

Urban Acupuncture as an Alternative Approach to Identification and Prioritization Public Spaces (Case Study: Pamenar Neighborhood in Tehran)

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ABSTRACT: Urban spaces are the heart of any city. These spaces play a crucial role in improving citizens' quality of life, welfare, and mental health. In recent decades, there have been growing concerns among urban experts over the widespread disregard for public spaces due to the dominance of capitalism and changes in citizens' lifestyles due to their crucial needs being ignored. Despite the considerable efforts to develop urban spaces in Iranian cities, there are still huge gaps between proposed plans and implementation processes. Due to limited resources and execution mechanisms, it is necessary to identify such spaces based on real-world needs and prioritize them in the implementation phase. In line with this, the present study seeks to develop an efficient method for identifying potential public spaces in deteriorated urban neighborhoods through participative processes, reducing the costs and time of projects, and increasing the effectiveness of projects employing the urban acupuncture approach. The data collection and analysis tools used in this study include semi-structured interviews, focus group discussions, analysis of documents related to the development of the neighborhood under study, space syntax analysis using Depth Map software, prioritization of indicators using AHP questionnaire and analyzing them in Expert Choice software, and analysis and overlaying information in ArcGIS software. The findings related to the Pamenar neighborhood in Tehran suggest that it is practically possible to identify and prioritize the public spaces through the urban acupuncture approach by studying and analyzing motion flows. Finally, 13 urban spaces have been identified and prioritized in the neighborhood.

Keywords: *Urban Acupuncture, Public Spaces, Deteriorated Urban Neighborhoods, Participative Planning, 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 citizens' quality of life, welfare, and mental health. Research has suggested various benefits for public spaces, such as performing social and cultural activities, reducing psychological tensions, enhancing citizens' mental health, developing social interactions, and realizing social cohesion (Arasteh & Heidarzadeh, 2021; Abdollahzadeh fard & Shams Al-Dini, 2020; Behzadfar & Tahmasebi, 2013; Rafieian & Khodaei 2009). The Strategic Document of Urban Space Management in Tehran recognizes the use of public spaces as a means of progress toward a sustainable society and mentions the following issues concerning the identification, assessment, evaluation, and management of these spaces:

- In Iran, particularly in Tehran, urban spaces have not been

integrated into urban planning, design, and management agendas.

- 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 (Tehran City Studies and Planning Center, 2016).

Therefore, it seems necessary to pay more attention to

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urban spaces as well as their meanings, characteristics, and requirements, encourage people's participation (especially on a local level) to identify 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 described in the literature for identifying and improving public spaces (Mohammadzadeh et al., 2021; Sadeghi et al., 2021; Shojaee & Partovi, 2015); however, most of them are not practically applicable due to numerous problems in the managerial and executive structure. Factors that hinder the implementation of many of these projects include financial limitations, the 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 an effective method based on the principle of participation that could facilitate the design and implementation of measures rapidly, efficiently, and cost-effectively. To this end, this paper elaborates on the urban acupuncture approach using state-of-the-art literature and implementation models. First, the literature on this approach will be reviewed, and then the methodology will be introduced. Finally, one of the deteriorated neighborhoods of Tehran (Pamenar neighborhood), which is of contextual and historical value, will be studied to identify and prioritize public spaces.

We reviewed some papers and dissertations in the field of urban acupuncture and examined the use of urban acupuncture as well as the attitudes of researchers to this approach. The results are summarized in Table 1.

Table 1: urban acupuncture in other urban studies

Research title	Urban acupuncture approach in research	References
urban acupuncture as a strategy for Sao Paulo	Using 12 new urban projects to improve the entire city center of São Paulo	(Shieh, 2001)
urban acupuncture: an alternative(purposive intervention to urban development to generate sustainable positive ripples for an Aided Self-Help Kampung Improvement	Examining the city of Curitiba as a model for solving urban problems utilizing urban acupuncture and developing solutions to the problems of the city of Kampung	(Harjoko, 2009)
Urban Acupuncture” Strategy in the Urban Renewal	Introducing urban acupuncture as a tool for point-by-point stimulation of urban metabolism	(Shidan & Qian, 2011)
Eco-Acupuncture: designing and facilitating pathways for urban transformation for a resilient, low-carbon future	Proposing a framework to determine specific points for beginning urban transformation via urban acupuncture	(Ryan, 2013)
Neighbourhoods through Urban Healing Acupuncture	Offering solutions to activate places using small precise interventions	(Pascaris, 2012)
Paracity: Urban Acupuncture	Dividing cities into first, second, and third generations and illustrating the effect of the urban acupuncture approach on the transformation of Taipei into a third-generation city	(Casagrande, 2014)
Urban Acupuncture in the era of Ubiquitous Media	Describing the process of developing a method to implement urban acupuncture techniques in cities with a large amount of interaction in social networks	(Iaconesi & Persico, 2014)
urban acupuncture	Describing urban acupuncture	(Lerner, 2014)
Urban eco-acupuncture methods: a case study in the city of Athens	Small-scale interventions with the aim of social and environmental improvement, as well as creating public spaces	(Apostolou, 2015)
An Alternative Approach to the Conservation and Fruition of the Phlegraean Fields Archaeological Landscape	Developing abandoned cultural heritage by attaching it to different sites along the coastline employing urban acupuncture	(Russo, 2016)
Urban acupuncture: dual spaces as a strategy for urban resilience	Urban acupuncture as a strategy for urban resilience	(Porebska & Rizzi, 2017)
Artistic experiments of urban acupuncture	Urban art is the instrument of urban acupuncture to change the perception of place through the filter of culture, creativity, and so on	(Pagliano, 2020)
Acupuncture- regeneration of Songyang village based on typo-morphology theory	Studying the morphology and evolution of Songyang throughout the years of intervention via urban acupuncture	(Zhang & Zhang, 2021)
Urban acupuncture as an approach to reviving	Revival of the city using micro-interventions of urban acupuncture	(Salman & Hussein, 2021)
Application of urban acupuncture approach in prioritizing the deteriorated and historical sites Case study: Pamenar neighborhood in Tehran	Prioritizing the intervention sites in the deteriorated and historical neighborhood through an urban acupuncture approach	(Manouchehri et al., 2021)
Urban Acupuncture as a Method of Open Space Regeneration in Greek Ex-refugee Areas. The Case of Nikea, Piraeus	Exploring the potential of implementing the principles of urban acupuncture in a selected Greek case study	(Tousi et al., 2022)

Theoretical Background

Suppose 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 to permanently improve the quality of urban life (Izadi et al., 2017). In that case, we will be able to compare the science of urban development with the field of medical acupuncture. In medicine, the pathogens are first studied, and then the treatment solutions are offered to the patient. Here, the term metabolism is a common notion in both fields. Urban metabolism refers to dynamic social and environmental transformations that combine 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). The urban acupuncture approach falls in the same category as the "broken window" (Maskaly & Bogess, 2014) and the "development catalyst" approaches because of their similar conception of improvement and development beginning at a single point. This point can be considered as "the apex," at which a minor change could exert a dramatic effect on a system in a very short time that quickly spreads throughout the system (Gladwell, 2000).

Urban Acupuncture

The term acupuncture is composed of the Latin 'acus' (needle) and 'pungere' (to make a hole). It refers to the insertion of needles into certain points on the body for medical purposes (Rezvani, 2011). 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 (Croner, 2016; Shidan & Qian, 2011; Sadaba & Lenzi, 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 traditional planning. Some of the founders of this approach, including Jame Lerner, Manuel de Sola-Morals, and Marco Casagrande, consider cities as complex energy organisms with overlapping layers containing energy. The energy meridians (the technical term for energy channels in acupuncture) in these layers determine how and in which direction the city will develop. By sticking needles into specific points on the meridians (the so-called points of energy blockage), we can stimulate a response in the city. As a result, positive cascade reactions improve the areas surrounding the needle points (Hoogduyn, 2014; Lerner, 2014; Casagrande, 2014). The main features of urban acupuncture include the necessity of participative processes, the use of micro-scale interventions, a comprehensive vision, network-like activation via point-by-point activation (progressive wave-like development), quick and efficient influence, use of development catalysts, contextualism, flexibility, the possibility of using digital technology and mobile media, easy implementation without much technology, and small amounts

of investment (Table 2) (Mang, 2009; Mora, 2013; Casagrande, 2014; Chen, 2016; Croner, 2016; Sun, 2016; Shen, 2016; Bevk, 2018; Margono & Zuriada, 2019; Bell et al., 2020; Perez-Lancellotti & Ziede, 2020; Attademo, 2020).

Acupuncture and Urban Development

In the human body, there is a vital energy referred to as Qi energy (pronounced chee) in Chinese. This energy flows throughout the body via channels called meridians. Any inconvenience in a meridian may lead to a state of disease. The qi is balanced by stimulating certain points on the meridian, and the disease is healed. The therapeutic effect may linger even after the needles are removed from the body (Rezvani, 2011). Like the human body, the city is also an organism sensitive to a multi-dimensional energy network. 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) (Fig 1).

In acupuncture, the therapist views any blockage in the meridians or negative or harmful energy flow as a disease. In the same way, any lack of activity or motion in public spaces and streets or any motion flow that is contrary to the aims of urban life can be considered a disease because it might lead to inefficiency in parts of the city. Thus, whatever affects the motion pattern negatively might be a pathogen referred to as an 'urban problem' in the present study. The motion flow of citizens in public spaces and streets, which correspond to energy flows in acupuncture, is referred to as "motion flows" in this study. These motion flows are the basis of our analysis and decision-making. In acupuncture treatment, the therapist inserts needles into specific points on the patient's body according to their disease type. In a city, the needles that help 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 with the highest impact on the intervention point and 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 solves the most 'urban problems' possible by using the most favorable 'development opportunities' at 'intervention points. The intervention points are selected in a way that they fulfill the main aims of urban acupuncture (i.e., short-term efficacy, quick and easy implementation, and reduction in economic costs). Overall, three basic features of urban acupuncture can be regarded as the main requirements of this approach. These features include contextualism, participation, and network view.

- Contextualism: Identification of influential local actors,

Table 2: The main features of urban acupuncture (Sources: Marzi & Ancona, 2004; Harjoko, 2009; Muller, 2009; Shidan & Qian, 2011; Pascaris, 2012; Ryan, 2013; Unt & Bell, 2014; Lerner, 2014; Hoogduyn, 2014; Stokes et al., 2015; Messeter, 2015; Haddad, 2015; Houghton et al., 2015; Russo, 2016; Tang, 2016; Sadaba & Lenzi, 2016; Lastra & Pojani, 2018; Santos, 2018; Naghibi et al., 2020; Al-Hinkawi & Al-Saadi, 2020; Zhang & Zhang, 2021; Wesolowski, 2021; Salman & Hussein, 2021; Manouchehri et al., 2021; Tousei et al., 2022)

Feature	Description
Micro-scale interventions	Underlying this approach is the idea of “minimal effort and maximal effect,” which refers to investing the least effort to obtain the possible result at a critical point. Micro-scale interventions require small investments while at the same time looking at long-term goals. That is, the fact that interventions are on a small scale does not negate the profound effect. The small scale of the interventions does not only refer to their physical scale but also covers the contextual aspect of the study and intervention.
The necessity of participative processes	These processes help extend communications and create a network of urban experts.
Comprehensive vision	Urban renovation is not specific to architects, urban planners, urban designers, or artists; rather, they all try to develop a common strategy in tandem.
Bottom-up process	In this process, those in charge of decision-making and intervention should seek mutual understanding. Thus, citizens can change the course of the project. Moreover, the private sector, non-profits, and even young companies can initiate urban interventions. In this way, the real needs of the residents are taken into account to increase the quality of life, and interaction among citizens is reinforced.
Speed	Urban renovation projects take a long time to complete. However, a catalyzing effect can reduce the need for economic resources as well as the duration of the project.
Network development	In acupuncture, the body is viewed as a neural system that should be stimulated at specific points to release energy. The aim is, therefore, to make a network of points. In urban acupuncture, when the points under intervention are connected, the entire city begins to heal. It means that the intervention points activate themselves and their entire surroundings. Thus, individual points are first activated, and then network activation occurs progressively and wave-likely.
Catalyzing process	Urban acupuncture catalysts vary due to the differences in energy meridians. Since meridians include the energy flows related to social, economic, cultural, and other factors, the catalysts, too, can be related to these various factors.
Contextualism	Urban acupuncture deeply respects local traditions, culture, industries, spatial fabric, and artistic styles.
Flexibility	Variables may not be quite clear at the outset and appear gradually as new needs emerge over time. Therefore, urban acupuncture does not assume absolute discipline and power.
Digital technology	The possibility of widespread use of mobile media contributes to the lived experience of place and reinforces social cohesion. Interaction via digital technology can act as a transformational force in society.
Small investment	Another factor that helps to increase the efficiency of urban acupuncture projects is the fact that the budget of projects is controlled, and interaction with private investors is increased due to the small scale of interventions.
Easy implementation without much technology	Compared with other approaches to urban renovation, urban acupuncture interventions require less effort.

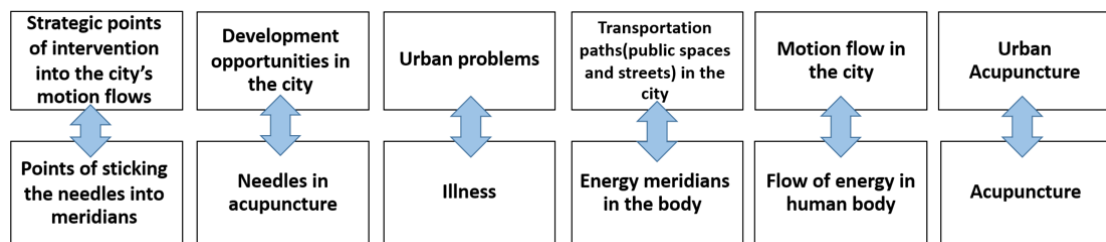


Fig. 1: Explanation of the practical concepts of urban acupuncture in terms of the medical acupuncture framework

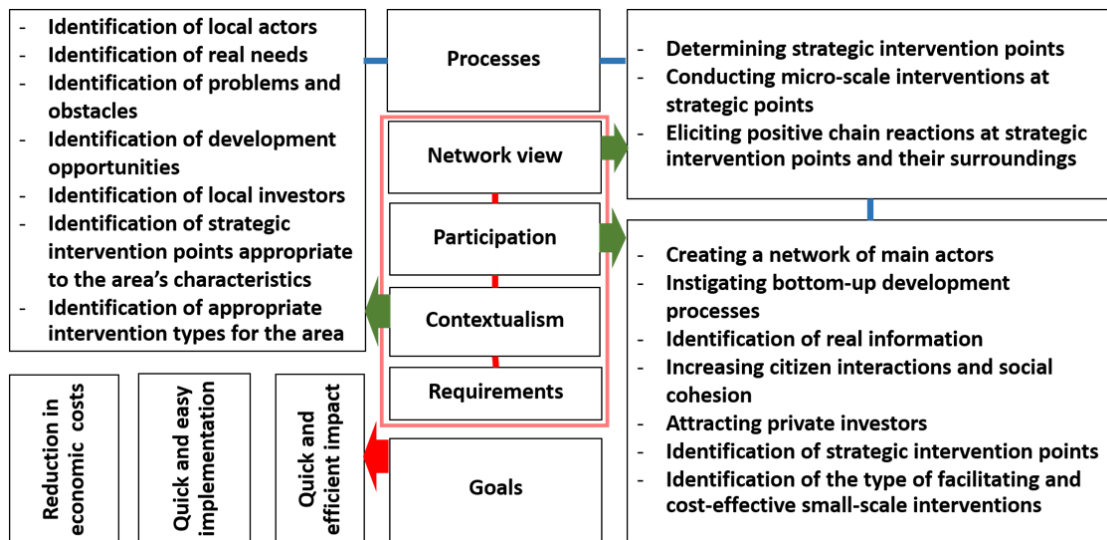


Fig. 2: The conceptual model of urban acupuncture

the residents' real needs, obstacles and opportunities for development, local investors, and strategic intervention points

- Participation: Effective communication in a network of major actors, creation of bottom-up development processes, increased interaction among citizens, improvement of social cohesion, and attraction of private investors.

- Network view: Selecting the intervention points and intervention types in a way that they have the strongest effect on their surroundings as well as on other intervention points and give rise to positive cascade reactions that result in a leap in the development process and bring about short-term results (Fig 2).

Small-scale interventions, design, and implementation of wave-like and progressive cascade reactions, and bottom-up and flexible development processes can be examined and executed throughout urban acupuncture. In the context of the requirements of urban acupuncture, processes are designed and implemented with the aim of short-term results and efficiency, quick and easy implementation, and reduction in economic costs.

Public Space

Public space is one of the three components of urban morphology. Its essence directly depends on the complex political, social, economic, and cultural context in which it is produced. In other words, public urban space provides people with a place for interaction and resting and can directly impact public life, urban environment, and renovation of urban structures (Shidan & Qian, 2011; Zhang & Zhang, 2021).

Terms such as social relationships, communication, interaction, mixing with outsiders, public discourse, human interactions,

contacts, meaning, and public functions, and scholars have used mutual human processes to explain and illustrate the publicness of a space. In this way, the index of 'sociability' is a necessary feature for understanding and presenting a public space. Sociability in public spaces is based on people's need for a social sense of belonging and interaction which are possible in a supportive social space along with physiological comfort, claim for territory, a sense of ownership, and experiencing justice within the space. The main characteristics of a sociable space include vitality, night activities, diversity of uses and activities, human scale, social security, all-inclusiveness, pleasantness, and accessibility (Shojaei & Partovi, 2015).

Urban Acupuncture and Public Spaces

Marchal has described urban acupuncture as a set of strategic urban interventions 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 its physical structures, the acupuncture points located on this structure 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, 2016; Al-Hinkawi & Al-Saadi, 2020; Tang, 2016).

According to Jaime Lerner (2014), creating continuity by filling empty urban spaces is one of the main tasks of urban acupuncture. He maintains that the 'needles' of urban acupuncture can be various interventions and events, ranging from a single building or park to street festivals or any other positive event in public spaces (Daugelaite & Grazuleviciute,

2018; Bevk, 2018). Generation or development of public spaces using small interventions can create new meanings for a place or revive its forgotten meanings. This can be done with the least amount of investment possible and creative ideas regarding the residents' needs and visions for improving their quality of life. Thus, public spaces will act as a magnetic field in addition to enhancing the city's visual beauty. Therefore, it is practical to conceive of public spaces as catalysts and acupuncture points. These points can extend development to surrounding areas and improve the conditions of a larger area.

MATERIALS AND METHODS

The present study follows an interpretative research paradigm that combines quantitative and qualitative data in the problem statement. The research question has arisen from the concerns related to the regeneration of deteriorated fabrics, especially in District 12 of Tehran. In compliance with the urban acupuncture approach and the necessity of contextualism, the first step was to determine a specific area for the evaluation of the process of urban acupuncture in District 12 of Tehran. After identifying and prioritizing neighborhoods, we finally decided on Pamemar neighborhood as an operational sample due to its historical identity and specific structural and residential elements. After an initial investigation of the neighborhood, the parameter of 'motion flows' was analyzed based on the theoretical basis of urban acupuncture 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 keyed in to be analyzed in GIS software. Based on the significance coefficient of each indicator, their status in the neighborhood was specified. Finally, different parts of the neighborhood were prioritized in 5 ranks after overlaying the information layers of the intensity of problems and development opportunities in the neighborhood. Next, in the parts with the highest priority, public spaces were first identified as intervention points where development would begin and then prioritized according to their features.

Case Study

Pamemar Neighborhood of Tehran

Pamemar 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:

- Pamemar was one of Tehran's first neighborhoods, and many of its buildings are of great historical significance.

- On its edges, the neighborhood is surrounded by commercial uses that do not belong to a specific urban district. 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.

- The number of bums, abandoned, or vacant plots have been increasing recently.

- In Pamemar, most religious, educational, cultural, storage, workshop, and commercial uses are active on the urban zone or district scale, and local activities have deteriorated.

- 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.

- Regarding accessibility, many of the streets surrounding or inside the neighborhood suffer from a lack of balance between their capacity, the type of activities, and the traffic (Bavand Consulting Engineers, 2013).

The First Step: Determining Indicators

According to urban acupuncture principles, motion flows are the basis for identifying neighborhood problems and development opportunities. In this method, participative processes (according to the neighborhood's features) are designed and implemented throughout all the steps.

To identify problems and development opportunities (determining indicators), we used trained and well-informed people, experts, and elites, as well as the development documents of the neighborhood. Identification and analysis of problems and opportunities were based on the researchers' field observations, semi-structured interviews, focus group discussions, and study and coding of documents. In the end, the obtained results were coded and classified. The interviews were conducted with 28 trained residents over six months. These persons have been trained by the workshops of the local renovation office and are familiar with the neighborhood's current conditions and the neighborhood's criteria. They have been selected through Snowball sampling. 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, guided by the researchers toward 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. Each group's discussion duration ranged between 45 and 80 minutes. The obtained information was then coded and classified into five categories (social, economic, physical-

Table 3: Identification of problems and development opportunities (indicators)

Categories	Problems
Social	The 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 the 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 pollution, 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, a large number of buildings with less than three stories, and a small number of coarse-grained buildings
Managerial-legal	People's close connection with decision-making institutions, people's heightened awareness of the institutions' decisions, people's great trust in the decision-making institutions, and the existence of local NGOs

environmental, and managerial). Thus, the problems and development opportunities (indicators) were identified (Table 3), and their functional definitions were prepared.

The Second Step: Identifying the Intervention area with Highest Priority

To prioritize the intervention areas, we studied the indicators in different places. The data collection methods 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, and space syntax analysis (physical-spatial) using the Depth Map software package. Table 4 demonstrates how the instruments for studying each indicator were selected.

To quantify the obtained data from interviews, focus group discussions, observations, and analysis of the available documents, the status of each indicator in each part of the

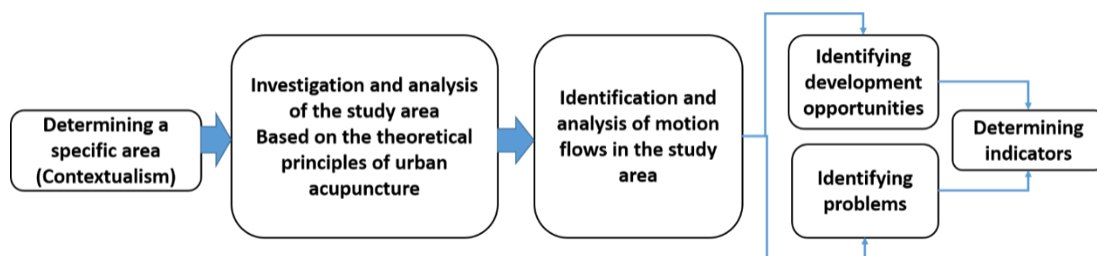


Fig. 3: determining the indicators based on the urban acupuncture approach

Table 4: An example of how the instruments for studying each indicator were selected\

Categories	Indicators	Instruments of studying the indicator in a place
Social	Diminishing sense of place	Studying development documents; semi-structured interviews with residents; focus group discussions
	Lack of social security during the day and at night	Semi-structured interviews with residents, focus group discussions, the researchers' field observations
Economic	Decrease in the economic value of residential property	Studying development documents, focus group discussions, the researchers' field studies
	Penetration of the uses supporting the bazaar into the residential fabric	Documents; the researchers' field observations



Fig. 4: Some examples of the spatialization of the indicators¹ (source: Arc Gis software)

neighborhood was scored from 1 to 5. A score of 1 would indicate the low intensity of the indicator in a place, while five would mean the highest intensity. In the next step, the quantitative data were entered into ArcGIS for analysis. Fig 4 demonstrates some examples of the spatialization of the indicators in the neighborhood.

In Figure 5, and 6, connectivity and integration are two variables that indicate the space syntax in the neighborhood. They have been analyzed in Depth Map software. These two maps help to determine the parts to be separated from the neighborhood. The more we move into the fabric, the less integration, and connectivity of the space.

The significance of the indicator in the neighborhood's regeneration is not equal, which is why we decided to determine their significance coefficient in this step. To this end, eight experts familiar with the neighborhood's conditions were asked to complete the AHP questionnaire. Next, we determined the significance coefficients via a pairwise comparison of the indicators and analysis of the results in the Expert Choice software package (Table 5).

By overlaying 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 that promote motion flow patterns in GIS software, we investigated the status of the neighborhood in terms of these two parameters (Fig 8, 9).

By Overlaying the information layers of the intensity of problems and the layers of development opportunities (Fig 8, 9), we established the priority of each part of the neighborhood. The highest priority (the darkest color in Fig10) shows the neighborhoods with the most problems and the most favorable development opportunities or means. The lowest priority (the lightest lines in Fig 10) indicates parts of the neighborhood with the least problems and the weakest means of development. As urban acupuncture aims to overcome the maximum number of problems possible by using the most powerful means of development to increase the efficiency of interventions and the easy and cost-effective implementation of the measures, Fig 10 indicates that development in the Pamenar neighborhood should develop from the inside. Due to the network view of urban acupuncture, improving those parts of the neighborhood with the highest priority through progressive wave-like interventions will also improve the other parts.

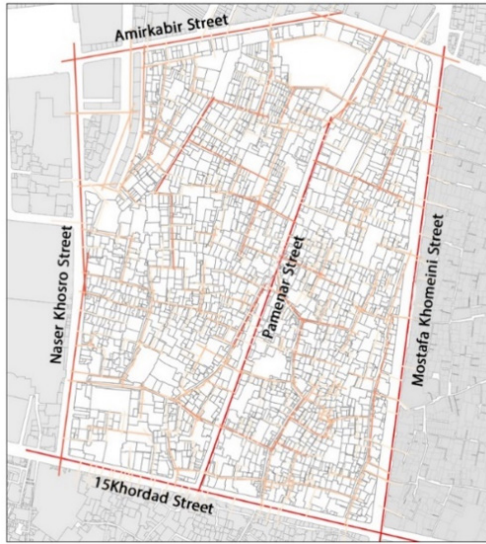


Fig. 5: connectivity of streets²
(source: Arc Gis software)

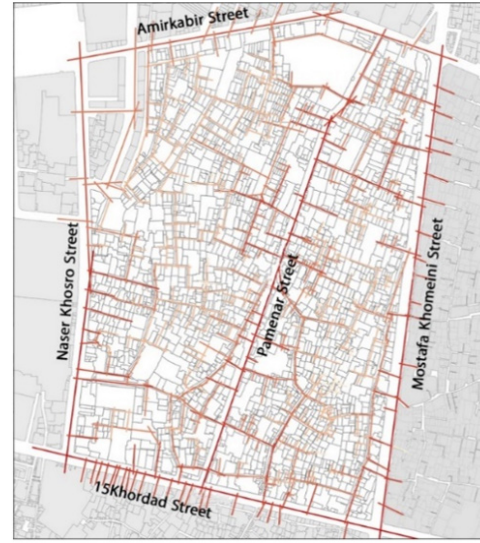


Fig. 6: integration of streets³
(source: Arc Gis software)

Table 5: The method of determining the significance coefficient for each indicator

Categories	Significance coefficient of categories	Indicators	Significance coefficient of indicators	Significance coefficient of the indicator in the category
Social	The data obtained from Expert Choice software	Social indicators	The data obtained from Expert Choice software	The product of values in the third and fourth columns
Economic		Economic indicators		
Spatial-physical		Spatial-physical indicators		
Managerial-legal		Managerial-legal indicators		

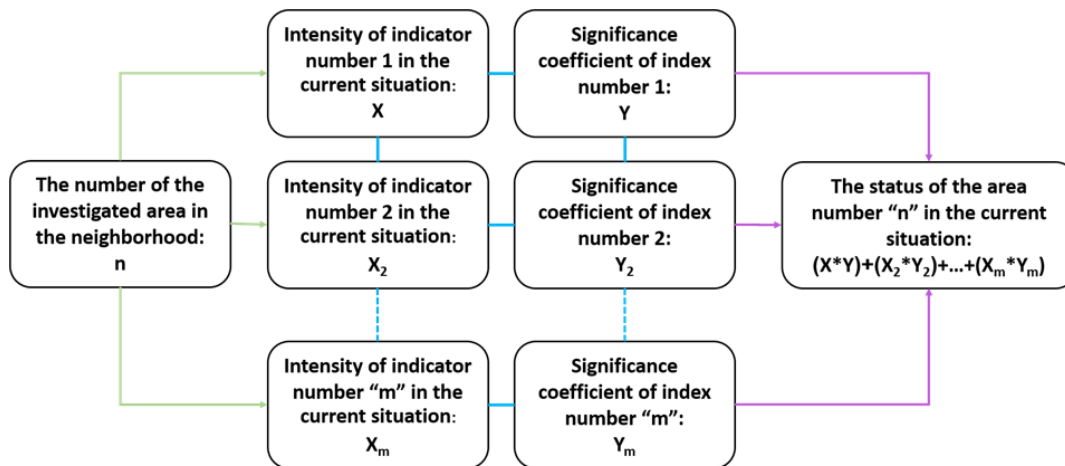


Fig. 7: Determining the status of different areas of the neighborhood

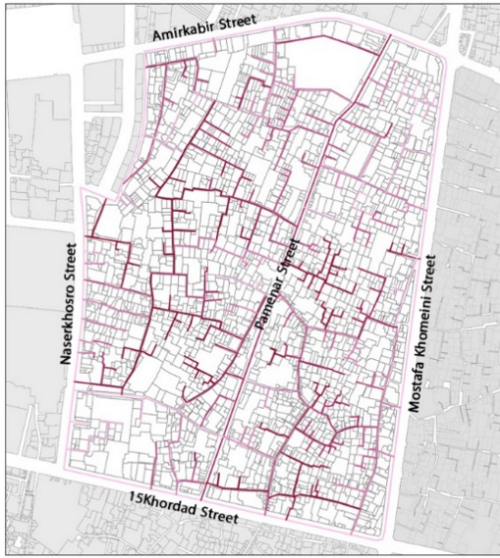


Fig. 8: overlaying the information layers of the intensity of problems⁴ (Source: Arc Gis software)



Fig. 9: overlaying the information layers of development opportunities⁵ (Source: Arc Gis software)



Fig. 10: Overlaying the problems and opportunities⁶ (source: Arc Gis software)



Fig. 11: Parts of the neighborhood with the highest priority (source: Arc Gis software)

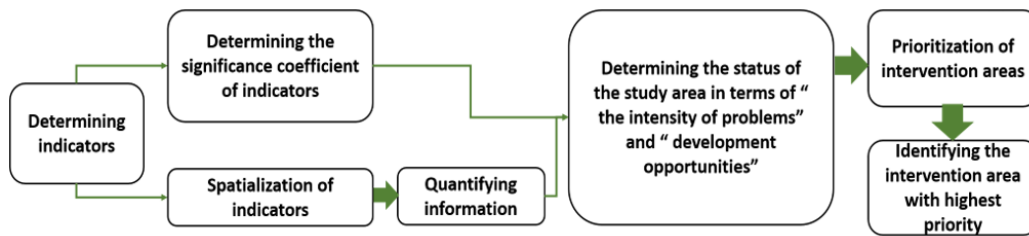


Fig.12: Identifying the intervention area with the highest priority

The Last Step: Identification and Prioritization of Public Spaces

This step determines intervention points in the parts with the highest priority (Fig 11). 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 this study's theoretical background and aims, public spaces will be identified and defined as intervention points. Creating new public spaces or developing and improving the existing ones 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 significant intervention points.

To identify public spaces as intervention points in the high-priority parts of the neighborhood, 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 a 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.

The intensity of each indicator of sociability 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 was quantified so that the highest intensity of an indicator in a place would be scored five, and the lowest intensity of an indicator would receive 1.

As all the indicators of sociability are not equivalent in creating or improving public space, eight experts in urban development examined the significance coefficient of each of them. For this purpose, the indicators underwent pairwise comparison via an AHP questionnaire, and the results were analyzed in the Expert Choice software package (Fig 13).

Then the entire information consisting of the intensity of each indicator of sociability in each place and the significance coefficient of each of them was entered into ArcGIS 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 indicator of sociability in different places and their significance coefficient would determine the location of public spaces and their priority (Table 6).

In general, 13 public spaces were identified in the most critical parts of the neighborhood and classified between the first to the fifth priority (Fig 14). By conducting interventions and creating suitable public spaces in places with the highest priority, the neighborhood's situation will improve due to wave-like progressive effects.

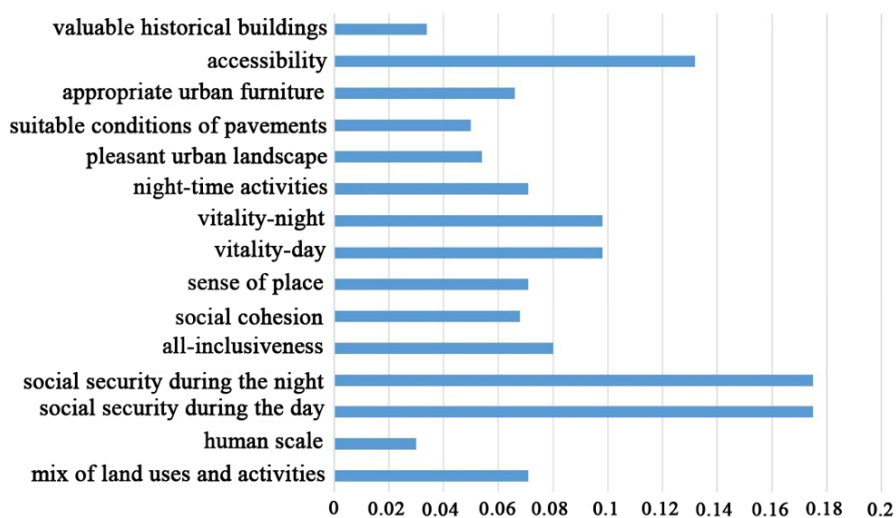


Fig. 13: The significance coefficient of sociability indicators (source: Expert choice software)

Table 6: Determining the sociability status of different places in the most priority areas of the neighborhood

a	The number of the investigated place in the highest priority areas	The intensity of sociability indicator number 1 in the current situation	Significance coefficient of sociability indicator number 1	The status of the place number "a" is based on the sociability indicator number 1
		Z	K	Z*K
	The intensity of sociability indicator number 2 in the current situation	Significance coefficient of sociability indicator number 2		The status of the place number "a" is based on the sociability indicator number 2
		Z₂	K₂	Z₂* K₂
	The intensity of sociability indicator number "m" in the current situation	Significance coefficient of sociability indicator number "m."		The status of the place number "a" is based on the sociability indicator number "m."
	Z_m	K_m	Z_m* K_m	
The status of the place number "a" in the current situation				(Z*K)+(Z₂* K₂)+...+(Z_m* K_m)



Fig. 14: Identification and prioritization of sociable places as public spaces (source: Arc Gis software)

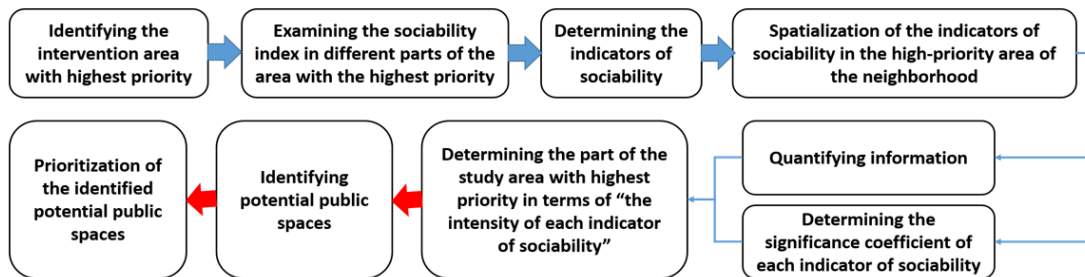


Fig. 15: Identification and Prioritization of Public Spaces

RESULTS AND DISCUSSIONS

The main aim of urban acupuncture is to reduce the costs and time of project implementation and increase efficiency. The reviewed literature discussed no particular method to achieve this aim. By studying and comparing multiple studies, we have attempted to identify the underlying principles of this approach to develop an appropriate methodology. We aim to identify and prioritize public spaces in urban neighborhoods.

Many studies have indicated that the prerequisites of urban acupuncture include contextualism, participation, and network view, without which it is impossible to achieve the three aims of this approach. A network view helps to observe the relationships of phenomena throughout the planning and design phase and become aware of their effects which strongly influence the type of interventions. Therefore, adopting an urban acupuncture approach in a project would mean that the three principles of contextualism, conscious participation, and network view should reduce the implementation time and costs and increase efficiency (Fig 16). If only one of these aims is fulfilled, it cannot be called an instance of urban acupuncture. By examining the global experiences in urban acupuncture from cities like Barcelona, Curitiba, San Francisco, Kobe, and Taipei, we understand that concepts such as reduction in time, reduction in costs, and increase in efficiency are relative and cannot be defined in a standard and all-inclusive manner to cover all urban projects (Casagrande, 2006; Suzuki et al.,2010; Hoogduyn, 2014; Lerner, 2014; Wesolowski, 2021).

Intending to use the principles of the urban acupuncture approach to identify and prioritize public spaces, we reviewed the urban acupuncture literature to search for the concept of

public space. Some authors have introduced public spaces as intervention points for urban acupuncture so that, in a certain region, these spaces could trigger development in a domino-like manner through participative processes and a network view.

In this study, our solution to achieving the three goals of urban acupuncture is to address priorities. This has become possible in two phases:

- In the first phase, which was aimed at identifying the intervention areas, prioritization was performed in two steps. First, problems were prioritized to select places with the most numerous and serious problems, and second, development opportunities were prioritized to determine places with the most powerful development tools. Finally, places with the most serious problems and powerful development tools were selected.

- In the second phase, sociability indicators were prioritized to identify places with the greatest potential to be converted to public spaces (Fig 17).

Importantly, these places were selected in areas with the most problems and the most powerful development tools. Therefore, the development of public spaces as intervention points of urban acupuncture resolves the most serious problems utilizing the most powerful development tools, thereby allowing for the three aims of urban acupuncture.

CONCLUSION

Given the aim of the study to identify and prioritize public spaces using the theoretical principles and practical application of the urban acupuncture approach, we attempted to develop a

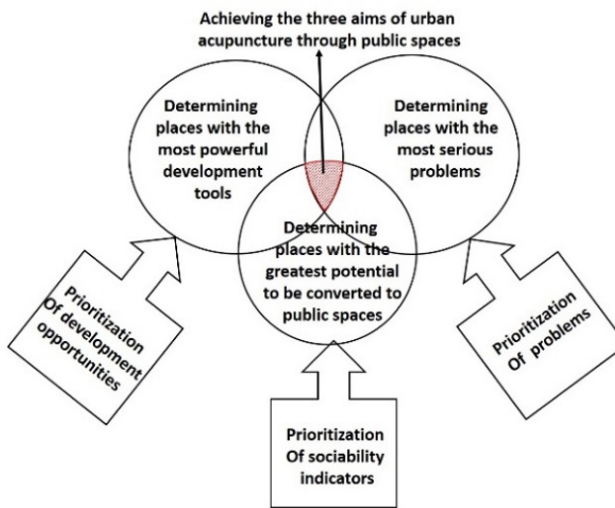


Fig. 16: The three goals of urban acupuncture

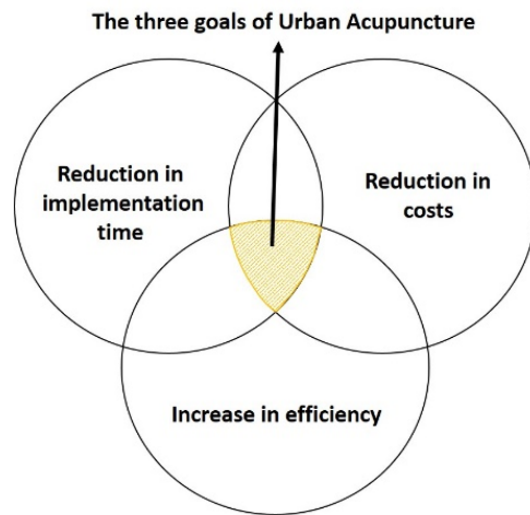


Fig. 17: Achieving the three aims of urban acupuncture through public spaces

solid theoretical basis and implement it through a clear step-by-step process. To this end, we first reviewed the existing documents, sources, features, and definitions and devised a conceptual model of urban acupuncture at three levels: requirements, processes, and goals.

One of the main outcomes of this study is to attain a specific model for identifying and prioritizing public spaces in the Pamenar neighborhood of Tehran, which could contribute to its extensive development. The formation of this model is based on the following:

- Due to their mutual effect on the urban fabric, motion flows were set as the investigation and analysis building block.
- Places with the greatest potential to be converted to public spaces were identified and analyzed as the intervention points of urban acupuncture.
- Certain participative processes were considered in all phases of the study.
- Different instruments were used to study the neighborhood, analyze the circumstances, and enrich the results.

By evaluating the results and the proposed model, it can be stated that effective and low-cost outcomes can be expected at the neighborhood level due to intervention in the identified places. Therefore:

- The place with the highest priority to develop a public space is one with the most numerous and serious problems, the most powerful development tools, and the highest indicators of sociability.
- Although 13 intervention points were identified as potential public spaces, development is not necessary for all of them. In other words, by initiating development at the point with the highest priority, other points will automatically undergo development through a domino effect. Thus, it is necessary to observe priorities and evaluate the outcomes of interventions step-by-step to make further decisions concerning the other spaces.
- Part of the effects of development and the scope of these effects depend on the type of interventions in each of these spaces. The scale and type of interventions should be selected so that they neither become neutralized due to being minor and ineffective nor become impossible due to high costs and being unrealistic.

It should be noted that interventions aren't necessarily physical. Economic, social, managerial, and even cultural factors can be introduced as the target of interventions. Sometimes a change in social habits or management policies may resolve many problems and bring about remarkable development consequences. Thus, we should consider the priority of problems as well as their weight in the stagnation of a certain spot.

ENDNOTES

1. darker lines indicate a higher intensity of the indicator in the place
2. darker lines indicate a higher connectivity

3. darker lines indicate a higher intensity
4. darker lines indicate a higher intensity of the indicator in the place
5. darker lines show a higher intensity of opportunities
6. the darkest lines show the highest priority

AUTHOR CONTRIBUTIONS

Performing literature Review, collection of raw data, design, and distribution of questionnaires work with related software for data processing, and preparation of manuscript text and manuscript edition have been done by M Manouchehri. The research methodology was designed with the participation of M. Manouchehri and M. Rafieian. M. Rafieian has also participated in reviewing the research and making some corrections.

CONFLICT OF INTEREST

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication or falsification, double publication and, or submission, and redundancy, have been completely witnessed by the authors.

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