

Original Research Article

A Feasibility Study of Changing the Central Part of Mahmoudabad in Mazandaran into an Urban Pedestrian StreetIman Najafpur¹, Masoud Haghlesan^{2*}

1. Department of Urban Planning, Ta.C., Islamic Azad University, Tabriz, Iran

2. Department of Architecture and Urban Planning, Ilk.C., Islamic Azad University, Ilkhchi, Iran

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Abstract

Problem statement: The central part of a city is usually known as a key point for economic, social, and cultural activities. Due to its old texture and density, the central three-way street of the city has challenged the resilience of the region and caused problems for citizens due to the rapid urban development, increasing density of uses, and outdated infrastructure.

Research objective: This research was conducted with the aim of studying the feasibility of changing the centre of the city to an urban pedestrian street in the Mahmoudabad neighbourhood of Mazandaran.

Research method: This research is descriptive, and the research data were collected using a library-based research method. The data analysis method was qualitative (interview). The samples for the research included 28 experts, professors, and managers in the field of urban and regional planning in Mahmoudabad, Mazandaran. The data were analysed and reviewed using MicMac software.

Conclusion: The results showed that sidewalks as urban spaces can help strengthen social interactions, reduce traffic and air pollution, and increase the security and peace of citizens. Based on the results, economic components with a score of 142 have the greatest impact, and environmental components with a score of 84 have the least impact in transforming the central part into an urban sidewalk in Mahmoudabad, Mazandaran. Accordingly, there is a need to review urban policies and planning to help improve living conditions in this area and increase its resilience.

Keywords: *Feasibility study, Central sector, Urban pedestrian path, MicMac software, Futures research.*

Introduction

The transformation of the central part of the city into an urban pedestrian street, as a new approach to the design and management of public spaces, is of particular importance for improving the quality of life for citizens. As a safe and suitable space for pedestrian traffic, pedestrian streets not only help reduce traffic and air pollution but also pave the way for social interactions and increase vitality among city residents. The daily expansion of cities, the

increasing number of cars entering urban activity areas, and changes in social communication have negatively impacted the attractiveness of streets and sidewalks, resulting in an excessive emphasis on motorised movement (Kanoni & Rezavian, 2018) that has weakened the role of pedestrians in urban spaces (Pourahmad et al., 2016, 176). In other words, vehicles now dominate public space, with pedestrians no longer considered the primary users (Arvin et al., 2018:315). Walking is one of the most natural and oldest ways of moving people in space,

*Corresponding author: 09149116474, Ma.Haghlesan@iaiu.ac.ir

and its importance in everyday life is still evident. Walking is not only a tool for seeing and experiencing places and activities but also a way to feel life and discover hidden beauties in the environment. This simple yet profound activity plays a key role in the formation of spatial identity and a sense of belonging to the environment (Farajzadeh et al., 2021).

Urban life and its revitalisation require creating appropriate conditions for public spaces and encouraging people to be present in these spaces and to utilise urban public spaces. Social activities include various types of communication between people in urban public spaces that require their presence. If there is life and activity in urban spaces, there will also be social interactions, and if urban spaces are isolated and empty, nothing will happen (Gehl & Svarre, 2015, 35). Pedestrian paths, as public spaces, can effectively improve the quality of life of citizens and facilitate access to urban services. The design and creation of these spaces can strengthen social connections and promote local culture, as well as help attract tourists and economic prosperity in the city centre. Transforming the central part of cities into urban pedestrian paths is one of the most important issues in urban design and public space management. Physical components directly influence this process. Physical components can significantly affect citizens' experience of public spaces.

The use of the central part of Mahmoudabad, Mazandaran, as an urban pedestrian walkway is an issue that has the potential to create profound transformations in various economic, social, environmental, and identity dimensions of this coastal city. Transforming the central part of Mahmoudabad, Mazandaran, into an urban pedestrian walkway presents an opportunity to profoundly impact the economic, social, environmental, and identity aspects of this city. The feasibility study of this project will not only help improve the quality of life of residents but also serve as a key strategy for sustainable development and increasing the attractiveness of Mahmoudabad as a modern and humane tourism destination. This research comprehensively

analyses the various technical, financial, social, and environmental dimensions of the project and evaluates its effects on improving the economic situation, increasing social interactions, reducing pollution, and strengthening urban identity. In the current conditions of urbanisation and the need to move towards sustainable cities, this study not only responds to local needs but is also related to global urban development trends. Given that creating appropriate, human-centered public spaces can help strengthen social and cultural ties, this plan can be considered a model for other cities on the path to sustainable development and improving the quality of life.

Finally, the results of this study show that by considering the existing capacities in Mahmoudabad, sidewalk construction can be an effective step in improving urban life and the quality of public spaces. The main goal of this study is to assess the feasibility of transforming the central part of Mahmoudabad, Mazandaran, into an urban pedestrian street, while identifying the factors that affect urban pedestrian streets serves as one of the secondary goals. This research is in line with answering the question of how to evaluate the central part of the city as an urban pedestrian street in Mahmoudabad, Mazandaran, using a futures research approach.

Theoretical Foundations

Urban space has been known since ancient times as a platform for human social interactions. The importance of activities carried out in urban spaces is related to two main factors: the cultural factor and the environmental factor, or spatial-physical characteristics. The impact of these two factors on human behaviours and patterns is different. In fact, the use of space, especially by pedestrians, is more influenced by culture, while the environment, form, and space play complementary roles and cannot determine behaviour alone; therefore, urban design should not seek to change or modify the behavioural patterns of society directly. Instead, the goal of urban design should be to design spaces and related elements in a way that facilitates positive behaviours

and limits undesirable ones by creating barriers (Bahreini, 2011).

Historically, public spaces in cities were used as spaces to serve basic needs, communication, and entertainment needs, and to perform a number of political, religious, commercial, civic, and social functions. In contemporary developed societies, many of these functions have been transferred to private or virtual arenas (Salaripour & Beheshtizadeh, 2025). Historical development has affected how public space is used, and spending time in it is not considered absolutely necessary for people, so it is difficult to encourage them to be present in it instead of staying in closed spaces or at home. Four decades of study in Copenhagen indicated that inviting people to stay by creating high-quality public spaces will be effective. The larger the area for staying in public spaces, the more people will stay in the space, provided that the space is designed in accordance with human needs (Gehl & Svarre, 2015, 190). Public spaces are a suitable platform for meeting some human needs such as social contact, belonging, recognition, and participation (Nassirpour & Molaie Birgani, 2021, 22). Place identity is described as a crystallisation of memories, concepts, interpretations, ideas, and related feelings about specific physical settings as well as types of settings. Place attachment is part of place identity, but place identity is more than attachment (Wang & Eldemerdash, 2022). The vitality of urban space is deeply influenced by the levels of social interaction provided. A quantitative assessment method based on spatial social interaction can effectively predict the vitality of urban space and improve stability and predictability compared to traditional methods (Guo et al., 2022). Public spaces are social places that enhance social life and interactions; therefore, it is important to design these spaces with the specific types of users and their social relationship groups in mind (Cao & Kang, 2019).

Walking is known as one of the main methods of transportation in cities for short distances and has many advantages over other modes of transportation. One of these advantages is that walking does not

require any special tools or equipment. Furthermore, this method does not consume non-renewable energy and does not harm the environment. The costs of creating and maintaining suitable infrastructure for walking are much lower than for other vehicles. Walking allows people to adjust their time as they wish and, if the right conditions are available, provides equal access to urban facilities for everyone. This activity contributes to the health and well-being of people and makes urban spaces more dynamic. Furthermore, people can see their surroundings better while walking and become familiar with different activities and places. Walking provides an opportunity to discover the hidden beauties and attractions of the city (Moeini, 2011). Pedestrianisation as a capability refers to areas whose environmental conditions are designed to provide comfort and tranquilly for pedestrians and connect them with different destinations. It should create appropriate visual attractions along the entire route, encourage people to walk, and provide support for them in this regard. People should feel satisfied while travelling. Pedestrianised areas are areas with pedestrian-friendly characteristics, meaning that the environment of these areas is friendly for people to live, shop, meet, and enjoy (Hosseini et al., 2021). We can examine the feasibility of changing the central part of the city to an urban pedestrian street from various dimensions. Not only does this change impact social and cultural aspects, but it also has significant economic and physical effects. Creating a pedestrian street as a space for pedestrian traffic can help strengthen social and cultural relations among citizens. In fact, these spaces provide an opportunity for social interactions and cultural exchange, which in turn enrich the urban culture. From an economic perspective, sidewalks can help boost business and attract tourists. Providing a suitable space for walking and recreation creates more economic incentives for investment in these areas. Furthermore, the physical changes resulting from the creation of sidewalks can lead to an improvement in the quality of urban life. These changes include increasing green space, improving the condition of

infrastructure, and providing a healthier environment for residents and visitors. Accordingly, the feasibility of these changes must be carefully assessed and take into account all social, economic, and physical dimensions to achieve the best possible results for citizens and the city. This multifaceted approach provides a comprehensive and scientific perspective to address sustainable development and enhance the quality of urban life.

Research Background

To comprehensively investigate the feasibility of transforming the central part of Mahmoudabad, Mazandaran, into an urban walkway, extensive studies have been conducted on successful domestic and international experiences in the creation and development of urban walkways. These studies, with the aim of identifying the challenges, opportunities, and implementation solutions related to this type of urban project, have provided the basis for a more detailed analysis and more practical suggestions in the context of Mahmoudabad. The following will discuss in detail the findings of these studies and their adaptation to the local conditions of Mahmoudabad. In an article titled Investigating Pedestrian Permeability in Urban Pedestrian Networks, Benassai-Dalmai et al. (2025) concluded that areas with shorter edge links and more complex network structures show higher pedestrian permeability, supporting urban theories on walkability and accessibility, as explained by Jacobs. Nathvani et al. (2025), in a study titled Measuring Urban Vitality with Time-Lapse Streetscape Images and Object Detection for Scalable Assessment of Pedestrian Sidewalk Dynamics, proposed a measure of urban vitality for each location based on the coefficient of variation of pedestrian volume over time in its images, obtained from the count of people identified using object detection. In their study titled "Urban Street Dynamics: Assessing the Relationship between Sidewalk Width and Pedestrian Activity in Auckland, New Zealand, Based on Mobile Phone Data," Chuang And Qingqing (2024) analysed

average sidewalk widths and developed mobility metrics to assess urban vitality and sidewalk use using a large-scale mobile phone spatial dataset. Pissaia de Souza & Mulaski (2018), in their study titled "Revitalising the City Centre by Creating a Walkable and Sustainable City," introduced an integrated system of elevated sidewalks (skywalks), pedestrian walkways, squares, parks, bus stops, offices, and shopping malls in Kuwait and Brazil, inspired by successful models in cities such as Hong Kong, Kuala Lumpur, and Bangkok while incorporating the city's unique existing infrastructure. Ghahramani (2024) in the article "Investigating the indicators of environmental quality measurement in urban sidewalks (case study: Jannat sidewalk in Mashhad)" states that the nature of sidewalks is to create a high-quality urban space, but the complexity of their design is accompanied by sensitivities that, if not paid attention to, will lead to a decrease in the quality of the environment and a lack of people's presence. Habibi et al. (2024), in the article "Investigating the role of pedestrian orientation on sustainable urban development (case study: Chaharbagh Abbasi sidewalk in Isfahan)", stated that urban pedestrian orientation has a significant impact on achieving urban sustainability, in such a way that it has led to the strengthening and promotion of urban activities, reducing the use of environmental pollutants and helping to protect the environment, and reducing dependence on motor vehicles on Chaharbagh Abbasi Street. Kashani Hamedani et al. (2021), in their article entitled Explaining the Role of Temporary Retail on the Environmental Quality of Urban Pedestrians, pointed out seven main categories in the form of a network of themes, which include social interactions, activity alignment, small-scale economic mobility, multi-layered perceptions, harmonious visual composition, environmental suitability, and purposeful control. Examining the impact of temporary retail on the quality of urban spaces and pedestrians underscored these categories. Considering the review of studies in previous research, more attention has been paid to the

presence, social interactions, economic components, and environmental quality. Therefore, based on theoretical foundations and study history, effective components in the research topic were extracted, and economic, physical, social, and environmental components were identified as effective components.

Research Method

This research falls into the category of applied research and relies on future and descriptive methods in nature. In this study, documentary and survey methods were used in combination, and a questionnaire was administered to collect information. In the first stage, the factors affecting the driving components of urban sidewalks were identified and extracted. The main objective of this research is to investigate and analyse the factors that affect the development and improvement of sidewalks in cities. We have attempted to gain a deeper understanding of the challenges and opportunities in this area using the collected data. In particular, this study emphasises the importance of paying attention to the needs of sidewalk users and their impact on the design and implementation of urban projects. We carried out this identification by utilising the opinions of experts in the relevant field. In the second stage, a targeted questionnaire was used to identify and prioritise the influential components of the environmental scanning technique; it was distributed to 28 experts, professors, and managers in the field of urban and regional planning. The selection of 28 people was done to ensure adequate coverage of all dimensions identified in the environmental scanning (political, economic, social, technological, and environmental), and the interviewees included.

Academic professors (8 people): PhD in city planning and urban development

Executive managers (10 people): experience in formulating and implementing policies, recognising implementation barriers, and being facilitators at different levels of government.

Experts and consultants (10 people): operational perspectives; recognising field challenges; and technological and environmental opportunities.

The data collection process proceeded gradually. We conducted interviews with an initial number of participants and then analysed the data to fully cover the environmental survey information. We reached a saturation point and stopped the sampling process after interviewing 28 people.

The time horizon of this research was considered for 7 years, from 2025 to 2032. Then, the influential factors in changing the central part of the city to an urban pedestrian street in Mahmoudabad, Mazandaran, were analysed using MicMac software. After entering the information in the MicMac software, the relationship between the variables is determined based on the opinions of the respondents. After collecting the information, the interaction matrix was prepared in two stages so that the indicators were placed in its rows and columns. In the present study, we investigated the feasibility of transforming the central part of the city into an urban pedestrian street based on future research studies in Mahmoudabad, Mazandaran. [Fig. 1](#) shows the environmental dynamics diagram. Considering the issues mentioned in the theoretical foundations section, the research background and methodology of the components and sub-components affecting the transformation of the central part into an urban pedestrian street are shown in [Table 1](#).

Study Area

Mahmoudabad’s city, with an area of 262. 8 square

Table 1. Influential components of transforming the central part into an urban pedestrian street. Source: Authors.

Social	Economic	Physical	Environmental
Identity (indigenous culture)	Business Development	Quality of sidewalks	Linear gardens
Sense of belonging	Local business development	Urban furniture	Green space
Social participation	Vendors enter the sidewalk	Unused partitions	Preserving biodiversity
Safety and security	Rising land and property values	Correct lighting	Sustainable transportation

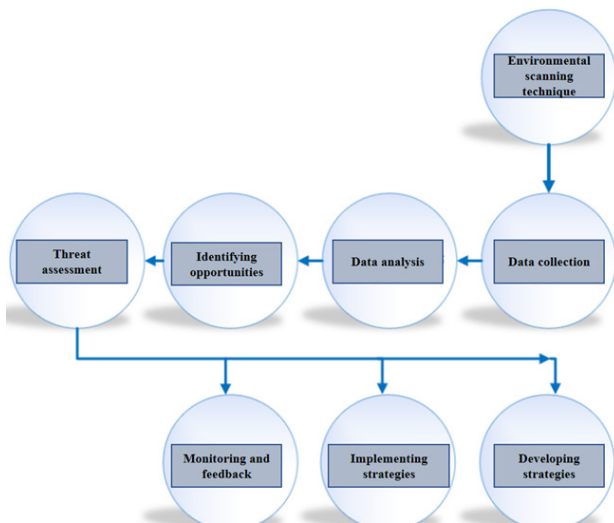


Fig. 1. Diagram of the environmental scanning technique. Source: Authors.

kilometres, is located adjacent to the Caspian Sea. Mahmoudabad city was selected as a case study to examine the transformation of the central part of the city into an urban pedestrian street due to its unique features and high potential in the field of sustainable urban development. Mahmoudabad, with its natural and historical attractions, is known as one of the tourist destinations in Mazandaran province. With its beautiful beaches, green spaces, and related infrastructure, this city provides the opportunity to create a suitable space for walking and social activities. Transforming the central part of Mahmoudabad into a pedestrian street can help improve the quality of life of citizens, increase social interactions, and boost economic prosperity. As public spaces, pedestrian streets provide the opportunity to create social interactions, promote a walking culture, and reduce air pollution. In this regard, studying the social, physical, economic, and environmental characteristics of Mahmudabad can help identify the needs and challenges in the area. This area has attracted special attention due to its geographical location and quick access to various facilities, including local markets, recreational centres, and cultural centres. Furthermore, the central part of Mahmudabad, as the beating heart of the city, is a meeting place for people and social activities, and many people come to this area every day for shopping, recreation, and spending

time. By examining this area, a better understanding of the needs and perceptions of the people can be achieved, and solutions can be proposed to improve the quality of life there. Identifying the strengths and weaknesses of this area can help better plan for its sustainable development. Fig. 2 shows the study area.

Research Findings

The MicMac software is designed as an advanced tool for analysing cross-effects in matrix calculations. After the end of the monitoring of the components, 16 sub-components affecting the effective components in the transformation of the central part to urban pedestrianisation were categorised into four groups: social, economic, physical, and environmental, according to theoretical foundations and research background. Based on the specified categories, 16 sub-criteria were analysed using the interaction/structural effects method using the MicMac software to extract the influential components. Based on the number of components, the dimensions of the matrix in the MicMac software were 16*16, which were arranged in four categories. Considering the importance of the subject and the accuracy, the number of repetitions in the software was considered twice, and accordingly, the degree of matrix filling was 92.96. Of the total 238 evaluable relationships in the matrix, 18 were zero relationships, 7 were one relationships, 122 were two relationships, 65 were three relationships, and 44 were potential relationships. According to the statistical indices obtained with two data rotations, the questionnaire had a desirability and optimisation of 100, which

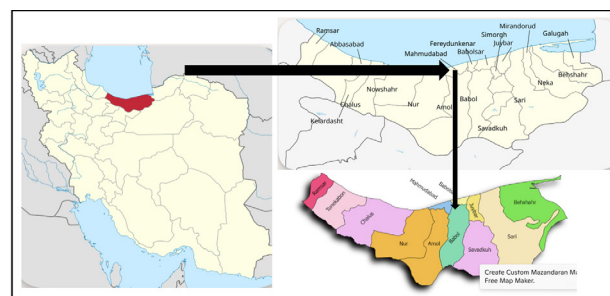


Fig. 2. Limited case study. Source: Authors.

indicated the high validity of the questionnaire. The distribution and dispersion of variables in the scatter plot indicate the stability or instability of a system. There are two main types of dispersion in this plot: the L-shaped dispersion, which indicates a stable system, and other dispersions, which indicate an unstable system. Fig. 3 shows the stability or instability of the system. The degree of suitability and optimisation of the matrix is shown in Table 2.

In the next step, to identify the key components, the stability and instability of the system are analysed. From the analysis of the scatter plot of the components affecting the changes in the central part of Mahmoudabad, Mazandaran, to the urban sidewalk, the instability of the system can be understood. Most of the variables are scattered around the diagonal axis of this plot. After completing the interaction matrix, the system variables are analysed using the MicMac software and categorised in an influence-dependence diagram, which divides the system variables into four main groups:

- 1- Independent variables: variables that have a great influence on other variables but themselves receive the least influence from other variables.
- 2- Dependent variables: variables that are greatly influenced by other variables but have little influence on other variables.

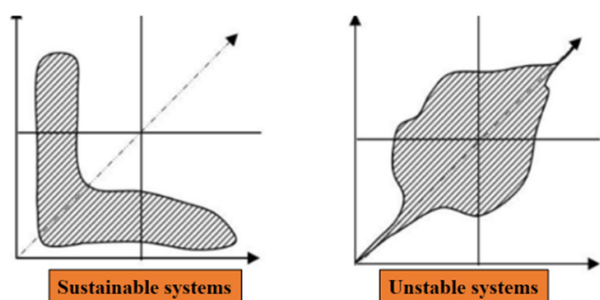


Fig. 3. System stability and instability in the distribution and dispersion of criteria in the Meek Meek model. Source: Godet, 2006.

3-Bimodal variables: variables that are both influential and affected, and these variables play an important role in the dynamics of the system, and changes in them can cause chain changes in the entire system.

4- Autonomous variables: variables that have little influence and impact on the system and usually do not play a key role in system changes. These variables may be important in some situations, but have a low impact on the system as a whole.

Considering the unstable state of the system, five types of variables can be identified: determining or influential variables, bimodal variables, regulatory variables, affected or outcome variables, and independent variables, which are shown in Fig. 4. Also, Table 3 shows the distribution of variables in order of location in each region.

Based on the analytical results of the matrix, the economic component with the number 142 had the greatest impact on the transformation of the central part of the city into an urban pedestrian street in Mahmoudabad, Mazandaran, and the environmental component with the number 84 had the least impact, while the social component with the number 123 had the greatest impact. Table 4 shows the degree of impact and direct impact of the components. The graph of the direct influence of the indicators is shown in Fig. 5. In these graphs, red lines mean strong influence “3”, blue lines mean medium influence “2”, and dotted black lines mean weak influence “1”. The first factor is the factor towards which the arrow is pointing. Based on determining the final score of the components in the transformation of the central part of the city into an urban pedestrian street, the three components of the entry of street vendors into the pedestrian street, the development of local businesses, and the increase in the value of land and property were identified as the most effective components in the transformation of the central part of the city into

Table 2. Degree of desirability and optimization of the matrix. Source: Authers.

Subject	Rotation	Influence	Influenceability
Factors influencing the transformation of the city center into an urban pedestrian zone	1	%91	%94
	2	%100	%102

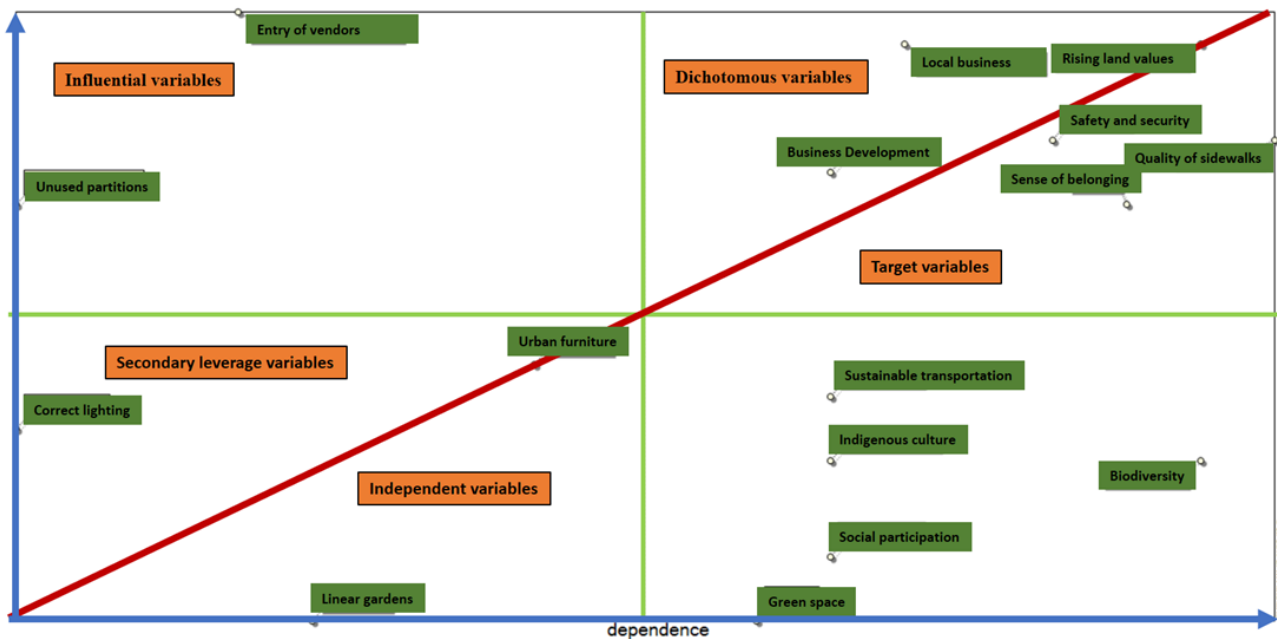


Fig. 4. Distribution of variables in the impact and impactability plan. Source: Authors.

Table 3. Distribution of variables Source: Authors.

Category	Component
Influential variable	Vendors entering sidewalks - Unused walls
Dichotomous variable	Business development - Local business development - Land and property values
Target variable	Safety and security = sense of belonging - Quality of sidewalks
Secondary leverage variable	Proper lighting - Urban furniture
Independent variable	Linear gardens
Influenced variable	Green space - Social participation - Indigenous culture - Preserving biodiversity - Sustainable transportation

Table 4. Direct impact and impact of components Source: Authors.

Component	Subcomponent	Impact Rate	Impact Rate
Social	Identity (Indigenous Culture)	23	29
	Sense of Belonging	31	33
	Social Participation	20	29
	Safety and Security	33	32
Social component plural		107	123
Economic	Business Development	32	29
	Local Business Growth	37	30
	Vendors Entering the Streets	36	21
	Rising Land and Property Values	37	34
Sum of economic components		142	114
Physical	Quality of sidewalks	33	35
	Urban furniture	26	25
	Unused walls	31	18
	Proper lighting	24	18
Physical component sum		114	96
Environmental	Linear Gardens	18	22
	Green Space	18	28
	Biodiversity Conservation	23	34
	Sustainable Transportation	25	29
Environmental component collection		84	113
Total		446	446

an urban pedestrian street. The key components affecting the transformation of the central part into an urban pedestrian street in Mahmoudabad, Mazandaran, are listed in Table 5.

Conclusion

The present study investigates the feasibility of transforming the central part of Mahmoudabad, Mazandaran, into an urban sidewalk, and this work is done from a futures research perspective. Based on the results obtained from the structural analysis in the MicMac software, sixteen components were selected as the components affecting the sidewalks of Mahmoudabad, Mazandaran, among which economic components were obtained as the most influential components in the future of urban sidewalks in the central part of Mahmoudabad, and it was determined that the components affecting the transformation of the central part into a sidewalk are mainly influenced by economic components. Physical components are strongly influenced by other components, and these

effects interact in a reciprocal and complex manner. In other words, the physical and architectural structures of a place are not only influenced by natural factors such as climate and geography but are also strongly dependent on social, economic, and cultural factors. Similarly, changes in physical components can also affect the social and economic behaviours of individuals. These components were identified as the most effective and influential components that enable the improvement and promotion of urban sidewalks in the central part of Mahmoudabad city. In order to achieve the goals of urban sidewalks, although it is not possible to accurately predict the future, it is possible to use components that provide clear images of the future of sidewalks. As a result, careful planning should be made to improve the influential components. Comparing the present study with other studies shows that in the study of Hamedani et al., the emphasis is on small-scale economic mobility in improving the quality of sidewalks, and in this study, economic components have also been emphasized as influential

Table 5. Key factors influencing the transformation of the central part into an urban pedestrian zone. Source: Authors.

Rank	Direct		Indirect	
	Component	Influence	Component	Influence
1	Entering the sidewalks by street vendors	829	Pedestrian Quality	784
2	Progressing local businesses	807	Rising Land and Property Values	762
3	Rising land and property values	807	Sustainable Transportation	762

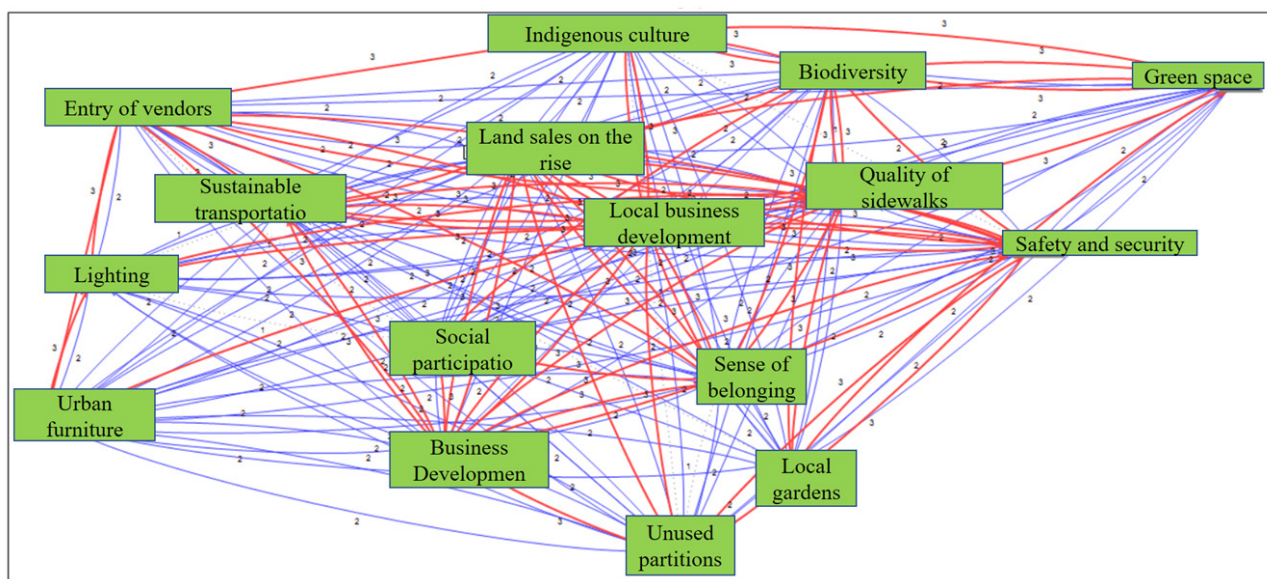


Table 5. Key factors influencing the transformation of the central part into an urban pedestrian zone. Source: Authors.

components in urban sidewalks. In the final conclusion of this research, it can be emphasised that in order to achieve the goals related to urban sidewalks, the necessity of establishing interaction and cooperation between influential components is felt. To enhance the scientific credibility and transparency of the results, the present research was conducted taking into account the possible limitations, which are mentioned below:

1- Collecting accurate and comprehensive data on traffic, economic, social, and behavioural patterns of Mahmudabad citizens, especially in the central part, faced challenges. Some data may be outdated, incomplete, or not publicly available.

2- Results from field studies may not represent general and stable conditions and may need to be revised in different time periods or conditions.

3- Economic feasibility analyses, especially for urban projects that have extensive social and cultural dimensions, may be accompanied by complexities in accurately modelling costs and benefits (both tangible and intangible).

Based on the above, the following are the executive suggestions for the research:

1- Dividing the project into smaller, more manageable stages

2- Holding briefing sessions, surveys, and participatory workshops with businesses, residents, urban activists, and NGOs.

3- Providing comprehensive solutions for traffic management around sidewalks, parking lots, and alternative routes for vehicles.

4- Emphasis on designing attractive public spaces, appropriate urban furniture, lighting, green spaces, and amenities to increase sidewalk use.

5- Activating sidewalks by holding festivals, exhibitions, art programmes, and social activities.

The research's policy recommendations include:

1-Identifying diverse financial sources, including municipal budgets, government funds, attracting private sector investment, and public-private partnerships.

2-Making necessary changes in upstream urban plans to adapt to the new use of sidewalks.

3-Establishing laws and executive regulations

for sidewalk use, traffic hours, advertising, and commercial activities.

4- Developing educational programmes for citizens and providing extensive information about the benefits of sidewalks and how to use them.

5- Studying and localising successful experiences in sidewalk construction in other cities in Iran and the world.

Also, Fig. 6 shows the components affecting the transformation of the central core of Mahmoudabad, Mazandaran, into an urban pedestrian street.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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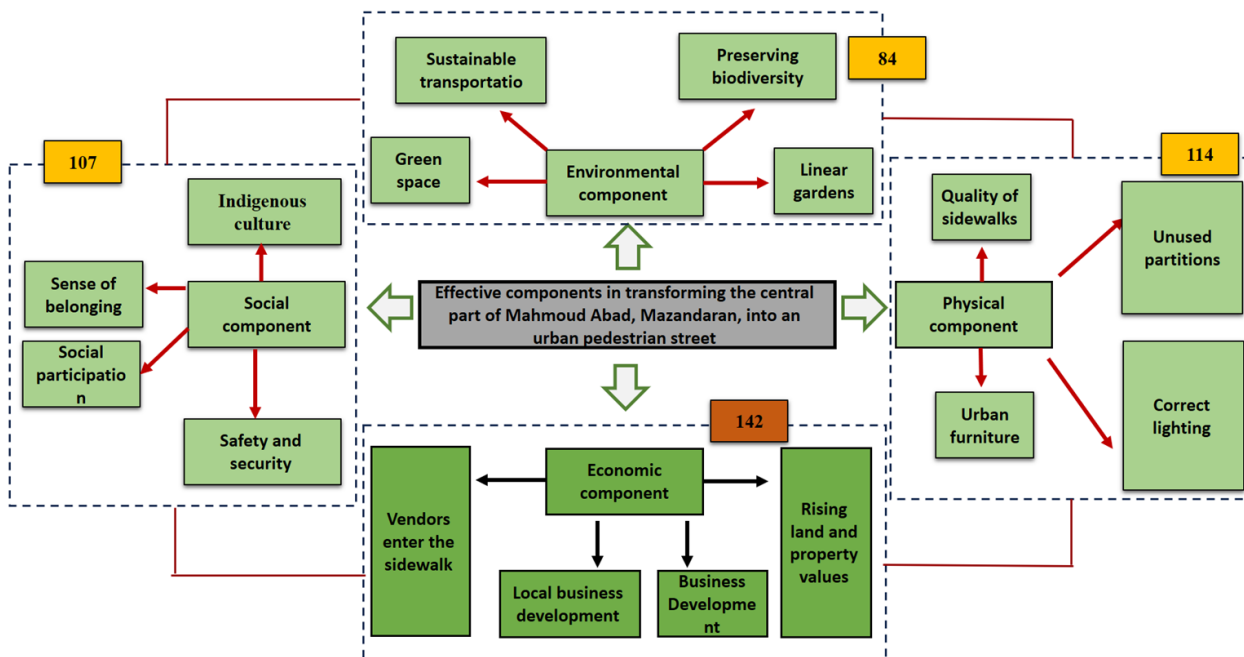


Fig. 6. Factors affecting the feasibility of converting the central part into an urban pedestrian street in Mahmoudabad, Mazandaran. Source: Authors.

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