



Analytical Hierarchy Process for the Selection of a Square: The Case Study of Konya City

Büşra Altay^{1,a}, Nurgül Arısoy^{1,b,*}

¹Selçuk University, Faculty of Architecture and Design, Department of Landscape Architecture, Konya, Türkiye

*Corresponding author

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ABSTRACT

Rapid population growth, industrial and technological development, and improvement in the social and economical conditions of people have increased their need for socializing, gathering, and relaxing with various recreational activities and mutual communications. The sustainable development of social life has increased the importance of squares as public spaces, which brings the citizens together for cultural, commercial, and political purposes; thus, giving an identity to the city and becoming the focal point of urban life. The selection of an area as a square is based on certain criteria. The decisions regarding the choice of the location and their use as squares must be per the internationally accepted criteria. We studied four squares, namely Mevlana Square with historical background, Hükümet Square, Anıt Square, and Kılıçarslan City Square with a high demand for social events. The squares are considered to be important and comprehensive titles for evaluating their comparative functions under the selection criteria of visuality, functionality, and accessibility. The Analytical Hierarchy Process (AHP) method was used to determine the importance of the selection criteria of squares in a survey with participants for solving the problem and selecting the best square according to these criteria. By performing the AHP analysis, we found that the most preferred square by the participants was the Mevlana Square with a preference rate of 58.68%, and the most preferred criterion was “visuality” with a preference rate of 64.5%. In this study, we aimed to determine the characteristics of a preferable square to improve the existing squares and to contribute to the stages of a new square design, planning, and implementation.

^a busra.altay@selcuk.edu.tr

^b <https://orcid.org/0000-0001-7895-0450>

^b nurgul@selcuk.edu.tr

^b <https://orcid.org/0000-0001-8811-2215>



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Introduction

People have needed each other for various purposes and have come together throughout history. The increase and diversification of human needs, great changes in social and economic conditions with the rapid population growth, developing industry and technology have led to an increase in the needs of people such as spending time with each other, socializing, gathering, relieving stress with various recreational activities and mutual communication, and getting out of the psychology of loneliness.

From the past to the present, squares have been the focus of urban life, which was the first to form in cities, and as the most widely and effectively used urban open space element of urban life, revealing the identity and personality of the city. When the squares that always serve the public in various aspects are examined, it is seen that they undertake one or more functions such as religious, political, recreational, commercial, cultural, and gathering (Özer and Ayten, 2005).

Squares are the most used public spaces in urban life where the physical environment interacts. Spaces have the characteristics of ‘centres’ where people come together for the development and maintenance of social life and for commercial, cultural, and political purposes (Demirel, 2008; Güngör et al., 2019).

Squares, which are among the urban open spaces, are the most significant factors in establishing communication between society and individuals, facilitating social interactions, and strengthening social awareness. Spending time with others and engaging in interactions positively influence personal development and psychology (Erdönmez and Akı, 2005).

Squares are spaces that cater to users’ rest, entertainment, spiritual, and physical needs, fostering and strengthening communication among people, ultimately constituting and enlivening social life (Altınçekiç and Kart, 2001).

Squares have brought people together primarily for commercial purposes and provided opportunities for various activities (Yamaçlı, 1997).

Throughout history, squares have hosted various activities such as rallies, celebrations, markets, executions, demonstrations, and parades, serving multiple functions simultaneously. Surrounding the square, there have been various structures at different times, such as churches, residences, universities, and printing houses, which have influenced the square's diverse services (Öztaşkın, 2008; Sayın and Çorbacı 2019).

If an area serves different functions, all these functions should be accommodated without hindering each other in practice (Kürkçüoğlu, 2009).

To this end, it is necessary to look at the squares from the eyes of the people who use them and to design accordingly. Squares where many different social groups take place should be defined in line with the needs and expectations of the people.

The function or functions of a square are very important in terms of the vitality and visual appeal of the space. In terms of usability, squares should host various activities to attract people (Sertkaya and Çolak, 2011; Çorbacı and Ertekin 2017). Squares built to be functional should have an impressive and unifying feature (Marcus, 1998; Demirel, 2008). In this context, it is of great importance for the squares to be high quality and preferable areas to plan the squares correctly, to make a strong functional and aesthetic design and to ensure its continuity.

As the squares are spatially formed in the historical process, some areas can be arranged as new squares according to the requirements. In this context, the aim of the research is to determine the criteria groups and importance levels that will be used as a basis in the evaluation of the square functions of the areas that are used as squares in the city center of Konya and will be planned to be used for this purpose by the local governments, and to compare the squares that are the subject of the research.

It is necessary to define urban squares' qualities and to apply these qualities in existing areas and new designs for the realization of human use to the required extent and contribution to urban life. The important qualities of squares that have such an important place in people's lives should be determined and brought to the fore. For this purpose squares such as Mevlana Square, Hükümet Square, Kılıçarslan City Square and Anıt Square, that serve a large user group with different usage purposes and located within the borders of Konya which is the largest city of Turkey, have been selected. The visual and functional qualities of these squares and the parameters that may be effective on these criteria were determined, and a survey to be carried out with the help of these parameters was evaluated by AHP method.

In this study, AHP, which is a decision-making model based on priority ranking that emerged with paired comparisons of several elements or factors depending on certain criteria, was applied to the square options in the city center of Konya. The usability of the model in the comparison of city square options in the context of urban design has been tried. In the evaluation of city square options specific to the research area, findings that will shed light on the projects and practices to be carried out by local governments have been reached. Principles and

suggestions that can form the basis for similar research, projects, and practices to be carried out in different cities, areas, and places were put forth.

Material and Method

The main materials of the research are Mevlana Square, Hükümet Square, Anıt Square and Kılıçarslan City Square, which are in the city center of Konya, at the center of the city's main transportation network, where gathering, resting and some recreational activities are intensely carried out, thus having a more user population and a diverse user profile.

Pairwise comparisons were used to evaluate the importance levels of square usage preferences.



Figure 1. Konya city and study areas

It is aimed to rank the importance level of the criteria of being a square in the example of the city of Konya and to rank the squares according to these criteria.

The setup of the research, which aims to prioritize and rank the options of Mevlana Square, Hükümet Square, Anıt Square and Kılıçarslan City Square with the help of the Analytical Hierarchy Process method, consists of five basic stages such as definition of the problem, model the problem as a hierarchy, evaluate the hierarchy, establish priorities, and the final decision.

Definition of the Problem: There are two main purposes of the study, which is made to compare the square options with the AHP method in Konya city center example. The first of these is the ordering of the importance level of the criteria of being a square, and the second is the ordering of the squares according to these criteria.

Model the Problem as a Hierarchy: The first step of the method applied in the study is the hierarchical structuring of the decision problem. At this stage, it is aimed to divide the decision-making problem into sub-items and to create a model that shows the relationships between these elements.

The levels and elements in the hierarchy are as follows:

Level 1: Purpose; Comparison of the square options with the AHP method in the example of Konya city center and the importance level of the criteria of being a square.

Level 2: Criteria; Visuality, functionality and accessibility criteria were determined by the synthesis of the functions, qualities, and quality criteria of the squares, which are public open spaces.

Level 3: Alternatives; Mevlana Square, Hükümet Square, Anıt Square and Kılçasırlan City Square.

Evaluate the Hierarchy: The user evaluation form, which was created according to the problem hierarchy, was prepared for the people who use the squares, for the user's opinion needed in the process of relative evaluation of different alternatives and the selection of the importance levels of the criteria most suitable for the purpose. It was conducted with 452 people visited these squares from different gender, age, education level and occupational groups to ensure a certain level of consistency in the problem solving and comparative judgments. The comparison of square options with the AHP method and the pairwise comparison matrices showing the judgments about the importance level of the criteria for being a square were prepared according to the user evaluation results. Final user preferences were determined by geometric averaging on the comparison data. The data obtained from the AHP rating scale were converted into a pairwise comparison matrix.

Establish Priorities: After the participants' decision problem, criteria and alternatives were revealed, they first determined the importance of the criteria with respect to each other by pairwise comparisons, and then the importance levels of all the options for each criterion by pairwise comparisons. Common values should be obtained by taking the geometric mean to make an evaluation with the common judgments of the participants.

In the second stage of the model, the participants determined the importance levels of four square alternatives by pairwise comparisons according to each criterion.

Final Decision: In the evaluation made to compare the square options with the AHP method in the Konya city center example and to determine the importance level of the criteria for being a square, criteria and alternatives were taken into consideration. The user opinions were entered into a database in Microsoft Excel. The geometric mean and consistency ratios of these data were calculated for each of the pairwise comparisons. The relative importance value and the criteria according to the purpose, the alternatives according to the criteria are listed. The final decision, reflecting the opinions of the users who know Konya city center closely, was made according to the findings obtained from the solution of the problem, multiplying the total composite relative importance value with the weights of the criteria and the weights assigned to the alternatives according to the criteria.

Results

To compare the squares present in the center of Konya city by the AHP method and to evaluate the importance of square criteria, three criteria such as visuality, functionality, and accessibility of four squares such as

Mevlana Square, Hükümet Square, Anıt Square, and Kılçasırlan City Square in the city center of Konya were examined. The analysis was performed by pairwise comparison. The relative important value, the criteria according to the purpose, and the alternatives according to the criteria are listed.

According to the participants in the survey, when the degree of importance of the three criteria is evaluated, the visuality criterion with a preference rate of 64.5% was in the first place, the functionality criterion with a preference rate of 26.5% was in the second place, and the accessibility criterion with a preference rate of 9% was in the third place (Table 1).

Table 1. Decision criteria weight scores

Decision Criteria	Weight Rating
Visuality	0.645
Functionality	0.265
Accessibility	0.090

This study is important to determine the best alternative criteria and present developmental strategies for each square. The AHP analysis results showed that the Mevlana Square is the most preferred square based on all three criteria. The weightage of the criteria for square selection by the participants is presented in Table 1. The participants preferred the Mevlana square with a preference rate of 60% in terms of visuality, 57.3% in terms of functionality, and 52.9% in terms of accessibility. The Mevlana square had the highest values of all criteria. Accessibility was the most preferred criterion with a preference rate of 26.6% in Hükümet Square, 13.9% in Anıt Square, and 6.4% in Kılçasırlan City Square (Figure 2).

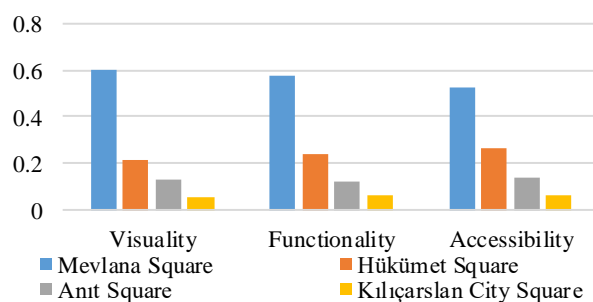


Figure 2. Ranking of alternatives for each criterion

The final decision reflects the opinions of the users who know Konya city center closely and visit these squares. By solving the problem, the total composite relative important value was obtained by multiplying the weights of the criteria and the weights assigned to the alternatives according to the criteria (Table 3). Mevlana Square stands out as having superior visual aesthetics; however, its functionality and accessibility are evaluated as relatively lower compared to the other squares. On the other hand, Hükümet Square emerges as a robust alternative in terms of functionality, albeit with less pronounced visual appeal compared to the other squares. Anıt Square holds an advantageous position with regard to accessibility considerations but garners lower scores in other critical criteria. Finally, Kılçasırlan City Square exhibits an overall inferior performance when compared to the other squares.

Table 3. General Synthesis Table

Decision Criteria	Weight Score	Criterion Points of Squares			
		Mevlana Square	Hükümet Square	Anıt Square	Kılıçarslan City Square
Visuality	0.645	0.600	0.213	0.132	0,056
Functionality	0.265	0.574	0.241	0.125	0,060
Accessibility	0.090	0.530	0.267	0.139	0,064
The final decision		0.587	0.408	0.095	0.024
Arrangement		1	2	3	4

Conclusion

The scope of the research included four squares such as Mevlana Square, Hükümet Square, Anıt Square, and Kılıçarslan City Square and three selection criteria such as visuality, functionality, and accessibility.

In this study, in addition to choosing the best square in terms of selection criteria, the importance of the criteria of a square was also evaluated based on the results of AHP analysis. The results also presented the developmental strategies for the squares present in the Konya city center. According to the evaluation results of the Mevlana Square, Hükümet Square, Anıt Square, and Kılıçarslan City Square and the alternatives examined in the study, we found that the visuality criteria was most preferred by the users. The Kılıçarslan City Square and the accessibility criteria were least preferred as per the rankings by the participants of the survey. As the population of the city increased, the need for housing increased, which increased the pace of construction in the city, and the growth of the city became inevitable. The development in technology, industrialization, and increased welfare of the people worldwide has increased the transportation networks and the use of public and private vehicles. Thus, the citizens can reach their desired destination easily. We assume that these factors are the possible reason for the lowest ranking of the accessibility criteria by the participants.

When the binary comparison of the squares and the criteria were considered one at a time, we concluded that the Mevlana Square was the most preferred square among the four squares based on all three criteria. Mevlana Celaleddin Rumi is popular for his unconditional tolerance and the philosophy of humanism worldwide and his tomb is situated at the Mevlana square. Therefore, the Mevlana square is the most visually preferred square by people, which is shown by our data. The Mevlana square is easily accessible by all types of transportations and provides an opportunity for gatherings and religious visits.

The Hükümet Square is the second most preferred square after Mevlana Square. As the square is located at the focal point and crossing point of the city, its accessibility rate is high. In the past, ceremonies such as enthronement were held in Hükümet Square. Currently, the square is used for administrative purposes as it is situated next to the government building and also for commercial purposes as it is situated next to the Historical Bedesten Bazaar. The proximity of the Şems tomb and the presence of the Şerafettin Mosque nearby for religious visits have affected the value of the functional criteria because of the square's versatile usability. The plants near Hükümet Square have to be increased to improvise the design and to increase its relationship with the structures that increase the urban identity in its vicinity.

In the Anıt Square, all three criteria showed similar results. The Anıt square is smaller in size than the other squares. The square is not large enough for public gatherings; therefore, its usage is low. The Atatürk Monument that was built in 1926 has given the name, image, and identity to the square, which is situated at the junction of some of the main streets of the city. Various ceremonies are hosted in the square, especially on national holidays such as 10th November, 23rd April, and 29th October every year. The existence and usability of the reinforcement elements in and around the square should be improved.

The Kılıçarslan City Square is observed to be the least preferred square by the users in terms of all criteria and general ratio. The Kılıçarslan City Square has been built recently and is close to Alaaddin Hill. Therefore, compared with the other three squares, the Kılıçarslan City Square does not have any historical background. The lack of greenery and equipment in and around the square is another reason for its least popularity among the users. Therefore, the number of plants near the square should be increased, which can enhance the design of the area. The existence and usability of infrastructure in plant applications should be increased. As the square can respond functionally to functions and changes that may occur later, structures that will ensure its relationship with the social and cultural facilities in its vicinity should be created.

We conclude that the AHP method, which is one of the most commonly used analytical and multi-purpose methods, can be used successfully for finding solutions on such hierarchical models. The method has advantages by providing a consistency criterion for evaluations in comparison charts, allowing cross-checking, and providing effective solutions to similar problems compared with other methods. The AHP method is considered one of the best methods that can select the best alternative criteria. By identifying the importance levels of the criteria, it can be possible to review and develop the low criteria as well.

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