center (Fig 7).



Fig.7. City after Cholera (Green Space , Quarantine Facilities , Added lands , expanded boulevards , Residential and commercial complexes)

The postmodern era city is facing the COVID-19 pandemic (fig 8). Increasing green space per capita, creating green roads to expand the connection and access to urban parks, creating sidewalks, and changing the function of the central streets of cities to sidewalks and bicycles are these era changes. Finally, it should be noted that the public space of the post-Corona era will be a combination of real and virtual space. Creating a virtual city, transferring the existing performance and interactions of urban public space to cyberspace are changes that it is expected to be Globalization soon (fig 9). It will be the task of policymakers and designers to create the optimal interaction between these two spaces. Because redefining them correctly seems vital given the essential role of each in the lives of today's citizens. Real public space, which has multiplied its role in increasing mental and physical health after the COVID-19 pandemic, and virtual public space, which played a significant role after Corona. It is possible to find cyberspace to introduce and get to know more public urban spaces, and with the help of various applications, it is the potential to make a virtual presence in real public spaces.



Fig .8. City after COVID-19 Pandemic (Sidewalks ■).

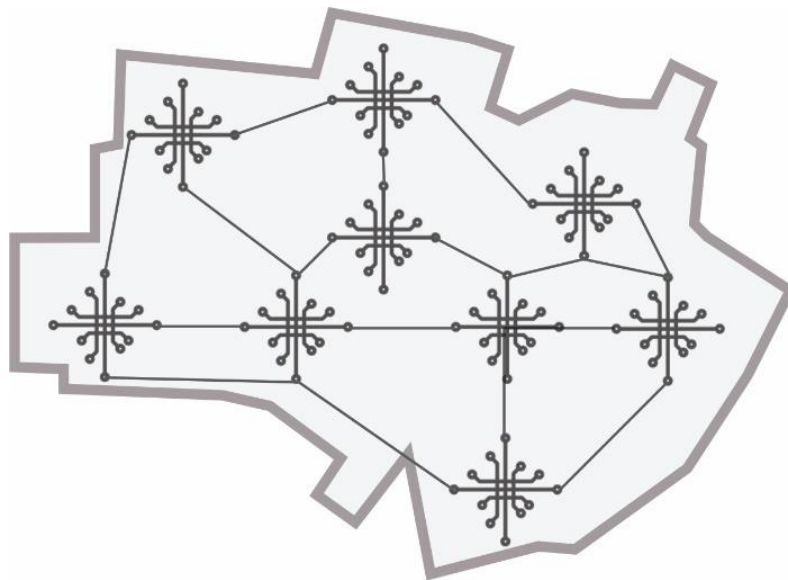


Fig .9. City after COVID-19 Pandemic

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