

Article

Accessibility of Urban Tourism in Historical Areas: Analysis of UNESCO World Heritage Sites in Safranbolu

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Abstract: Expansion of cities with population growth leads to the differentiation of urban texture, negatively affecting the accessibility of tourism areas in historical regions. For this reason, there is a need to develop tourism areas that enable people to experience the areas of historical heritage. Sustainable urban development, which is also the theory of the study, has become an agenda for the protection and revitalization of historical areas in order to increase accessibility to tourism. The Safranbolu Protected Area, which is one of the oldest settlements with its traditional housing texture and which is included in the UNESCO World Heritage Sites List in Turkey, was chosen as the study area. In this study, the aim is to examine the accessibility of historical tourism centers, analyze the spatial configuration of the street texture in the city of Karabük and determine the features of the formation mechanism of the Safranbolu historical region. The research questions are based on the impact of (1) the accessibility of the street network on the formation mechanism of the urban architecture and (2) the shaping of urban tourism areas in historical cities. The space syntax method was used to examine the relationship between the building features of the Safranbolu Urban Protected Area and the formation features of the space. Within the scope of the study, the accessibility of the Safranbolu historical center was examined through the street texture that shapes the city form using data from Open Street Map. Segment and axial analyses were made based on the current street network data of the city. The key findings of the research revealed that the accessibility level of the city's street network was practically effective in shaping the Safranbolu Urban Protected Area. It was theoretically found that the streets with a high global integration value in the city have an impact on the shaping of traditional architecture and constitute important routes for tourism in sustainable development. The findings serve as a reference for researchers in sustainable development, urban planners and local governments who will use it to test the methodology for understanding the street layout of the historical area and improving the experiential characteristics of the users.

Keywords: urban tourism accessibility; street network; space syntax; spatial configuration; urban morphology



Citation: Şahin Körmeçli, P. Accessibility of Urban Tourism in Historical Areas: Analysis of UNESCO World Heritage Sites in Safranbolu. *Sustainability* **2024**, *16*, 2485. <https://doi.org/10.3390/su16062485>

Academic Editor: J. Andres
Coca-Stefaniak

Received: 12 February 2024

Revised: 8 March 2024

Accepted: 15 March 2024

Published: 17 March 2024



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1. Introduction

Historical environments in cities are the areas that enable the transfer of cultural heritage from past to present. Historical centers are places with cultural, historical, social, symbolic and urban values that represent the collective memory of their cities [1]. As an economically developing sector, tourism is gaining importance in historical areas. Historical city centers are points of attraction for national and international visitors. The renewal of cities over time and the use of historical heritage areas by people for tourism purposes will benefit the understanding of urban identity by developing the structural and social structure of a city [2]. It is stated that the protection of historical heritage and the sustainable reorganization of tourism areas have become a common agenda for urbanists [3,4]. The relationship between tourism and sustainability aims to balance the environmental, social and economic impacts of the tourism sector and protect historical heritage for the future. Sustainable tourism aims to minimize the negative effects of tourism making positive

contributions to local communities, cultures and the environment. Urban sustainability is a concept that has developed in connection with the newly emerging world of smart cities [5]. If tourism is controlled with appropriate technological methods, a more sustainable and smarter development of the urban system will be achieved. Steps are being taken to apply the concept of sustainability, which is understood as the local implementation of policies and actions to ensure sustainable development, to tourism [6]. With rapid population growth and uncontrolled urbanization, city centers are going through changes, which bring many problems along with them. And, with the impact of this change, the historical and cultural heritage, which is effective in the formation of the city's identity, is also being lost. Historical-cultural heritage is one of the non-renewable and limited resource values that establishes a bond between the past and the future, ensures intergenerational communication, and solves the identity problem by developing a sense of belonging to a place, a nation, a culture [7]. With rapid and irregular urbanization, areas with historical characteristics begin to deteriorate, losing their cultural identities. The integration of historical urban areas with newly planned areas is important for the preservation and sustainability of an urban identity. It is recognized that there is a conflict between heritage conservation and tourism development, which is pronounced in developing countries [8]. In this context, it is necessary to protect historical places within the understanding of sustainable tourism.

In order to increase the quality of life in cities with increasing population pressures, a good spatial organization should be ensured in touristic places. In improving the quality of urban life and creating urban integrity, the qualitative rather than quantitative features of urban factors become prominent. That is to say, streets, roads and avenues that connect buildings, neighborhoods, squares, zoning areas and, more generally, all regions of the city are important urban elements [9]. Gospodini [10] stated that urban design can be used as a tool of urban and tourism development. In order to understand urban design and the architecture that creates a city, it is necessary to examine the planning order that creates the urban form. Examining the street texture through the city form helps to understand the architectural structure and the process of the formation of cities. The characteristics of historical areas and the social structure of the society can be read through the city form. Street networks in cities are one of the most important parts that shape the urban form. Li et al. [4] applied a space syntax analysis to a historical site in China to investigate the relationship between the street network and tourism preferences while providing recommendations for tourism management. To sum up, there are many studies evaluating historical city centers regarding the spatial configuration of streets [9], the relationship between street network integration and urban texture [4], the effect of urban morphology on tourism [10], the building features and the formation features of spaces [2]. However, there is a need for research that will improve the accessibility of the streets in historical areas in the neighborhood unit and will examine spatial features from a macro to a micro scale for sustainable development.

Accessibility is defined as "the ease of access from a particular location to a land use activity using a particular transportation system" [11]. Providing an ease of transportation is also examined through urban morphology, which is related to the design, use and organization of urban areas. Urban morphology is a science used in determining the transformation processes of urban textures, making sense of the historical origins of spatial and functional structures and bringing them to the present day [12]. Urban morphology establishes a relationship with architecture for examining the formation process of cities. Urban morphology integrates architecture and town settlements that establish a positive relationship between buildings and urban forms at different urban scales [13–15]. There are many studies that use street networks as important parameters in understanding urban morphology [16–20]. Space syntax is a method used in research to analyze the morphological structure of the city and understand the social formation structure. Examining the street network, which is one of the essential elements of a city's morphology, with space syntax analysis gives an idea about the entire morphological features of the city [2]. It is effective

in mathematically examining urban areas in different topologies, from a residential scale to an urban scale. This method aims to reveal the extent to which spaces are used and the relationship between social factors and architectural forms with an objective and precise definition [21]. Based on the hypothesis that there is a direct relationship between space organization and social structure, the space syntax, which is a method for reading the city, investigates the potential of people to come together by overlapping their areas of movement and vision, especially in urban open spaces [22].

Studies carried out with the space syntax method generally focus on developing solutions for urban design by concentrating on issues such as the spatial organization of urban open spaces and the relationship between human and pedestrian movements. The space syntax analysis has been preferred in previous research on historical areas as it provides a visualized and quantitative approach to the exploration and investigation of historical districts in these areas of management, conservation and planning [23]. Hillier and Hanson [24] focus on the potential for the use of space through the relationship between people and space. Areas that are relatively more integrated tend to have a relatively higher density of use by individual users [25]. By examining the physical geometry of the city with the space syntax method, areas of movement are revealed. Hillier [26] argues that spatial configuration can be seen as the main determinant of urban movement flows. Studies have shown that the space syntax theory of motion flows sheds light on urban morphological studies. Hillier and Lida [27] examined the correlation used in graphical measurements of the street network in space syntax studies, the representation of axes and the observation of movement patterns, answering how people find their way in a complex urban structure and how they benefit from space. Using the space syntax method, Eyüpoğlu et al. [28] identified strategic axes for development and change in the historical center of Istanbul Galata and key areas for renewal, and proposed special design solutions to revitalize this area. Hillier [29] states that in the productive phase of design, what is needed to maximize architectural creativity is ideas about formal and spatial configuration that are as comprehensive as possible about specific formulas in order to leave the solution space as open as possible to creative invention. Özbil et al. [30] explain how street network design affects the distribution of pedestrian movement by adopting appropriate connectivity metrics that are sensitive to the spatial structure of street networks. Li et al. [4], in their research on the Gulangyu Island site, found that tourist preferences showed a high correlation with street network integration, and various suggestions were made to evaluate and guide better tourist area organization and historical heritage protection. Yu and Liu [31] combined an axis and image map to explore the special forms of Gulangyu of Xiamen in China, and their analysis results revealed that the social and cultural environment cannot be ignored for the spatial pattern of urban morphology. The results of the comparison of space syntax analysis and image map analysis show that consistent structure, organization and continuity are the main elements of understanding a city [32]. Understanding the spatial formation processes, differences and similarities of cities depending on cultural and social values is one of the most important questions regarding space syntax [33].

Many studies have been conducted on the spatial characteristics of historical areas. However, there is a need for evaluations regarding the spatial configuration characteristics of streets within sustainable development. The theory of this research is based on sustainable development, which provides an evaluation with an analytical and methodological framework. It has been stated that the management of sustainable tourism development is needed more than ever today [34]. The sustainable development concept has been defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [35]. Sustainable Development goals generally reflect a shift from a focus on ecological issues to the inclusion of broader societal issues [36]. Manioudis and Meramveliotakis [37] state that the recent focus on sustainable development presents the most serious social and political initiative to date to change humanity’s perspective on its relationship with the world of which it is a part. Sustainable development provides regular economic growth by choosing the right technologies. In this

context, the study contributes to sustainable development theory by evaluating tourism accessibility in an analytical framework with a method model. In this study, unlike others, the spatial configuration of the Karabük city, the Safranbolu district and the Safranbolu Urban Protected Area was analyzed from an upper scale to a lower scale through the macro form of the city. By using the space syntax method in the study, the effect of urban morphology on the formation of the architectural structure was measured, rather than its relations with human movements, as in other studies. The novelty of this research is that the basic analytical process is different and the choice of Safranbolu as the study area is important for its being included in the UNESCO List in terms of its accessibility of historical neighborhoods. Neighborhoods, which are micro-plan scales and one of the smallest living units, are important study areas in terms of creating a sustainable transportation system. This research is also important in terms of making an evaluation at the neighborhood scale, which is the smallest design unit of cities, for sustainable development in the future.

This study was carried out in the district of Safranbolu, which is on the UNESCO World Heritage List in Turkey. The Safranbolu Urban Protected Area is one of the oldest settlements and international tourism centers. Knowing the accessibility of the historical center of Safranbolu with its old settlement explains the relationship between the discipline of architecture and urban morphology. With the concept of City Planning entering the world agenda, the zoning plans of cities in Anatolia were drawn up immediately after the establishment of the Republic, and Safranbolu became one of the cities planned within the framework of these first practices [38]. In this context, the analysis of Safranbolu through the urban form contributes to other studies in terms of understanding the formation mechanism of historical sites. Understanding the formation mechanism of this settlement, whose traditional housing texture dates back to ancient times, in this part of the city is of importance in revealing its impact on conservation and sustainability. The aim of this study is to contribute to improving the spatial characteristics of the streets by revealing the integration status of the street network in the historical city center. The objective of this study is to make an evaluation from the city scale to the neighborhood scale and test the effect of ensuring neighborhood accessibility on sustainable development. As a result, determinations were made about where cognitive experiences could be developed in the historical city center. Specifically, the two main questions of the study are as follows: (1) Is the accessibility of the street network in historical cities effective in the formation of urban tourism areas? (2) How does street texture, which is one of the accessibility parameters of urban morphology, affect the formation mechanism of urban architecture? This study is based on the hypothesis of a positive relationship between the accessibility of urban morphology and the spatial configuration of urban tourism areas.

In the research, the relationship between the urban protected area and the city was examined through the street texture that shapes the urban form. The street texture of the Safranbolu historical city center was examined using the space syntax method. A numerical evaluation model was applied to analyze the spatial configuration underlying the traditional housing texture of Safranbolu. An examination was made to reveal the mathematical infrastructure of historical streets and where the uses have developed or can be developed. Examining the developing areas around historical centers such as Safranbolu is important for seeing their impact on the shaping of the urban form. The first information obtained about the Safranbolu city form dates back to the 14th century [38]. Understanding the spatial organization of the ancient city is important for its preservation and development. On the other hand, the findings of this research contribute to reveal the experiential characteristics of the streets and development of their tourism potential in a sustainable way.

2. Study Area

Safranbolu, which constitutes the main material of this study, was declared a 'World Heritage City' by UNESCO in 1994 with its natural and cultural values, and was protected with its tangible and intangible cultural heritage [39]. Safranbolu is one of the 15 sites on

the UNESCO World Heritage List in Turkey and is an important cultural tourism area reflecting 17th and 18th century Ottoman civil architecture [40]. It was chosen as the study area because it contains the unique architecture of the city. Examining the developing areas in an old settlement area such as Safranbolu is important for observing their impact on urban morphology.

Safranbolu, located in the city of Karabük, has intense tourism potential due to its natural and cultural values. The district is in a rugged terrain in terms of its geographical structure and has a surface area of 1013 km² [41]. The Safranbolu district, within the borders of the study area, is located in the geographical coordinates of 41°15'0" N latitude, 32°40'59" E longitude. Today, Safranbolu is a unique city that reflects all the traditional features of Turkish social life by depicting its unique historical and cultural environment [42]. Safranbolu was an economically important agricultural center until the end of the 19th century, and its economic structure had an impact on its socio-cultural structure by strengthening unity and solidarity, which in turn shaped the architecture and urban functions of the area [43]. The Safranbolu Urban Protected Area functions as an area with cultural values within its old neighborhoods and historical buildings. The city, which has been a home to many civilizations, has preserved historical values with its registered architectural structures. Monuments, baths, mosques and madrassas in the city's original architecture reflect its historical texture (Figure 1).



Figure 1. Historical city texture of Safranbolu.

The city of Karabük consists of six districts. These are Eflani, Yenice, Eskipazar, Ovacik, Merkez, and Safranbolu. Safranbolu is located in the center of the city of Karabük. In order to protect the historical city center of Safranbolu, which brings together many architectural structures, it is necessary to improve its physical accessibility and to increase its functionality without damaging its texture. Creating a city center that keeps the historical texture alive is important in terms of sustainability. The geographical location of the study area is given in Figure 2.

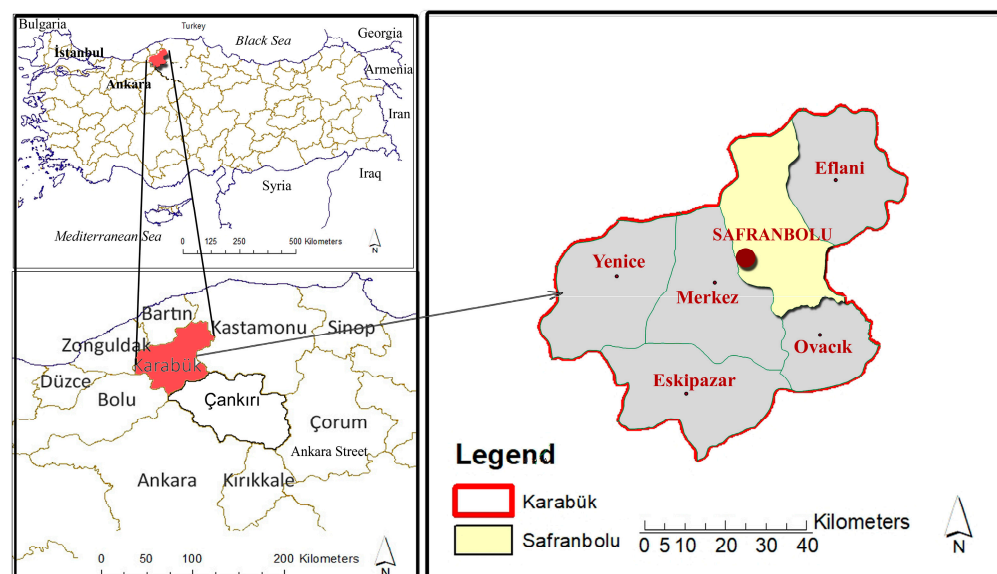


Figure 2. The geographical location of the study area.

3. Material and Methods

3.1. Methodology

The space syntax analysis method was used to analyze the study area. In the first stage of the study, data were collected, combined and made ready for use. Current road data were downloaded from the Open Street Map website and used in the study (Anonymous, 2023). Transportation axes were transferred to the ArcMap 10.5 software, where the roads were combined and a street network was created. The street network was transferred to the Autocad 2017, digitized and converted into an Autocad file format. These data were transferred to the Depthmap X 0.80. This study was carried out using data obtained in the summer of 2023.

In the second stage of the study, the street network configuration was analyzed. In this context, the Karabük city form, the Safranbolu district and the Safranbolu Urban Protected Area street network's accessibility were examined from an upper scale to a lower scale. For this purpose, segment and axial analyses were carried out in Depthmap X 0.8. Basically, the research focused on global and local integration as a result of the axial map analysis and the accessibility analysis as a result of the angular segment analysis. In the analysis phase, the segment analysis was performed first. Segment maps were created to analyze the length of each axle on the map created by the axes. Based on this map, an angular segment analysis (ASA) was applied to the city of Karabük and the Safranbolu district. Maps were created with the integration values calculated as a result of the ASA conducted in the research. In the Karabük city integration map obtained after the analysis, the accessibility status among all the districts of Safranbolu was determined. Then, the axial analysis was performed to reveal the accessibility of the Safranbolu Urban Protected Area at a lower scale. As a result of the axial analysis, global integration, local integration and connectivity values were calculated and maps of the area were created. The accessibility level was analyzed through the Safranbolu street texture. In the study, four basic measurements were used to obtain how the existing street system of the Safranbolu Urban Protected Area fits with the macro-scale street features of the Karabük city. These are the integration, connectivity, synergy and intelligibility.

In the last stage of the study, the street texture in the Safranbolu Urban Protected Area was analyzed and it was discussed whether the accessibility of this area was effective in the location selection of this area and the shaping of the historical city architecture. In line with the obtained maps and statistical charts, it aimed to evaluate the functional performance of the accessible street network based on the tourist route connection. The relationship network between the built environment and the city was interpreted in the area, where

there is a historical texture. The accessibility status of the Urban Protected Area is revealed in the Safranbolu integration map created as a result of the analyses. The experiential features of Safranbolu's historical city texture that need to be improved were identified. As a result of the research, various suggestions were made to develop tourism routes, taking into account the integration of the street network, and to direct the protection of the historical heritage through a good organization of the tourism area. The working flow chart is given in Figure 3.

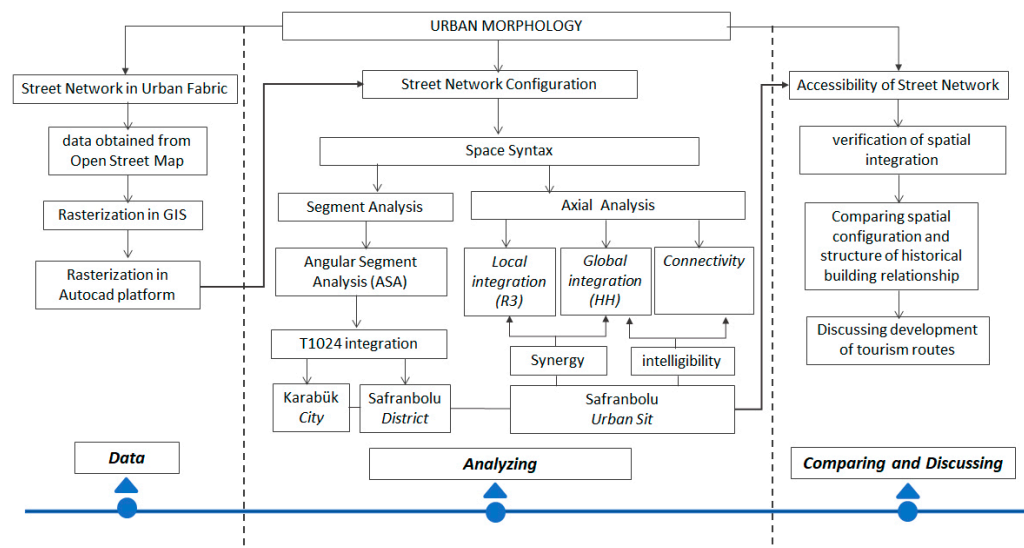


Figure 3. Data processing flow chart.

3.2. Space Syntax

A space syntax analysis represents spatial organizations at the building or city scale as patterns of relationality [44]. The space syntax method was first applied by Hillier and Hanson [45] to analyze configurations of an urban space. It is a method used in urban morphology studies and sheds light on research with a quantitative-based approach. Space syntax techniques can be used in the morphological analysis of urban areas and city plans. As a matter of fact, Atakara and Allahmoradi [46] state that the spatial syntax approach is useful for defining the spatial relations of the historical center and their difficulties in new urban development. Accessibility in spatial syntax is defined by integration, which is identified as the centrality of the proximity from the starting point to the destination in space syntax [47]. Configurational correlates of the urban grid configuration are found to be measures of the global properties of the grid, and the measure of 'integration' in the space syntax is consistently found to be the most important [25]. In all analyses of this method, two values are taken into account: local integration and global integration. While an analysis on a global scale shows many interrelated elements from any part of the city to any other place ($R = n$), an analysis on a local scale is limited to a specific area with a radius of 3 km ($R = 3$). Global integration calculates and analyzes the degree of the spatial integration of nodes with other streets [48].

In the space syntax method, the most important factor determining the mobility in the area is the integration value [49]. Integration maps are important for understanding how vehicle and pedestrian movement works within the urban system and the frequency of use of public spaces [29]. The higher the integration value, the higher the accessibility and commonality of the space [50]. Integration in space syntax is a primary indicator of spatial accessibility [51]. The integration of a line is, by definition, a value that indicates how integrated the line is with the system as a whole or how separate/inaccessible it is from the system [52]. High or low integration values indicate the accessibility value. The software classifies the analysis results as red, orange, green, blue and purple colors from increasing value to decreasing value.

An angular segment analysis (ASA), one of the elements of the space syntax method, is used to make up for the lack of geometric information [53–56]. An angular segment analysis (ASA) calculates how many paths must be passed from one segment to another. The street network was obtained with this map, which was created by drawing the longest and uninterrupted lines. The software provides a connection between two nodes in open areas.

In the integration maps, the depth values of the axes in the system vary. Depth is defined as the minimum number of compositional steps taken between two places to reach another place [57]. The total depth calculated by adding up the depths of each of the shortest paths between one section and the others in a street network is as follows [58]:

$$TD_x = \sum_{i \in s, i \neq x} D(x, i)$$

Areas with higher integration values, such as less deep areas, receive more movement, while deeper areas receive less movement [9]. Places with high integration values in the system indicate that they are well connected and easily accessible, and the integration value calculation is as follows [59]:

$$I_x = NC^2 / TD_x \quad (I_x: \text{integration value of space } x, NC: \text{node counts}, (TD_x): \text{total depth})$$

Intelligibility is the correlation between integration and connectivity. It measures whether the local spatial structure can help interpret the entire spatial system [60]. The space syntax literature defines the concept of intelligibility as the ability of a space to provide clues for the objective perception of the urban spatial configuration [61]. Synergy is the correlation between the global integration and local integration [45]. This value indexes the degree to which the number of instantaneous connections a line has (and are therefore visible from that line) is a dependable guide to the importance of that line in the system as a whole [62]. The higher the correlation, the more local areas in the system can be used as well-structured local combinations of the urban grid [12]. Srivanit et al. [15] stated that the higher the synergy value, the more the overall area is perceived to have local area accessibility.

4. Results

4.1. Segment Analyses

In order to evaluate the accessibility of the area, segment maps were created first. The segment map created by examining the transportation network of the Karabük province at the first upper scale is given in Figure 4a, and the segment map of the Safranbolu district is given in Figure 4b.

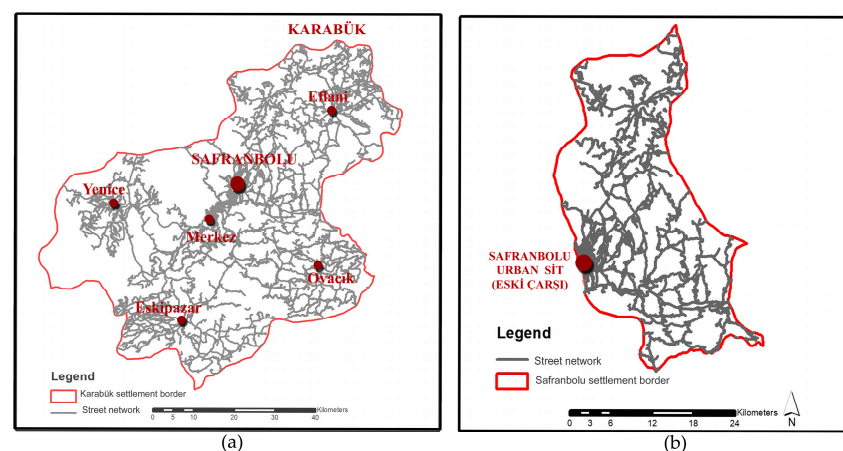


Figure 4. (a) Segment map of Karabük; (b) Segment map of Safranbolu.

An angular segment analysis was performed on the segment maps of the Karabük city and the Safranbolu district, and maps were obtained according to integration values. The

integration map of the Karabük province is given in Figure 5a, and the integration map of the Safranbolu district is given in Figure 5b.

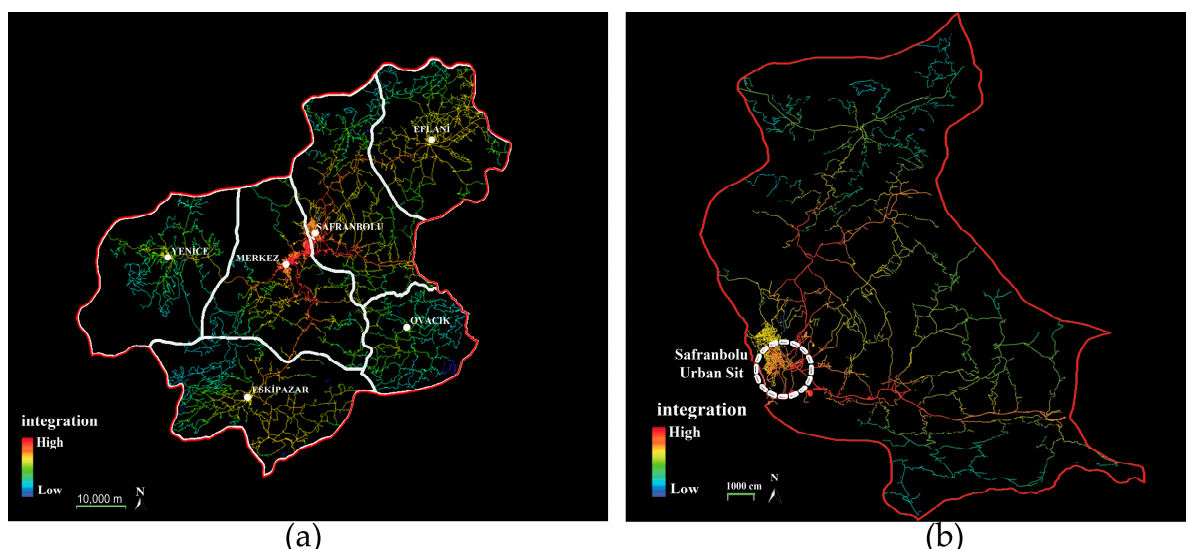


Figure 5. (a) Integration map of Karabük; (b) Integration map of Safranbolu.

Integration values were calculated according to the results of the Karabük city angular segment analysis. When the integration map of Karabük was examined, it can be seen that the highest values in red and orange are concentrated in the Central and Safranbolu districts. These areas, shown in red, have a high accessibility level. The areas defined as hot spots of transportation axes are concentrated in the center. It was determined that Safranbolu is located on intensively used and accessible transportation axes within its urban form. According to the integration map of Safranbolu, it is the region known as the Old Bazaar where the Urban Protected Area is located. It can be seen that the integration value of this region is at a high accessibility level with the orange and yellow colors. This area, located in the city center of Safranbolu, provides an overlap between historical and touristic areas and street network configurations. The streets in the region where the historical city center is located show commercial streets with a higher usage density and areas where movement in urban space increases. As we move from an upper scale to a lower scale through the city form, it is seen that Safranbolu is positioned in the morphology formed by the streets with high integration values.

In Karabük, the highest integration value is 84,162.7, the average is 49,339.9, and the lowest is 92.0342. In the Safranbolu district, the highest integration value is 716.747, the average is 458.134 and the lowest is 6.62368. The standard deviation is an important statistical measure that helps us understand how variable or homogeneous the data distribution is. It can be seen that the standard deviation is lower than the average in Karabük and Safranbolu. Compared to Karabük, integration values in the Safranbolu district have a narrower distribution around the average. As a result, integration values in the Safranbolu district are distributed in a homogeneous and consistent manner. Maximum, minimum and average integration values for Karabük and Safranbolu are given in Table 1.

Table 1. The T1024 integration values in Karabük and Safranbolu ($R = n$).

T1024 Integration	Mean	Minimum	Maximum	Std. Dev.
Karabük	49,339.9	92.0342	84,162.7	16,349.5
Safranbolu	458.134	6.62368	716.747	136.44

4.2. Axial Analyses

An axial analysis was applied to the Safranbolu Urban Protected Area and global, local integration and connectivity values were calculated. These maps are given in Figure 6.

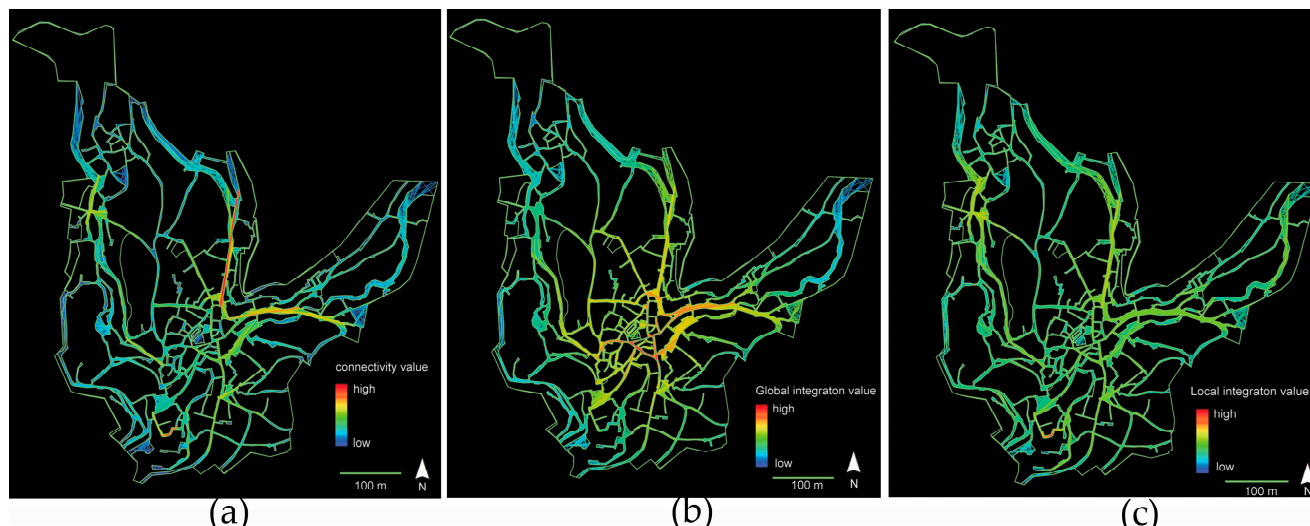


Figure 6. (a) Connectivity map, (b) Global integration map, and (c) Local integration map of the Safranbolu Urban Protected Area.

It was observed that the global integration values in the Safranbolu Urban Protected Area are higher than those of local integration. The connectivity value is higher in regions with long axes in the center. Maximum, minimum, average and standard deviations for the global, local integration and connectivity values in the Safranbolu Urban Protected Area and the attribute characteristics of the study result values are given in Table 2.

Table 2. Attribute properties of the study result values.

Variables	Mean	Minimum	Maximum	Std. Dev.
Global integration (HH) Rn	1.48401	0.628239	2.45177	0.310119
Local integration (HH) R3	4.56135	1.13657	9.28596	0.953063
Connectivity	71.998	3	300	50.6958

In order to analyze the intelligibility in the study area, the correlation of the global and local integration values was examined. The intelligibility value, generally given as R^2 , is evaluated to be either weak, good or strong, and values between 0 and 0.5 indicate that spatial identifiability is weak [63]. It was determined that this value was low ($R^2 = 0.093$). It is stated that if a spatial group has a high degree of comprehensibility, this means that its general spatial order is more easily recognized and understood by people [63]. It was determined that the general recognition of the intelligibility value in the area is also low in the urban area. The Safranbolu Urban Protected Area's synergy and intelligibility scatter plots are given in Figure 7.

The Urban Protected Area located in the Safranbolu district is a region of high importance due to its historical and cultural values. In order to examine the accessibility of this area, the current state of the area was revealed first. The current status of the Safranbolu Urban Protected Area is given in Figure 8a. The area includes regions formed by traditional houses, educational, commercial, religious, and social facility areas and green areas. In order to evaluate the spatial accessibility of the Safranbolu Urban Protected Area, the current situation map was overlapped with the integration map obtained by the space syntax method. The Safranbolu Urban Protected Area integration map is shown in Figure 8b.

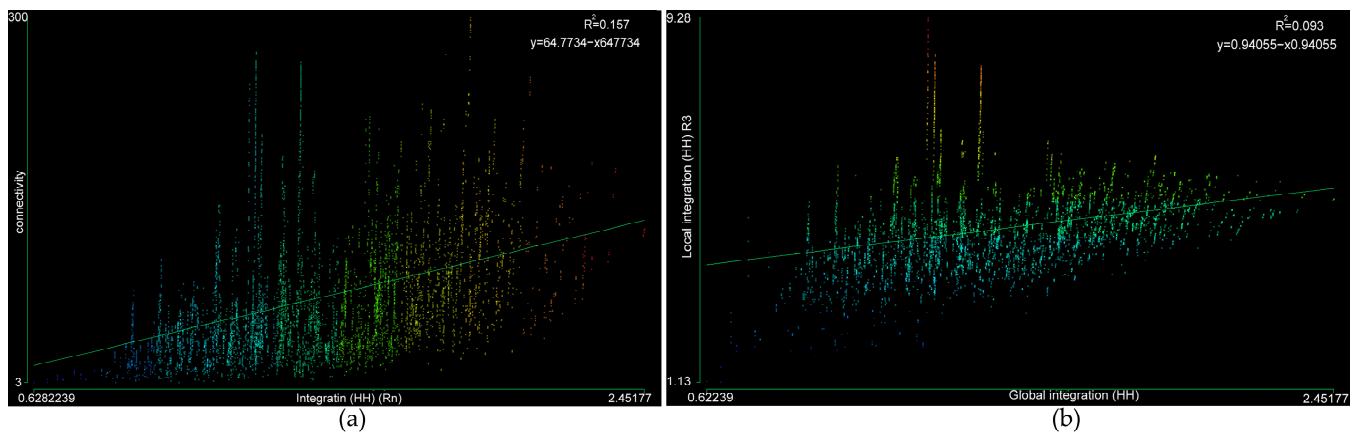


Figure 7. (a) Scatter plot of intelligibility; (b) Scatter plot of synergy.

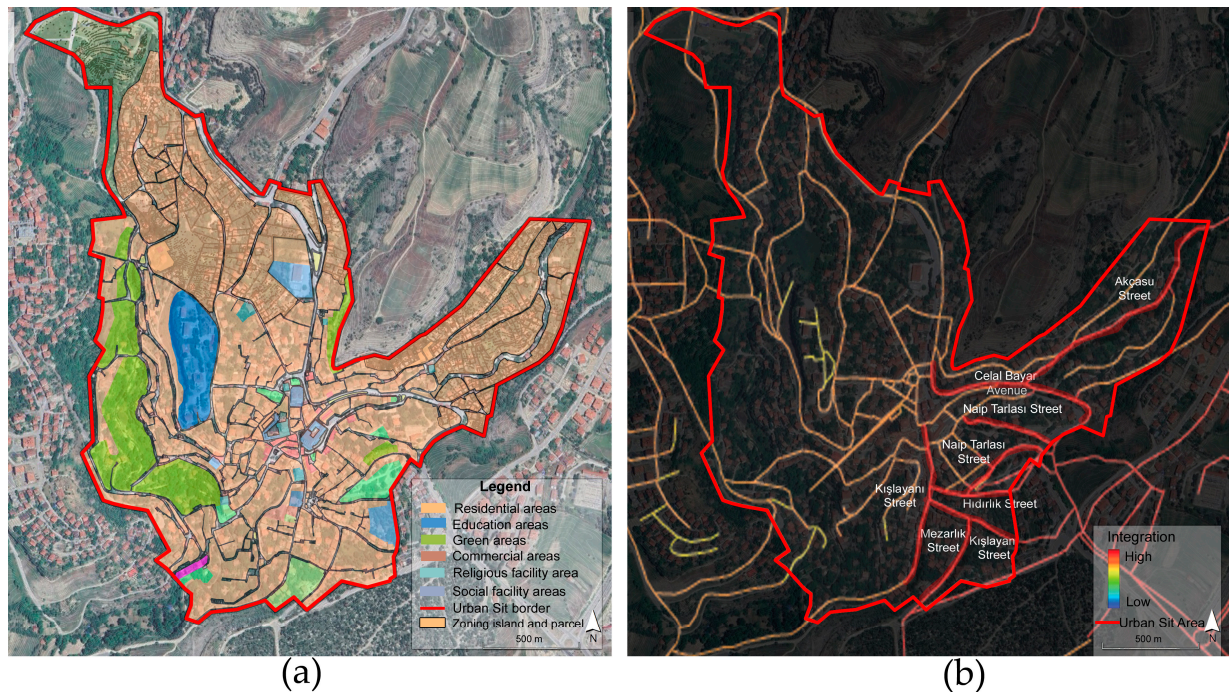


Figure 8. (a) Current map of the Safranbolu Urban Protected Area; (b) The integration map of the Safranbolu Urban Protected Area.

In the integration map, it can be seen that the Safranbolu Urban Protected Area is located in the region where the axes with high values are colored in red, yellow and orange. The highest integration value in the Urban Protected Area is the Akçasu Street with an average integration value of 676. Streets with high integration values in the Safranbolu Urban Protected Area are given in Table 3.

While the integration value is red in the eastern region of the Safranbolu Urban Protected area, it is orange in the western region. This is the region where urban construction increases in the western direction of the area. The socio-spatial development potential is higher with the axes in red in the eastern region of the area. The area is connected to road transportation axes in the southeastern direction. Among the roads reaching the center of Safranbolu, the integration value (in red) of the roads connected to the Kastamonu-Karabük and Bartın-Karabük highway is high. Therefore, this facilitates access to the urban protected area using the highway. When developing historical protected areas, it is important to identify the streets according to the intensity of use and balance the density.

Table 3. Streets with high integration values in the Safranbolu Urban Protected Area.

Street Name	Average Integration Value
Celal Bayar Avenue	666.5
Naip Tarlası Street	667
Akçasu Street	676
Kışlayanı Street	647
Mezarlık Street	661
Hıdırlık Street	672

5. Discussion

Historical city centers are important tourism areas for cities because of their cultural values. With the recent rapid growth of cities, historical areas are experiencing rapid change. In this context, perceiving the spatial structure of historical city centers and generating strategies to develop tourism potentials have gained importance in terms of urban identity. In order to reduce the pressures created by the rapidly increasing population and ensure sustainability, tourism accessibility in historical areas should be well organized. This study focuses on the spatial configuration of the city and examines the shaping of the historical city center with the parameters of space syntax.

In the research, it was found that the street network should be evaluated at the planning and design scale. In order to understand the mechanism that constitutes the traditional architecture of Safranbolu, which is evaluated in this study, the street texture that forms the city skeleton offers ideas on many subjects. In this study, the space syntax method was used as a tool to understand and evaluate the structure of the historical city center through the city form. The space syntax analysis provided different information about the relationship of a space with its social life. Gospodini [10] examined how urban morphology, including spatial and formal patterns, can affect urban tourism. It is stated that the wayfinding and accessibility of tourists in the city are important factors for city tourism [47]. On the other hand, the research showed that streets with very high global integration have potential for developing tourism routes. In their research on improving urban tourism accessibility, Kuzugil et al. [2] found that places that manage to balance global and local integrations could lead to an overlap in the behavior of tourists and local residents and these places can easily become tourist destinations. The results support this study and it was determined that the synergy value, which forms the correlation of global and local integration in the field, is low. Although the city of Karabük is located in an accessible location through the Safranbolu city morphology, the intelligibility value within the area (the correlation of connectivity and global integration) was found to be at a low level. In their research on the historical region in Iran, Askarizad and He [64] revealed that there is a significant relationship between spatial readability and human mobility patterns. Srinurak et al. [65] stated in their results on the historical area of Chiang Mai that the low value of the intelligibility coefficient affects the disappearance of the city and may make it difficult for users to understand the urban network of this city in terms of wayfinding. In this research, the low intelligibility of the space is similar to the result that the use of space and mobility in the area is low.

In the study, the Safranbolu Protected Area was analyzed through urban morphology, and it was determined that there is a relationship between the building block features that are effective in the formation of urban architecture and the shaping of the space. The space syntax method was useful in detecting this relationship. The space syntax proposed a mathematical framework for urban design and plays a role in making the urban space suitable to be people's living spaces. Günaydın and Altunkasa [56] stated that their study shows the importance of the spatial syntax method in determining spatial problems and producing solutions to these problems prior to planning or designing studies to be carried out in many historical city centers. As a result of this research, it was found that the

historical city center was located in a region where the accessibility of the street network was high, according to the Karabük and Safranbolu integration maps. However, it was revealed that the level of intelligibility within the Safranbolu Urban Protected Area is low.

The accessibility of the city morphology is effective in shaping the historical city center of Safranbolu. It was determined that the factor that increases the accessibility value of the eastern part of the Urban Protected Area is its connection with the road transportation axes in the southeastern direction. The findings showed that the spatial configuration features of the urban morphology play an important role in the use of streets in the historical area. Yetiş et al. [38] concluded that the biggest factor in shaping the houses that form the traditional texture of Safranbolu is the size of the building block. This research shows that the roads that shape the urban form enable the shaping of parcels and islands, which is effective in the formation mechanism of the traditional housing texture. The study argues that the spatial configuration of the street network in cities shapes land uses by predicting areas of movement and concentrations of human uses.

The study suggested that the spatial configuration that forms the street network in cities shapes land uses by predicting movement areas and areas where human use areas will be concentrated. In the integration maps that measure the accessibility level at the city and district scale, the points where access is concentrated are similar and it is seen that the historical city center is located there. Understanding the character and formation mechanism of a historical area will contribute to the creation of conservation and development strategies. As a matter of fact, Ceylan and Somuncu [40] stated that the areas to be protected should be considered with current city dynamics.

It is necessary to increase cultural and social uses and emphasize historical identity features in regions with high integration values in the history of Safranbolu. It is important to emphasize the perceptual characteristics of the area, based on the historical city center. In their study, Kuzugil et al. [2] stated that places with high integration values constitute important routes for passing tourists, while places with low integration values may prevent tourists from reaching these regions. In studies applying space syntax to visitor behavior and street networks, it was revealed that tourists prefer to walk on streets with high integration values [10,26,66,67]. It is indicated that UNESCO Standards emphasize the need to advance the decision-making process for the development and management of cities and historical sites [68]. Li et al. [69] stated that understanding the relationship between tourism systems and urban transport guides the optimization of tourism attractions' layout, sustainable transport systems and the road networks' improvement. In this context, by improving the morphological structure and perceptual characteristics, well-organized and sustainable tourism areas can be provided to Safranbolu, which is on the UNESCO World Heritage List.

5.1. Recommendations

The results of research show that the concept of sustainability, which enables the creation of smart cities, should be evaluated with technological methods through tourism in cities and developed with applications. For this purpose, streets with different accessibility levels obtained with space syntax technology in the Safranbolu tourism area can be developed with routes and applications that city residents can freely access. The accessibility of the area for tourists and local people can be improved with spatial configurations in newly created streets. Smart devices that measure visitor movements on these routes should be installed and monitored on the transportation infrastructure and their usage opportunities should be improved. Thus, the transportation system can be compared with both space syntax analysis tools and on-site smart measurements. On the other hand, pedestrian and vehicle traffic should be separated by controlling the passage of vehicles in the historical area, and pedestrian-oriented design areas should be developed in the area. In order to reveal traditional houses, local governments and tourism developers should first repair and protect the original buildings, and then develop tourism activities suitable for different structures, such as research tours. For sustainable development, city government

departments should encourage business owners to revitalize social and cultural facilities to enhance tourist experiences. The development policy should also be examined from an economic perspective by placing vehicles that will reflect the travel time and costs in the transportation systems of tourists on these determined routes. By ensuring the regular development of the road transportation network throughout the city, a more accessible and equal distribution of new tourism areas to be planned in the future should be ensured. The planning and management of tourism activities in districts with high accessibility on the transportation axis will contribute to sustainable development. In addition, creating a sustainable transportation system in the city ensures its accessibility for tourists in the surrounding areas. Creating a sustainable transportation system throughout the city can address the lack of accessibility to tourism and help achieve the goal of the sustainable development of tourism systems. Meanwhile, tourism accessibility should not only include improving tourism accessibility in central areas but also managing tourist demands. Development plans and policies regarding demands and transportation accessibility should be formulated in every region with tourism potential.

5.2. Research Contributions and Limitations

The study contributes to the literature of other studies by developing an analysis method from an upper scale to a lower scale in order to ensure sustainable development. The study proposes an analysis method model for how to achieve sustainable tourism development in urban areas in practice. It also sheds light on urban research in understanding the settlement mechanism of historical and traditional housing texture. Analyzing street networks through space syntax has contributed to a better understanding of the logic of urban formation and provided new insights. On the other hand, choosing the street texture parameter due to the research method tools of the urban morphology framework is a natural limitation of the research. One of the limitations of the study is that the morphology of the city was not analyzed by taking into account the street network and human movement patterns. Another limitation of the research is that it is based on physical parameters as it evaluates the accessibility criterion in interpreting urban morphology. Since the study area is a Protected Area, data collection is limited, and it can be improved using on-site data collection in the field (people counting, the determination of socio-economic variables, etc.) for a more comprehensive examination of the spatial configuration. For this, it is necessary to examine the area's relationship with urban life in terms of the social life, economic as well as physical aspects, in order to add a new dimension with different studies. For example, Manioudis & Meramveliotakis [70] provide perspective on the historical organizational and spatial transformations of Greek retailing by analyzing the evolution of the Greek retail trade to assess the spatial and social impacts associated with the establishment and operation of new forms of commerce. How the spatial restructuring of the historical area will affect economic and social life should be examined in future studies. Analyzing the morphology of the city by considering the street network and human movement patterns may reveal more important problems in space syntax. In this context, criticisms and limitations should be expanded in other studies. In the future, it is necessary to expand the scope of research and include human movements in the evaluation parameters in order to create inclusive living spaces between the people and the city.

6. Conclusions

This study aimed to understand the structure of cities from a different perspective by evaluating the accessibility of tourism areas in historical cities using the space syntax method. The findings provide an analytical and systematic framework to investigate the street layout of the Safranbolu Urban Protected Area, evaluating it from a macro to a micro scale. As a result of the study, it was revealed that the street texture, which is effective in the accessibility of the city morphology, is also effective in the shaping of its traditional architecture. It was determined that the axes with high integration constitute a much more important route for tourism. Safranbolu is being affected by its urban form and historical

past. On the other hand, it was determined that the main highways that make up the urban macroform are effective in determining the accessibility of the axes to which they are connected in the area. Having a low intelligibility value in the field resulted in low spatial identifiability.

Planning and design practices in historical city centers play an important role in ensuring sustainable development and creating a balance of protection and use. Providing the sustainable development of urban tourism and improving the tourism structure are of great importance in terms of assisting regional macro decision-making processes. Therefore, examining the accessibility of tourism centers in historical areas with technological methods and techniques will contribute to future studies. This study also shows that the spatial configuration, which is an important component of the sustainability of cultural tourism, will affect the tourist flow by examining it through the city form. This article provides a theoretical basis for the sustainable development of tourism by examining the rational configuration of transportation networks. The results from the historical city center of Safranbolu emphasized the importance of developing landscape design practices to increase cultural sustainability in areas with high street accessibility. This research offers an evaluation proposal in understanding the accessibility of tourism centers and in improving space and user relations. The research sheds light on how urban planners and designers can address historic sites to create a sustainable urban environment that encourages social interaction. The space syntax method can be used as a tool to understand the spatial structure of tourism regions to be newly created or developed in cities. The analysis results in the study are specific to Safranbolu and can be applied to other cities or can be evaluated to ensure sustainable protection in the planning studies of newly designed tourism areas. By using this tool, potential development areas can be managed and planning and design strategies can be developed. In this regard, it would be useful to evaluate the research on this subject with urban commissions that will bring together local governments and various professional disciplines. This study evaluates the urban form by determining the limitations of urban analysis, taking into account street widths, building block and parcel characteristics. Future studies should be developed to include human-scale analyses to validate methods for different impacts on other heritage sites and regions.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The author declares no conflicts of interest.

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