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The spatial evaluation of the real estates in the Konya- Hacıkaymak Neighborhood with the analytical hierarchy process method

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Abstract

Real estate valuation is the appraisal of the real estate with an objective and impartial point of view, by evaluating many criteria related to the real estate, such as the characteristics of the real estate, the environment and the conditions of use. While valuing the immovable, it is necessary to consider all the criteria of the immovable and to determine the superiority of the criteria to each other in order to make the valuation qualified. Generally, in real estate valuation studies for residences, the spatial criteria of the real estate are ignored and are not considered important, but in fact, spatial characteristics also play an important role in determining the value of the real estate. In order to be able to evaluate spatially, it is necessary to determine and research the criteria effectively. In this study, the importance of spatial criteria in real estate valuation has been emphasized. It is aimed to make a spatial valuation of all residences located in Hacıkaymak Neighborhood in Selçuklu district of Konya province. 8 main criteria have been determined in order to make the evaluation in terms of location. The Analytical Hierarchy Process (AHP), which is the most widely used of the Multi-Criteria Decision Making (MCDM) methods, was used to determine the order of importance and weighting among these criteria in the evaluation of the houses in the selected region. Relationships between these criteria were determined with the help of literature research and expert opinions. In order to carry out this study, analyzes made with the help of Geographic Information Systems (GIS) were used. Distance maps of each criterion were produced and then a spatial value map was produced using the weighting obtained by the Analytical Hierarchy Process. As a result; The value of the immovables located within the boundaries of Hacıkaymak District in Konya/Selçuklu has been determined according to their spatial characteristics.

1. Introduction

The immovable is the whole of the goods that cannot be changed, cannot be moved from where they are located, and are fixed in place. Real estate valuation, on the other hand, is the estimation of the defined value of a real estate or a real estate project on the valuation day, based on independent, impartial and objective criteria [1]. Real estate valuation is defined as the sum of the formalities necessary for the objective and independent determination of the value of real estate, taking into account factors such as quality, benefit, environmental conditions and use [2].

In order to make a real estate valuation, it is necessary to know the value concepts related to real estate well and to reveal the differences [1]. Real estate valuation is a developing and important discipline today. It is important in terms of protecting the rights of the public and individuals, which are used for public needs such as expropriation, data regulations, nationalization and land-land arrangements, and private sector needs such as real estate and capital markets, insurance and banking [3]. It is not possible to talk about a precise model or mathematical method in valuation of real estate because there are many different methods used in valuation and

the criteria affecting the value of the real estate play an effective role in choosing which of these methods to use. Sometimes, real estate valuation may be preferred by more than one method.

While valuation of real estates that are residential properties, properties related to the residence are generally taken into consideration and external factors, that is, locational factors, are not included in the valuation. In order to make a qualified valuation, it is important to consider all the criteria for the house and to weigh the criteria according to their superiority to each other. Positional factors are also undeniably important and necessary in making housing valuation.

One of the methods used in real estate valuation and the preferred method in this study is Multi-Criteria Decision Making (MCDM) techniques. MCDM methods are a process that evaluates multiple criteria together and assigns values to alternatives [4]. It enables the determination of the best alternative when it comes to the evaluation and analysis of multiple criteria in the same time period. This method is preferred because more than one criterion affects the value of the real estate in real estate valuation. MCDM methods also have some advantages over each other. In this respect, the method is determined by showing which method to use can yield more qualified results.

Yalpir [5] conducted a survey to determine the factors affecting the value in his study. He created data sets in two different regions according to the structuring and aimed to select the most suitable model by determining the alternatives with fuzzy logic. Yalpır and Ünel [6] found that the criteria affecting the land value are; how it is formed in academic studies, legislations and international standards has been examined. In the study of Özcan [7], real estate value maps of the region were created for Mahmutlar Neighborhood, located in the Alanya district of Antalya province, using Analytical Hierarchy Process and Geographic Information Systems technology. Tunca and Üstüntaş [8], the study area was determined as the borders of 7 neighborhoods located within the borders of Seyhan district of Adana. They determined 10 criteria affecting the value of the real estate and created a mathematical model by weighting it with the TOPSIS method. Ertaş [9] aimed to educate real estate valuation in Turkey in his study. In Özgüven and Erenoğlu [10] studies, it is aimed to create a real estate value map of Çanakkale Province, Merkez District, Esenler District. They determined the criteria affecting the real estate value and produced a real estate value map as a result of the model obtained with the help of the Analytical Hierarchy Process.

In this study, Hacıkaymak neighborhood located in Konya/Selçuklu was determined as the study area. It is aimed to make a spatial real estate valuation of all residences in the neighborhood within the spatial criteria. In this study; 8 main criteria were determined in terms of location and it was aimed to draw attention to the importance of spatial criteria in the valuation of real estate by emphasizing the changes in the value of the houses in a neighborhood based on only spatial criteria. In the study, spatial criteria were weighted using the Analytical Hierarchy Process method. Geographic Information Systems technology was used in the production of the distance and spatial real estate valuation map.

2. Material and Method

Analytical Hierarchy Process (AHP) is one of the multi-criteria decision-making methods in which a hierarchical structure is created among alternative criteria [11]. It also provides a methodology for calibrating the numerical scale for the measurement of quantitative and qualitative performances. The scale ranges between 1/9 for the least valuable, 9 for the more important, and 1 for the equal ones [11]. In its general form, AHP is a method used to perform both deductive and inductive thinking without using analogies by considering several factors simultaneously, allowing dependency and feedback, and making numerical trade-offs to arrive at a synthesis or conclusion [12].

The necessary steps for the analysis and solution of a decision problem with AHP are as follows [13]:

1. Defining the decision problem is the first step. After the decision problem is defined, important criteria are determined depending on the perspective from which this problem will be analyzed.
2. Scoring is made according to the pairwise comparison method for the determined criteria. The degrees of value for this are as in Table 1. In this pairwise comparison method, all criteria are compared with each other and their superiority to each other is expressed numerically by giving values from 1 to 9, taking into account the previous pairwise comparisons in terms of consistency [14].

Table 1. Value Scale [14]

Significance Scale	Defines	Description
1	Equally important	Both criteria are equally important.
3	Moderately important	One criterion is superior to the other.
5	Extremely important	One criterion is strongly superior to the other.
7	Very strongly important	One criterion is strongly superior to the other.
9	Absolute degree of importance	One criterion is absolutely superior to the other.
2,4,6,8	Intermediate values	Values used when compromise between two consecutive criteria is required.

3. Pairwise comparison matrices are created. The comparison matrix is an n x n square matrix (Equation (1)) [15].

$$A = X_{ij} = {}_{(nxn)} \quad (1)$$

$$\begin{matrix} 1 & X_{12} & X_{13} \ldots & X_{1n} \\ X_{21} & 1 & X_{23} \ldots & X_{2n} \\ X_{31} & X_{32} & 1 \ \ldots & X_{3n} \\ \ldots & \ldots & \ldots & \ldots \\ X_{n1} & X_{n2} & X_{n3} \ldots & 1 \end{matrix}$$

The synthesis process is started to determine its weight among all criteria. Each column total is found (Equation (2)).

$$Bij = Xij \ / \ \sum ni=1 \ Xij \quad (2)$$

As a result of this operation, the B column vector is created (Equation (3)).

$$B_{ij} = {}_{(nx1)} \quad (3)$$

$$\begin{matrix} b_{11} \\ b_{21} \\ b_{31} \\ \ldots \\ B_{n1} \end{matrix}$$

Each value in the A matrix is divided by its column sum and in this way the normed matrix A is obtained (Equation (4)).

$$N = {}_{(nxn)} \quad (4)$$

$$\begin{matrix} 1/b_{11} & X/b_{11} & X/b_{11} \ldots & X/b_{11} \\ X/b_{21} & 1/b_{21} & X/b_{21} \ \ldots & X/b_{21} \\ X/b_{31} & X/b_{31} & 1/b_{31} \ \ldots & X/b_{31} \\ .. & .. & .. & .. \\ X/b_{n1} & X/b_{n1} & X/b_{n1} \ \ldots & 1/b_{n1} \end{matrix}$$

By summing the same column values in the N matrix, the criterion weights matrix (1xn) is obtained.

4. Consistency Measurement and Sensitivity Analysis; Before the criterion weights are used in the analysis, it is tested for usability. Performing this test is important for the accuracy of the study.

The values in the A matrix are multiplied by the criterion weights matrix and the values in the same row are summed. In this way, the (1xn) T matrix is obtained. We divide the values in the T matrix by the corresponding values in the criterion weights matrix. When we add the values in the obtained T/C matrix and take the average, this value is the lambda value. With this lambda value, the consistency index is calculated (Equation (5)).

$$CI = \lambda \, max - n \ / \ n - 1 \quad (5)$$

Table 2. Randomness Indicator Values [12]

n	RI	n	RI
1	0	6	1.24
2	0	7	1.32
3	0.58	8	1.41
4	0.90	9	1.45
5	1.12	10	1.49

The Randomness Indicator Value is determined by the help of Table 2 according to the number of criteria. The CR value required to determine consistency and precision is calculated as CI/RI. The CR value is expected to be less than 0.10 for consistent and sensitive analysis. If it is less than 0.10, grading between criteria can be made using the criterion weights matrix [16].

3. Results

The study area handled in this project is Hacıkaymak District in Selçuklu district of Konya province (Figure 1). In this study, it is aimed to evaluate the houses in Hacıkaymak District by considering the spatial criteria. The zoning map of the region and its current version on google maps have been provided. Buildings, roads and other layers in the neighborhood were transferred to ArcGIS 10.5 using Netcad 8 GIS. The centers affecting the real estate value were checked simultaneously with Google Earth, and each of them was recorded in different layers. These layers were also transferred to ArcGIS 10.5 with .kml extension and all data was obtained in this way.

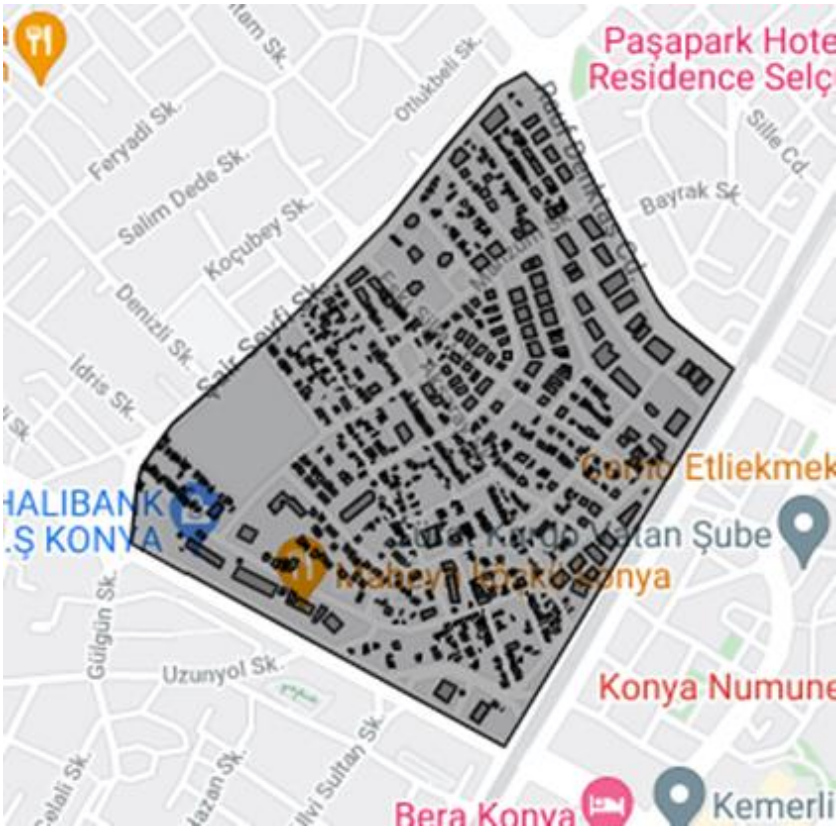

Figure 1. Field Area [17]

Analytical Hierarchy Process method, which is a modern valuation method mentioned above, was used in the evaluation of the criteria affecting the value of the real estate. First of all, in order to implement this process, spatial criteria affecting the housing valuation were determined (Table 3).

Table 3. Spatial Criteria

Criteria	Description
Distance to Health Centers	Proximity to Health Centers is very important in terms of emergency health situations
Distance to Transportation	Ease of transportation has been determined as a criterion because it facilitates the flow of life
Distance to Markets	Being close to the markets provides convenience in terms of meeting the needs
Distance to Street	Commercial centers, markets, hospitals and stops make real estate on the street more valuable
Distance to Park-Green Area	Proximity to parks and green areas is important for sports and social activities
Distance to Schools	Proximity to education centers is important for families with children
Distance to Pharmacies	Distance to pharmacies is important in case of urgent need
Distance to Mosques	Proximity to worship centers is important in terms of ease of worship

After the criteria are determined, pairwise comparisons are made with the help of the questionnaire and literature review, the superiority between the criteria is determined and the comparison matrix is formed (Table 3). The criterion weights and the effect percentage are determined (Table 4).

Table 3. Comparison Matrix

1	2	2	5	5	6	6	9
1/2	1	2	3	4	5	6	7
1/2	1/2	1	3	5	5	6	7
1/5	1/3	1/3	1	2	3	5	5
1/5	1/4	1/5	1/2	1	2	5	5
1/6	1/5	1/5	1/3	1/2	1	3	5
1/6	1/6	1/6	1/5	1/5	1/3	1	2
1/9	1/7	1/7	1/5	1/5	1/5	1/2	1

Table 4. Criterion Weights and Percentage Impact

Distance to Health Centers	0.306	30.6
Distance to Transportation Centers	0.219	21.9
Distance to Market	0.192	19.2
Distance to Street	0.099	9.9
Distance to Green Fields	0.077	7.7
Distance to Education Centers	0.056	5.6
Distance to Pharmacy	0.03	3
Distance to Worship Centers	0.021	2.1

Before the determined criterion weights are used in the analysis, it is tested whether they are usable. For this, Lambda, CI, RI values are calculated. The number obtained with CI/RI is expected to be less than 0.10 for the analysis to continue.

Lambda = 8.837258
CI = 0.119608
RI = 1.41
CI/RI=0.084829

Since 0.08 < 0.10, it has been determined that it is appropriate to use these values for analysis.

After this stage, it is passed to the stage of analysis using GIS technology. Criteria are set and distance analysis maps are created with ArcGIS 10.5. As a result, a spatial real estate value map is produced by using the weights determined for these distance maps and criteria.

In terms of location, 8 criteria have been determined. Distance to the street (Figure 2), distance to places of worship (Figure 3), distance to pharmacies (Figure 4), distance to markets (Figure 5), distance to schools (Figure 6), distance to green areas (Figure 7), distance to health centers (Figure 8), distance maps to transportation centers (Figure 9) were produced using the ArcGIS 10.5 program. Since the proximity to the determined criteria makes the house valuable in terms of location, each criterion has been evaluated with distance maps. Then, these maps were combined based on the determined Analytical Hierarchy Process weighting, in line with the weighting of the criteria. As a result; real estate value map was produced based on spatial criteria (Figure 10).

4. Conclusion and Discussion

Real estate valuation is an increasingly important issue today. In real estate valuation, the location of the spatial criteria is undeniably important. One of the most important investment tools is housing. Housing has always been important from the first-time people started to settled life until today. Evaluation and analysis of houses, which are a great need for human life and an important investment tool, and all kinds of studies on this, are important for the development of the real estate valuation area.

Many factors play a role in determining the value of houses. Undoubtedly, the location factor, which people always attach importance to, constitutes an important part of the criteria affecting the house. The reason why spatial criteria are important is that they are factors that make life easier and are necessary for well-being. Therefore, the analysis of the location and all the criteria related to the location is directly related to the value of the real estate.

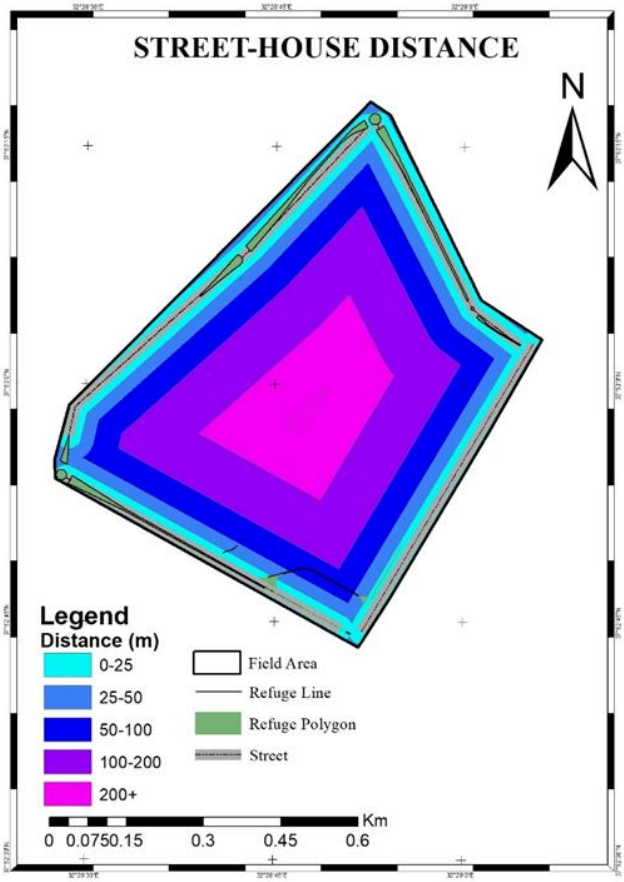

Figure 2. Distance Buffer Analysis Map to Street

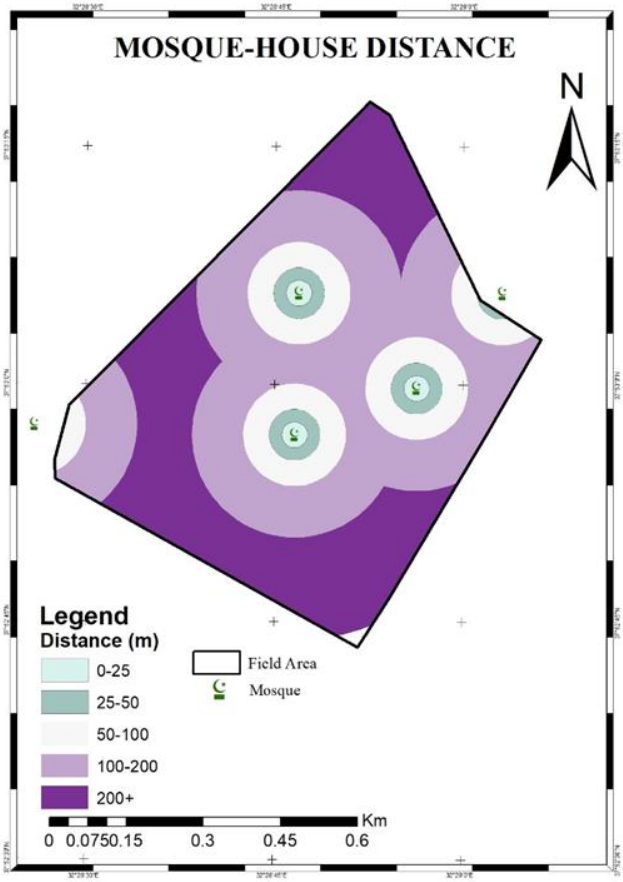

Figure 3. Distance Buffer Analysis Map to Mosques

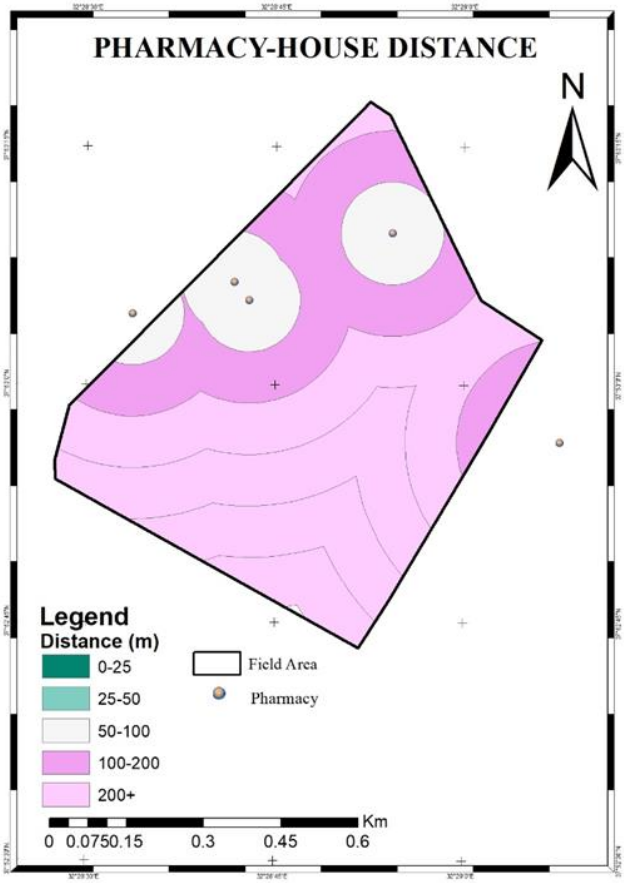

Figure 4. Distance Buffer Analysis Map to Pharmacies

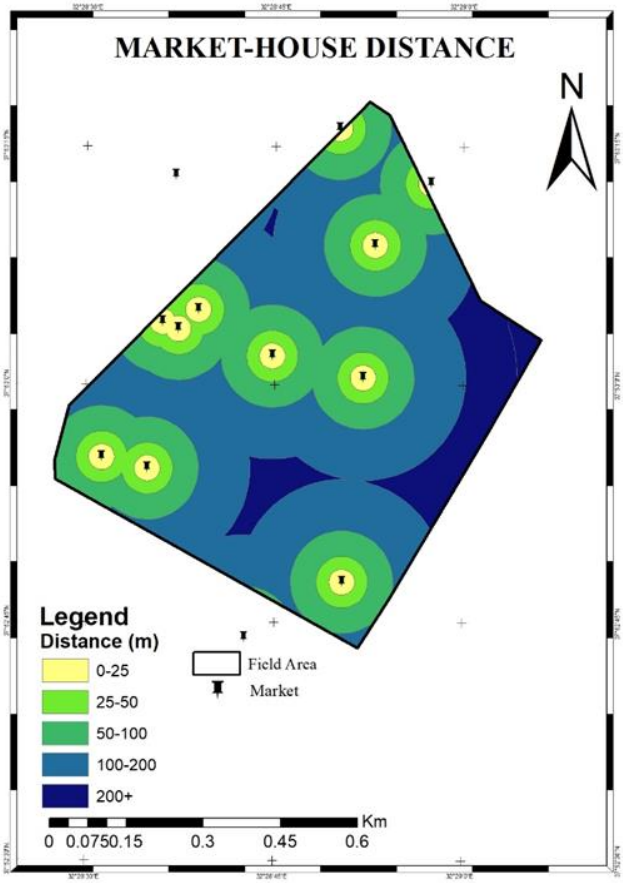

Figure 5. Distance Buffer Analysis Map to Markets

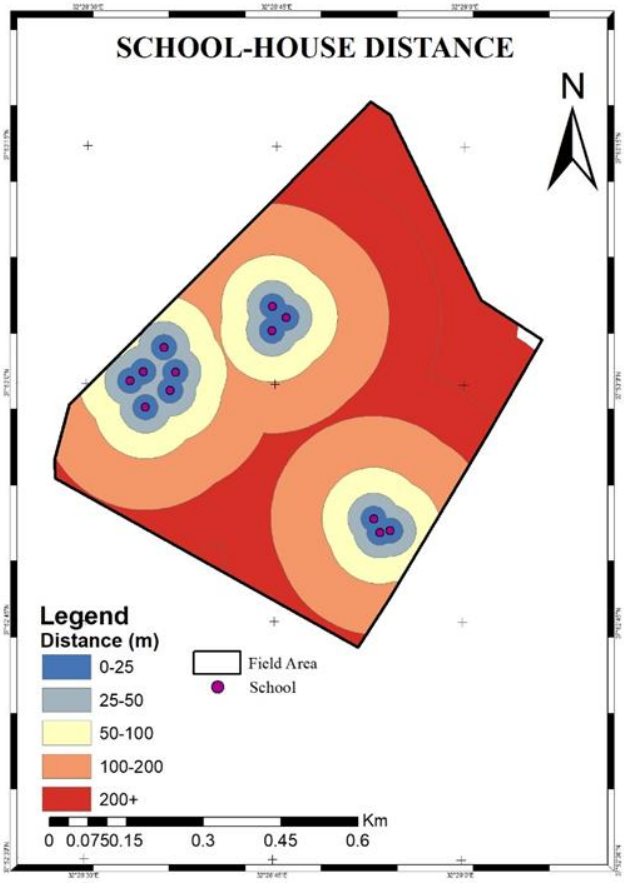

Figure 6. Distance Buffer Analysis Map to Schools

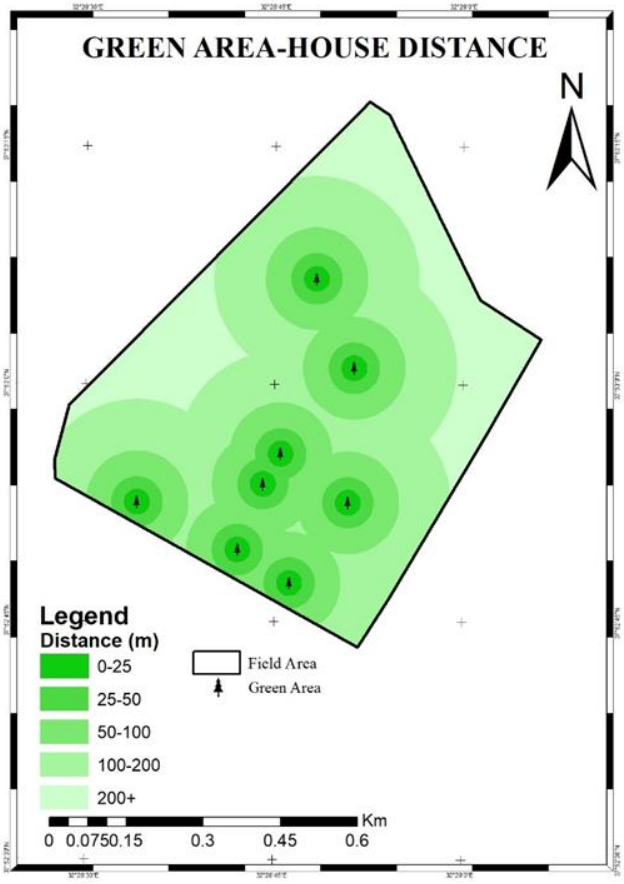

Figure 7. Distance Buffer Analysis Map to Green Areas

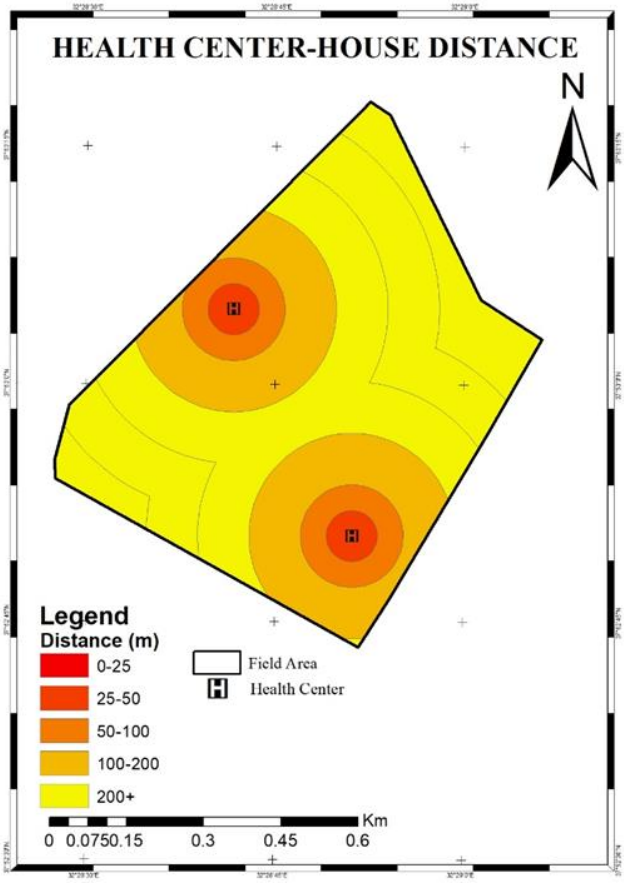

Figure 8. Distance Buffer Analysis Map to Health Centers

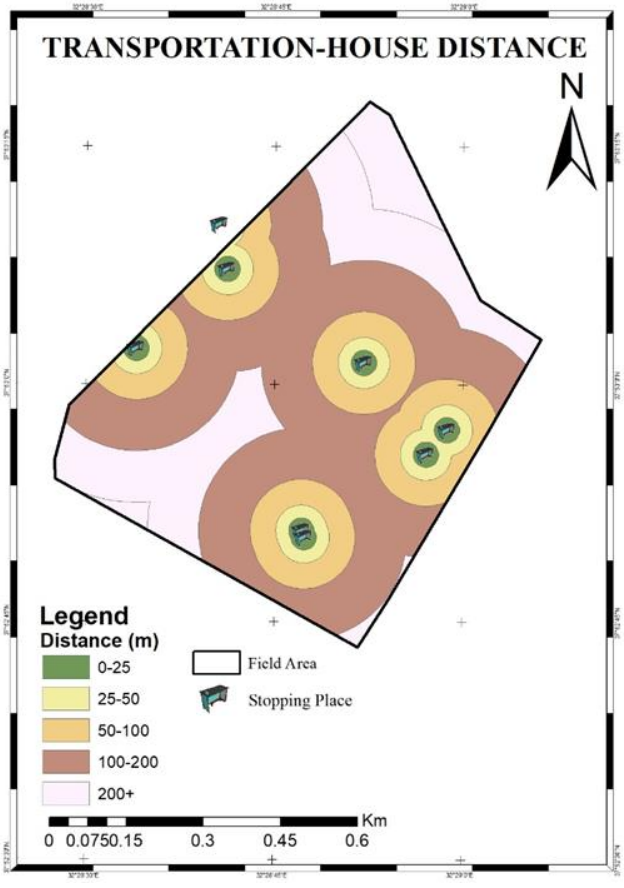

Figure 9. Distance Buffer Analysis Map to Transportation

In this study, it is aimed to make a spatial valuation of the residences in the Hacıkaymak District in Konya. The base used in the study was obtained from the zoning maps of the Selçuklu district of 2019 and Google Maps. The criteria affecting the value of the immovable and the residences were taken from the zoning map and Google Maps, and some operations were carried out in the ArcGIS 10.5 program in order to perform the necessary analyzes in the GIS environment.

For the evaluation of the immovables, 8 main spatial criteria have been determined. These criteria are; distance to the street, distance to health centers, distance to education centers, distance to transportation centers, distance to pharmacies, distance to prayer centers, distance to markets, distance to green areas. Distance maps of these criteria were created. The superiority of the criteria to each other was determined by survey study and scientific research. Within this ratio, the Immovables were weighted by the AHP method according to the degree of importance in the light of the criteria subject to the distance analysis. According to the weighting obtained, a spatial value map of the Hacıkaymak District was produced (Figure 10).

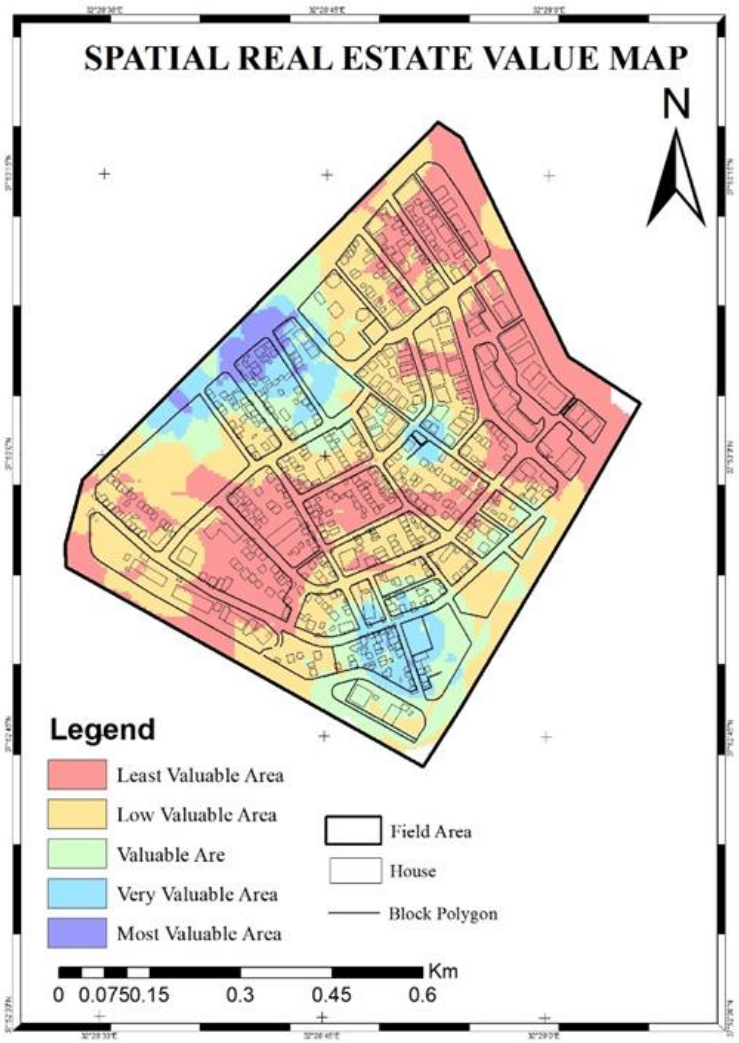

Figure 10. Immovable Value Map by Spatial Criteria

With this study, it is aimed to emphasize the importance of spatial criteria in real estate valuation by showing the effect on the houses located in the same neighborhood. In the real estate value map produced, it has been determined that the houses closer to the street are also closer to other facilities. It has been determined that the houses in the inner parts of the neighborhood are less valuable in terms of location compared to the houses in the outer part.

In the light of this study, it is desired to draw attention to the importance of positional criteria on the basis of valuation. While valuation of the house is made, the criteria of the house are generally taken as a basis. But positional criteria are not considered that important. In fact, spatial criteria are among the factors that affect the value of the house. In order to make the valuation of the house more qualified, it will be important to consider the spatial criteria and to affect the valuation. Based on only the spatial criteria, the change in the spatial value of the houses in a neighborhood is clearly seen in the spatial valuation map produced for the real estates. Therefore, it has been determined that the positional factors that may affect the valuation should be included in the valuation process and this is a requirement for a qualified valuation.

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Author contributions

Bengü Özsubaşı*:* Writing-Original draft preparation, Methodology, Application, **Mehmet Ertaş:** Reviewed and Editing, Investigation.

Conflicts of interest

The authors declare no conflicts of interest.

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The historical evolution and acquisition, circulation and withdrawal of rural homestead system in China

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Abstract

The land system of China generally falls into three positions, namely agricultural, land conversion, and urban land use. But, the land system of China's rural area is quite different from the rest of the world. This unique land system ultimately contributes to changing the countryside. After forming the new China, the Land Reform Law of 1950 paved the way for creating land ownership for farmers. But, implementing the rural homestead system in China's countryside was not an easy task because of considering the issue of the rural economy and farmers' rights. With the passage of time, China's land reform policy regarding the rural homestead system gets matured. Despite numerous efforts from the government side to effectively apply the right to use the rural homestead, there are many factors work that hinder the process. This paper tries to draw attention to the issues like the uncertain subject of homestead use right, restricted circulation of homestead use right, withdrawal of homestead use right, and others, along with the evolution of the homestead system in China.

1. Introduction

After the founding of new China, the rural homestead system evolved and has been continuously in practice and matured. Homestead ownership in China over the last three decades went on a transition from private to public ownership [1]. The evolution process of the rural homestead system in China can be divided into three stages (Table 1). The first stage was the beginning of the founding of new China from 1949 to 1961, where it was necessary to develop the rural economy in order to protect the rights of farmers living, promote rural economic development, and at this stage, the homestead was still in private ownership. The second stage was from 1962 to 2006; during this time period, the ownership and use rights of the rural homestead were separated. And the third stage is from 2007 to now, in which the ownership, use right, and qualification right of the homestead are separated, and endowing the homestead with more property ownership.

Table 1. The rural homestead stage system of China and their outcomes

Stage	Time	Outcome
First	1949 to 1961	• homestead privatization stage • introduced Land Reform Law • abolished feudal land ownership • ensured land ownership of farmers • production tools changed from private ownership to public ownership
Second	1962 to 2006	(1) collectivization of homestead (1962-1981) • end of the privatization stage and begin of the collectivization stage • restrictions on transferring the right to use the homestead (2) collective ownership system of homestead (1982-2006) • formulation of the Regulations on the Management of Land • introduction of "one family and one homestead" • restoration of property attribute of the rural homestead • strengthened laws to prevent the waste of land resources • Land Management Law promulgated in 1991 • imposed restrictions on transferring the use right of the rural homestead to urban residents
Third	2007 to now	(1) Reform and exploration of usufruct of homestead (2007-2015) • adoption of the Property Law in 2007 • usufructuary right holder got three rights to possess, use and benefit • guaranteed the usufruct of the homestead (2) "three rights separation" system of homestead (2015 to present) • revitalization of homestead and homestead circulation began locally • CPC Central Committee and the State Council approved farmer's qualification right of homestead in 2018

1.1 Homestead privatization stage (1949-1961)

In the early years, the People's Republic of China lagged behind the rest of the world in all aspects of strength, especially in economic development. Therefore, in order to achieve rapid economic development, new China formulated the first five-year plan and the second five-year plan during this period. In 1950, China promulgated and implemented the Land Reform Law, which abolished feudal land ownership and pointed out that farmers' land ownership was implemented in rural areas of China [2], and the land was uniformly and reasonably distributed to farmers. The law also explained that the land could be freely transferred, bought, sold, leased, or inherited. By the end of 1952, land reform had been successfully completed in all rural areas except Tibet and a few other areas. Combined with the land reform in the old liberated areas, more than 300 million landless peasants and those with little land were allotted about 700 million *mu* (Chinese land measure) of land and other means of production. The victory of land reform completely eliminated feudal land ownership, liberated agricultural productive forces, further consolidated the alliance of workers and peasants, and created conditions for the recovery and development of the national economy, national socialist industrialization, and agricultural socialist transformation.

In December 1951, the Central Committee of the Communist Party of China (CPC) adopted the Resolution on Mutual Aid and Cooperation in Agricultural Production (draft), which proposed to protect the enthusiasm of farmers' individual economy and mutual aid and cooperation, encourage and advocate farmers to carry out mutual aid and cooperation in rural production. After the land reform was basically completed, China soon entered a period of mutual assistance and cooperation, during which farmers still owned the ownership of rural homesteads. In July 1955, the Central Committee of the Communist Party of China adopted the Resolution on Rural Cooperation, which proposed that China should realize the establishment of primary agricultural production cooperatives throughout the country before 1958. However, as farmers actively responded to the call of the Central Committee of the CPC during this period, the enthusiasm for land reform was high, and China's agricultural socialist transformation was completed ahead of schedule at the end of 1956. At that time, rural homesteads, farm tools, and farm animals had all been collectively owned, and production tools and means of production had changed from private ownership to public ownership. However, there were no documents and policies in this period that clearly stipulated the ownership of rural homestead, so rural homestead could still be owned by peasant households by default.

1.2 Separation stage of homestead ownership and use right (1962-2006)

1.2.1 Collectivization of homestead (1962-1981)

On September 27, 1962, the tenth plenary session of the Eighth Central Committee of the Communist Party of China adopted the Revised Draft Regulations on the Work of Rural People's Communes, which stipulated the nature, organization, scale, and management of the people's communes. The production teams shall own all land within the scope of the production teams, and all land owned by the production teams, including members' private plots and hills and rural house sites, shall not be sold or leased. However, the house owned by the member shall still be owned by the member, who may freely sell or rent the house. In addition, article 152 of the Property Law allows the homestead users to occupy and use collectively owned land and make houses and create other facilities for them within the law [3]. Therefore, the privatization stage of rural homestead also ended with the birth of the draft amendment, and the collectivization stage of rural homestead began.

In March 1963, the concept of the right to use homestead appeared for the first time, making some supplementary provisions for members' homestead. However, farmers were not the only group allowed to own homesteads at this time. As long as they belonged to production facility personnel, they could apply for homesteads according to the process. This supplementary regulation notice confirmed the homestead transfer policy of "land for homestead", and initially formed the system model of the separation of ownership and use the right of the homestead. Later, on August 28, 1963, the Supreme People's Court issued opinions on several issues concerning the implementation of Civil Policy (Revised Draft), which made more detailed provisions on disputes over the right to use homestead. According to the guideline, members' homesteads, including empty homesteads with and without buildings, shall be collectively owned by the production teams and shall not be rented or bought or sold, but shall still be owned by individual households for long-term use. In the second paragraph of article 2 of the 1963 notice of the Central Committee of the CPC stipulates that "the attached objects on the homestead, such as houses, woods, shed, pigsty and latrines, shall always be owned by the members, who have the right to buy, sell or lease houses. After the house is sold, the right to use the homestead is transferred to the new owner, but the ownership of the homestead will still be owned by the production team" [4]. The commune members should not occupy the cultivated land by expanding the courtyard wall or the homestead on the pretext of building houses. Those who have already expanded their occupation and encroachment must withdraw. To protect cultivable land from rural housing, the state has imposed restrictions on transferring the right to use homestead. Addressing this issue, article 3 of the State Council's Emergency Notice on Preventing Rural Housing from Seizing Cultivated Land in 1981 stipulates that members who have been assigned to own a homestead can only have the right to use it except for renting, selling or transferring or building houses without authorization [5].

For the acquisition of the right to the use of a homestead, the household shall first apply for it, and the production team shall make a unified plan and solve the problem after discussion and approval by the members' congress. However, the idle land shall be used as far as possible, and the cultivated land shall not be occupied. In case of occupying the cultivated land, it shall be reported to the people's committee of the county for approval according to the provisions of "Article 60". The announcement of the Supreme People's Court's opinion makes the system of the right to use homestead clearer, but also emphasizes the collectivization of a rural homestead once again. Then the 1975 constitution stipulates that the state protects the ownership of the citizens and their earned income, savings, houses, and other means of subsistence. It also confirmed an economic system based on three levels of ownership and teams. The 1978 constitution made similar provisions. At this stage, the homestead system that the ownership of homestead belongs to collectives and the right to use homestead belongs to farmers has been confirmed by the constitution and relevant laws, but the conditions and procedures for farmers to obtain the right to use homestead are still not clear and specific [6].

1.2.2 Mature stage of collective ownership system of homestead (1982-2006)

With the development of the economy and culture, the state's protection of citizens' personal property is gradually restored and strengthened. At the same time, with the beginning and deepening of reform and opening up, people's living standards are constantly improving, and rural farmers' enthusiasm for building houses is also rising. As a result, misuse of farmland construction and other irregularities arose. Therefore, the urgent notice of the State Council on Preventing the Encroachment of Farmland by Rural Housing Construction on April 17, 1981, emphasized once again that the land owned by rural communities and teams should be owned by collectives, and the land used for rural housing construction should be unified in planning, rational layout, and economical use. In 1982, The State Council formulated the Regulations on the Management of Land used for building houses in villages and towns, which proposed "one family and one homestead", further standardizing the behavior of using rural land for building houses. In the same year, the State Council promulgated the "Notice of the General Office of the CPC Central Committee and the General Office of the State Council retransmission Secretariat Rural Policy Research Office of the Ministry of Urban and Rural Construction and Environmental Protection on effectively Solving the Report on the Misuse of Cultivated Land for Building Houses", which means that the existing homestead

and vacant land can only be used to solve the problem. At this stage, the property attribute of the rural homestead was restored to some extent. China has further strengthened the protection of the right to use rural homestead, and also further strengthened the restriction of the right to use rural homestead, which is still mainly to guarantee the right to live of farmers, but also to prevent the waste of land resources. To restrict the circulation of the homestead, the Administration of Rural Housing Land 1982 of its article 15 of the second paragraph stipulates that those who previously sold or rented house cannot reapply for homestead [7]. The same statement has been restated in article 38 of the Land Administration Law 1986 [8].

On June 25, 1986, the 16th Session of the Standing Committee of the Sixth National People's Congress adopted the Land Administration Law of the People's Republic of China to further solve the problems of unjustified occupation of cultivated land and misuse of land. Since then, On January 4, 1991, China promulgated the Implementation Regulations of the Land Management Law, which stipulated in detail the application procedures for the use of the homestead. So far, the conditions and procedures for the use of homesteads in China are relatively sound, and the system of homestead use right is gradually getting matured. In 1997, to protect cultivated land, the CPC Central Committee and the State Council issued the Circular on Improving Land Management and Effectively Protecting Cultivated Land, stipulating that the approval and administration of construction land should be further tightened. At the same time, this is the first time that "one household, homestead" was formally proposed in the form of central documents. In 1999, the State Council issued the Notice on Strengthening the Management of Land Transfer and Prohibiting Speculation in Land, which prohibited urban residents from purchasing homestead in rural areas, and the transfer of the right to use the houses on the homesteads was also restricted. The houses on the homesteads could only be transferred within the collectives belonging to the homesteads. In 2004, the Decision of the State Council on Deepening Reform and Strict Land Management emphasized once again that the use right of rural homestead should not be transferred to urban residents. The decision continues to maintain the residential security nature of rural homestead.

1.3 "Separation of the three rights of homestead" stage (2007 to present)

With the continuous development of the country's industrialization and urbanization and the continuous improvement of the national economic level, the circulation of the homestead is restricted, and the people occupy the farmland to build houses, and other problems are increasingly becoming prominent. After the Property Law of 2007 clarified the legal attributes of the homestead, restrictions on homestead circulation and various land management problems were alleviated to some extent. Later, Chinese laws also explored the system construction of the homestead system, gradually strengthened the management of land, and issued a series of relevant policies and regulations.

1.3.1 Reform and exploration of usufruct of homestead (2007-2015)

The Property Law was adopted at the seventh session of the Fifth Session of the Tenth National People's Congress on March 16, 2007, which clearly defines the right to use homestead as usufructuary right. That was the first time the state clarified the legal attributes of the homestead. According to Article 117 of the Property Law of the People's Republic of China, a usufructuary right holder has the right to possess, use and benefit from realty or chattel owned by others. Article 152 stipulates that the owners of the right to use the land owned by collectives have the right to occupy and use the land in accordance with the law to build houses and ancillary facilities. In the two law regulations of "Property Law" show that although the property law gives the usufructuary right holder three rights to possess, use and benefit, but for the right to use house sites, the law only clears the possession and uses of the two rights, and to a certain limit in the scope of our rights, namely the limited to the construction of residential and ancillary facilities, the right to use homestead is not explicitly granted. In 2013, the Decision of the Central Committee on Some Major Issues Concerning Comprehensively Deepening Reform proposed to guarantee the usufruct of the homestead and explore the mortgage, guarantee, and transfer of property rights of agricultural houses. In 2014, the Central Government issued opinions on Rural Land Expropriation, Marketization of Collective Commercial Construction Land, and Pilot Reform of the Homestead System, proposing to explore the mechanism of compensated use of homestead and voluntary compensated withdrawal of homestead [9].

1.3.2 Exploration stage of the "three rights separation" system of homestead (2015 to present)

Agricultural modernization should be accelerated, according to the 2015 government work report, referring to "coordinated efforts to promote stable economic growth and structural optimization." It mentioned prudently carrying out pilot reforms to expropriate rural land, put collective commercial construction land on the market, and implement the homestead system. Some local governments began to revitalize homestead and homestead circulation in various forms. In 2016, the Zhejiang government's compulsory reform pilot put forward the farmer's "qualification right" of the homestead for the first time, which laid a certain foundation for the "separation of the three rights" of rural homestead in China. Then in 2018, the CPC Central Committee and the State Council issued

the no. 1 document, which for the first time, put forward the expression of the farmer's qualification right of the homestead, which also marked the formal beginning of the exploration of the separation of the three rights of the rural homestead. In 2020, China began to deploy a new round of homestead reform pilots to further explore the reform of the separation of the three rights of the rural homestead. Up to now, China is still exploring the "three rights separation" system of homestead ownership, qualification right and use right according to the dual structure of urban and rural areas and the national conditions of urban and rural household registration systems with Chinese characteristics.

2. Material and Method

The present study is a descriptive-analytical approach to solving the acquisition, circulation and withdrawal of the rural homestead system in China. The study reviewed different laws and regulations related to housing and rural land management, including Land Reform Law 1950, Property Law 2007, Administration of Rural Housing Land 1982, Resolution on Mutual Aid and Cooperation in Agricultural Production, Resolution on Rural Cooperation, Notice on Preventing Rural Housing from Seizing Cultivated Land, Notice on Preventing the Encroachment of Farmland by Rural Housing Construction, Regulations on the Management of Land, and constitution of the people's republic of China. The Reform Law was considered a bold step of the government to protect the rights of the rural people by abolishing feudal land ownership. The property Law bestows homestead users to build houses and do other things on the land by conferring the law. The current study also consulted existing literature in support of this paper.

3. The Acquisition, Circulation and Withdrawal of the Right to Use Rural Homestead

3.1 Acquisition of the right to use rural homestead

3.1.1 The subject of obtaining the right to use rural homestead

Members of rural collective economic organizations who meet the requirements for building houses and applying for homestead shall enjoy the right to use homestead according to law (Table 2). Non-members of rural collective economic organizations shall not apply for the right to use residential land. But, meeting the following conditions can also become the subject of obtaining the right to the use of homestead: those who really need household division due to their children and other reasons and lack homestead; those who settle down and become members of their own collective economic organizations without homestead; relocation is necessary for the occurrence or prevention of natural disasters, the implementation of village and market town planning, and the construction of public facilities and public welfare undertakings of townships (towns). In addition, rural villagers shall not be approved to use house sites under any of the following circumstances: under 18 years of age; the area of the original homestead has reached the prescribed standards or can meet the needs of household division; selling or leasing houses in a village. Due to the different conditions of each province, the specific requirements of the subject of obtaining the right to use rural homestead are also different.

3.1.2 General procedures for obtaining the right to use rural homestead

The use right of the homestead has certain welfare nature. The main way for rural residents to obtain the use right of the homestead is to apply for it. Those who do not have a homestead, or do not need homestead for household separation due to the marriage of their children, or do not have homestead due to the need to build houses or due to the settlement of migrant population in the village, as well as those who need to be relocated due to natural disasters or the implementation of village and market town planning, can apply for homestead. Rural residents generally have to undergo application, examination, approval, and registration procedures to obtain homestead.

Application is the main procedure for obtaining the right to use a homestead. Only a villager may submit an application to the villagers' committee, which shall discuss it and report it to the township (town) people's government for examination and approval. According to the law, rural villagers applying for a homestead must meet strict conditions: first, they must be rural villagers; second, they must apply in the name of a household, and a household can only apply for a homestead; third, the area of the application shall not exceed the standards set by the municipal governments of provinces, autonomous regions and municipalities directly under the Central Government; fourthly, farmers shall not apply for homestead after selling or renting housing; fifth, the original homestead and the vacant land in the village should be used as far as possible.

Examination and approval of homestead should also go through certain procedures. Users shall, according to the prescribed land use standards, put forward their plans for building houses and submit their land use applications to the villagers' committees where they are located. The villagers' committees shall, according to the

village and town planning, conduct a comprehensive examination of their land use applications and, if necessary, submit them to the villagers' assembly for discussion and approval. A village committee shall, within the limits of its authority, report to the people's government of the township (town) for examination and approval by the people's government at the county level. No one may illegally occupy land to build houses without obtaining approval or by fraudulent means. After the people's government at the county level approves the transfer of the right to the use of homestead, the applicant shall register with the land administration department at or above the county level to clarify its scope of authority and better guarantee the realization of the right to the use of homestead. When applying for registration, relevant certification materials shall be provided in accordance with the requirements of the Civil Code and specific regulations concerning registration [10].

3.2 Circulation of the right to use rural homestead

3.2.1 The theory of prohibiting transfer of homestead

The theory of prohibiting the circulation of homestead is that the circulation of the right to use rural homestead should be prohibited. Because China has experienced a long agricultural society period, and the rural population proportion is very big, in the agricultural society period, the vast majority of farmers' income sources rely on land. Living, life, etc. also need to rely on the land; so, China must restrict the flow of housing land use right to a certain extent to ensure that farmers' residency and guarantee the living conditions of the farmers. At the same time, China is a largely agricultural country, and people's food is guaranteed by arable land. If there is no restriction on the transfer of the right to use homestead, a large part of arable land may be occupied and sold by illegal means to make profits, resulting in the reduction of China's arable land area and posing a threat to national food security.

3.2.2 Theory of free transfer of homestead

According to the theory of free transfer of homestead, rural residents can obtain economic benefits through leasing and selling, increase farmers' income and improve rural residents' living standards by lifting restrictions on homestead transfer. Simultaneously, urban residents can also obtain the right to use homestead through leasing and purchase, which to some extent solves the housing pressure of urban residents.

3.2.3 Theory of restricted circulation of homestead

According to the theory of the restricted circulation of the homestead, the circulation of homestead cannot be restricted blindly, and the circulation of homestead cannot be released regardless, and a compromise is needed. On the one hand, farmers' right to residence should be guaranteed; on the other hand, land should be fully utilized to avoid too much-unutilized land. According to the theory, the transfer subject of the right to use homestead can be limited to members of rural collective economic organizations in the early stage, but with the development of the economy and the change of times, the right to use homestead also needs to be opened to urban residents to some extent.

3.3 Withdrawal of the right to use rural homestead

3.3.1 Overview of withdrawal of rural homestead use right

At present, there is no unified authoritative conclusion on the concept of withdrawal of homestead use right. Some scholars divide the withdrawal of rural homestead use right into voluntary withdrawal and forced withdrawal of farmers. Others divide the withdrawal of rural homestead use right into three categories: conditional farmers voluntarily withdraw from rural collective economic organizations, compulsory recovery of the illegal homestead, and homestead consolidation, reclamation and replacement promoted by the government. However, no scholars have clearly pointed out that there is no law that clearly stipulates the concept of withdrawal of homestead use right. In fact, the withdrawal of rural homestead use right is also a form of homestead use right transfer, but this form can not only change the owner of homestead use right, but also change the nature of homestead, that is, change the use of land.

3.3.2 The way of withdrawal compensation for the right to use rural homestead

The current way of withdrawing compensation for rural homestead use right mainly includes monetary compensation, material compensation, and policy compensation. Among them, monetary compensation is the main way of rural homestead withdrawal compensation. Monetary compensation shall be given to the owner of the homestead use right by estimating the value of the rural homestead according to the area of the rural homestead, local conditions, and other factors. Food compensation refers to the replacement and resettlement of

houses according to certain standards and according to the use area of the homestead and the population of the head of the household so as to protect the residents' right of residence. Policy compensation includes employment security, old-age security, medical security, etc., which aims to maintain the life of rural residents after they legally withdraw from the homestead [11].

Table 2. Overview of the acquisition, circulation and withdrawal of the right to use rural homestead

Acquisition conditions	• Members of rural collective economic organizations can apply for the right to use residential land • Non-members of rural collective economic organizations are not eligible for it • Meeting certain conditions can avail the right
Acquisition procedures	• Submitting an application to the villager's committee • Meet conditions • Examinations and approval
Circulation right	• Prohibit transferring of the homestead to save arable land from illegal occupy • Under "free transfer of homestead" theory rural and urban residents can lease and sell the homestead for additional income • The theory of "restricted circulation of homestead" emphasizes on mild-restriction to ensure farmer's right of residence and avoid unnecessary loss of land
Withdrawal system	• Through monetary compensation • Material compensation • Policy compensation

4.The Barriers to the Use of Rural Homestead

4.1 The widespread empty rural homestead

With the rapid development of China's economy and the continuous improvement of people's living standards, the proportion of rural population is also decreasing. Many young people will choose to work, develop and try to settle down in cities. Therefore, its rural homestead and residence will be idle for a long time. In addition, young people who settle down in cities also bring their elderly parents to the city so that they can take care of the elderly while working. In the long run, there are seen more and more empty houses in rural areas, and "zombie villages" keep emerging, which leads to the widespread problem of the empty rural homestead and a serious waste of land resources. A study of the National New-type Urbanization Plan (2014–2020) reveals that the nearly 133 million rural population has decreased from 2000 to 2011 in China, where the demand for rural residential land grew by 30.45 million mu [12]. The outflow of rural people to cities in the last 20 years has reduced the number of rural homestead but increased the homestead [13]. Additionally, the migration of rural people to cities adds 594 million cubic meters of unused housing in rural areas each year [14].

4.2 The ambiguous transfer mechanism of rural homestead use right

At the legislative level, China's laws do not have specific provisions on the transfer mechanism of the right to use rural homestead, and the Civil Code only provides some principled issues, such as the right to transfer the right to use rural homestead, and the transfer shall follow the provisions of the Land Management Law. The Land Management Law only stipulates the conditions and restrictions of the transfer of the right to use homestead, but does not mention the specific process and implementation standards of the transfer of the right to use homestead. This makes China's rural homestead use the right circulation system in an imperfect, unclear position. In practice, if rural homestead users want to transfer homestead use right, they can only refer to other similar relevant provisions. The ambiguity of the transaction mechanism makes the transaction relationship and transaction interests of both parties unable to be clearly guaranteed and restricts the circulation of the right to use rural homestead to some extent.

4.3 Imperfect legislations of rural homestead use right withdrawal compensation

Similar to the circulation system of rural homestead use right, China's laws on the withdrawal compensation mechanism of rural homestead use right only stipulate some basic guiding rules, which are often not very operable in practice, and the actual operation of different places is also different [15].

The decision on deepening reform and strict land management issued by the State Council in 2004 encouraged the consolidation of rural construction land, and the increase of urban construction land should be linked to the decrease of rural construction land. This policy has greatly promoted the development of the withdrawal mechanism of rural homestead use right. However, at the same time, due to the lack of specific and clear provisions on the details, such as how to withdraw from the right to use the homestead, whether compensation is needed after withdrawal, and the scope of compensation, coupled with the link between it and performance in some areas,

rural residents are forced to withdraw from the right to use the homestead, cannot get compensation after withdrawing from the right to use the homestead, or there are compensation disputes. Therefore, provinces and cities are also trying to make further provisions on the conditions and procedures for the withdrawal of homestead use right and the withdrawal compensation mechanism, but on the whole, they are also some principles. So, China still needs to continue to explore the compensation mechanism for the withdrawal of homestead use right, and constantly summarize and learn from past practical experience, so as to continually improve the relevant legal system of the withdrawal of homestead use right.

4.4 Imperfect after-withdrawal security system

Rural homestead is the guarantee of rural residents' right of residence, which is related to the survival of rural residents. Without rural homestead, farmers' life and survival conditions will be difficult to guarantee. Although China has constantly been improving and improving the social security system, and continuously promoting the development of the rural social security system, but compared with the urban social security system, the rural social security system is still not perfect. If rural residents choose to give up the right to use rural homesteads and choose to live in cities, they will face greater living pressure from various aspects, such as medical security, employment and education. Therefore, in order to further activate the restriction of the rural homestead, we must improve the guarantee mechanism after the withdrawal of rural homestead use right, and eliminate the worries of rural residents. Local governments should constantly improve the guarantee mechanism for the withdrawal of rural homestead use right within the scope of laws and regulations according to the actual situation of the region, such as providing preferential policies in employment and house purchase for rural residents who withdraw from the withdrawal of rural homestead use right, and allowing them to obtain the right to use rural homestead again under certain conditions.

4.5 The limitation of usufruct of the rural homestead

Rural refers to the rural residents of housing land use right of the land to possess, utilize, seek profits from and dispose of the right. However, the repealed property law and the current civil code have no clear provisions on the income function of homestead use right as usufructuary right. On the contrary, the legal provisions also limit the income function of homestead use right to a certain extent. For example, no matter within the collective economic organization or within the collective economic organization, the use right of the rural homestead is not allowed to be mortgaged. In practice, the use right of the rural homestead as collateral shall be deemed invalid. This provision greatly limits the income right of rural residents to the use right of rural homestead. In addition, with regard to the lease of the right to use the homestead, in practice, the right to use the homestead is not allowed to be leased separately, and only the owner of the right to use the homestead is allowed to lease the house. This is also a great restriction on the right to use homestead.

4.6 Existing problems for obtaining and changing the right to use the rural homestead

At present, the construction of the rural homestead use right system in China is not perfect, many regulations are not clear, and there are even legislative conflicts. First of all, the legal provisions are not clear. There are many principles and regulations regarding the acquisition and change of the right to use rural homesteads, but have few specific regulations. For example, the system of one family and one house on the rural homestead is stipulated, but there is no relevant regulation on how to deal with the situation of multiple houses in one family caused by the homestead user obtaining the right to use the homestead through inheritance. Secondly, there are contradictions between homestead law and policy, and between policy and policy. For example, the contradiction between rural homestead uses right mortgage and rural house mortgage system, the contradiction between one family and one house system, and the contradiction between one family and many houses caused by the system of homestead goes with the house. These contradictions, if not promptly resolved, will lead to the decline of the authority of the law, which is not conducive to the construction of the rule of law.

5. Conclusion

The right to use homestead was given to farmers after the founding of new China. This right ensures the farmers' ownership of land and also establishes social stability. The constitution of China and other relevant laws mandate the ownership of homestead to the collective, and farmers are given right to use it. It is a matter of great regret that after many decades, the process and terms and conditions for the right to use homestead have become complicated for the farmers. Additionally, the economic migration of rural people to cities left the homestead empty and abused land. Regarding the transfer mechanism of the right to use rural homestead, neither Civil Code nor Land Management Law provides specific provisions. Even, these laws have no clear provisions about the definite process and implementation standards of the transfer of the right to use homestead. However, the

government came up with Land Administration Law 1986 to minimize the problem of unjustified occupation of cultivated land and to stop the misuse of land; and it is believed that the revised Land Administration Law 2020 will contribute to solving these problems.

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Site selection for wind farms using geographic information system with best-worst method: A case study Amhara Region of Ethiopia

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Abstract

Finding a wind potential site that is ideal for energy production and planning for sustainable land use, environmental management, and protection all depend on the analysis of suitability for wind farms. This study's objective was to locate potential sites for wind farms using a Geographic Information System (GIS) and the Best-Worst Method (BWM). In order to determine the weights of the eight criteria, BWM was utilized. The most crucial factor in choosing where to put wind farms was determined to be wind speed, which was then followed by slope, power grid lines, land cover, aspect, airports, major roads, and protected regions. Weighted Overlay analysis in a GIS environment was used to illustrate the wind farm's suitability map. According to the study, the Amhara region's eastern and western regions have good potential for producing wind-based renewable energy. The suitability of the area for wind farms is indicated on a scale of 0 to 5 as unsuitable, very low, low, moderate, high, and very high potential.

1. Introduction

Energy is a crucial component of developing countries' plans for economic development since it contributes significantly to national advancement, increased competitiveness, and societal welfare [1]. The energy supply policies of several nations throughout the world have undergone fundamental changes as a result of the demand for adequate, secure, continuous, and clean energy. The development of renewable energy in the world is increasing as a result of population growth and industrialization [2, 3].

Ethiopia is one of the fastest-growing countries in the eastern part of Africa, and its' energy demand is increasing at an alarming rate due to the fast-growing economy and flourishing infrastructures. Even though Ethiopia has a vast amount of renewable energy sources, including solar, hydro, wind, and geothermal, only a small amount of its potential hydropower is now used. Because of this, traditional fuels including charcoal, fuel wood, dung cakes, and agricultural waste are the majority of the energy used in Ethiopia's rural areas, which provides significant health and environmental risks [4]. Up to 45,000 MW of hydropower, 10,000 MW of wind, 5000 MW of geothermal, and an average of 5.26 kWh per square meter per day of solar energy that hasn't yet been fully utilized make up its renewable energy potential [5].

Exploiting renewable energy alternatives boosts energy supply by shifting away from the usage of fossil fuels to fill the gap in electricity consumption in rural and urban areas. Renewable energy sources such as wind and solar produce little to no global warming emissions, reducing the use of fossil fuels and their adverse

environmental effects. Wind turbines create energy without emitting any pollutants, in contrast to conventional energy sources (i.e., coal, gas, and petroleum-based fuel). As a result, emissions especially those of carbon dioxide, nitrogen oxide, and sulfur dioxide can be reduce. Wind turbines have a variety of environmental and societal impacts such as sound noise to the vicinity, wildlife mortality from collision of wind turbines, habitat disruption and displacement that must be properly investigated and evaluated [6, 7].

Since wind energy is clean, renewable, and has no influence on people or the environment, it is one of the newest and fastest-developing renewable energy sources [7, 8]. Additionally, wind turbines are simple to build and have low operating and maintenance expenses. There are a variety of aspects that must be taken into account while developing wind energy projects [9]. Finding a good investment location for a wind power plant (WPP) is important, taking into account the preliminary evaluation for economic, technical, environmental, and land-use implementation circumstances [10].

The best locations for wind can be identified using a combination of a GIS and multi-criteria decision-making (MCDM). In order to manage the decision-making process in accordance with criteria, MCDM techniques focus on an analysis process that enhances the decision benefit of the decision maker by choosing the most important criteria among competing alternatives [11]. MCDM can be implemented using a variety of techniques, some of which can be combined with the GIS environment, including the rating method, weighted sum method (WSM), ranking method, analytical hierarchy process (AHP), weighted linear combination (WLC), Boolean overlay operation, analytic network process (ANP), trade-off analysis method, trade-off analysis method, Order Weighted Average (OWA), and Technique for Order Preference by Similar to Ideal Solution (TOPSIS), Best-Worst Method (BWM) [12]. BWM approaches attempt to evaluate several criteria simultaneously and provide an optimal solution [13, 14]. Different real-world problem-solving researches in different research themes have been used BWM for criteria weight evaluation such as Land valuation, transportation, communication and tourism [15-17].

The objective of the study is to identify a suitable site selection for the wind farms using GIS with BWM in the Amhara region of Ethiopia.

2. Material and Method

In this study, the data such as wind speed, DEM, Land cover, administrative boundary, power grid line and protected areas were downloaded from different sources as indicated in Table 1.

Table 1. Data and sources

Data	Sources
Wind speed	https://globalwindatlas)
Digital Elevation Model (DEM)	https://earthexplorer.usgs.gov/
Land cover	https://livingatlas.arcgis.com/landcover/
Administrative boundaries	https://ethiopia.africageoportal.com/
Power grid lines	https://energydata.info/
Protected Areas	https://data.apps.fao.org/

The database was constructed to organize and manage the data downloaded from multiple sources in the GIS environment. Extraction of all the parametrical data within the intended area of interest, buffering, resampling, rasterization, surface analysis, reclassification at a given scale, weight of each criterion was determined by using multicriteria decision making method (Best-Worst Method) and weighted overlay analysis were done to identify suitable wind farm's location. In this study, the general workflow is illustrated in Figure 1.

2.1. Study area

The study was conducted in the Amhara region in the northern part of Ethiopia, shown in Figure 2. The region is dominated by a chain of mountains, hills, and valleys ranging in elevation from 505 to 4529 meters above MSL [18] and has more than 6.8 m/s wind speed; Such geographical characteristics are suitable places for energy development from the wind.

2.2. Determination of the criteria for suitable site selection

The low production, operation, and maintenance costs of wind energy, as well as its relatively low environmental impact, make it one of the most alluring sustainable energy sources. Finding the ideal locations to build wind power plants is a challenging process that requires careful consideration of a number of criteria.

The criteria for wind farm suitability analysis were determined based on recent literature [6, 12, 13, 19-22] and considering opinions of experts who dealt with similar problems. Based on literature and experts' opinions eight criteria were selected and categorized as unsuitable, very low, low, moderate, high and very high as described in Table 2 and Table 3.

Vector and raster datasets were clipped and masked with the area of interest respectively. Multi-buffer and Euclidean distance were used for proximity analysis. Based on the scale mentioned for each criterion in Table 2, the criteria were reclassified and criteria reclassified maps were produced. The reclassified maps of the criteria are shown in Figure 3.

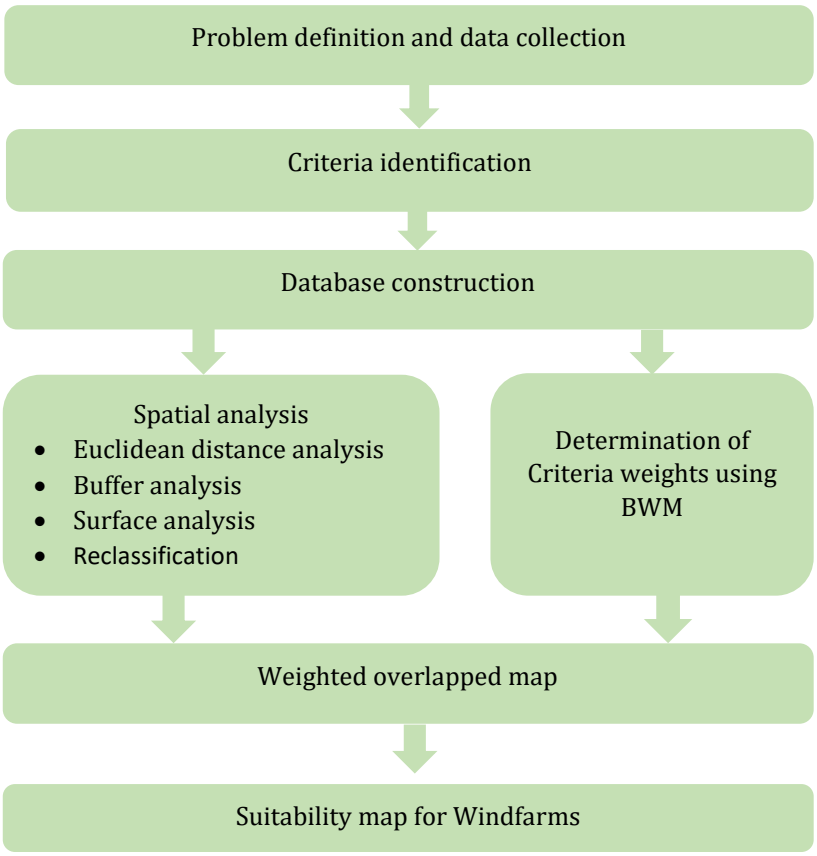


Figure 1. The flow chart of the proposed method

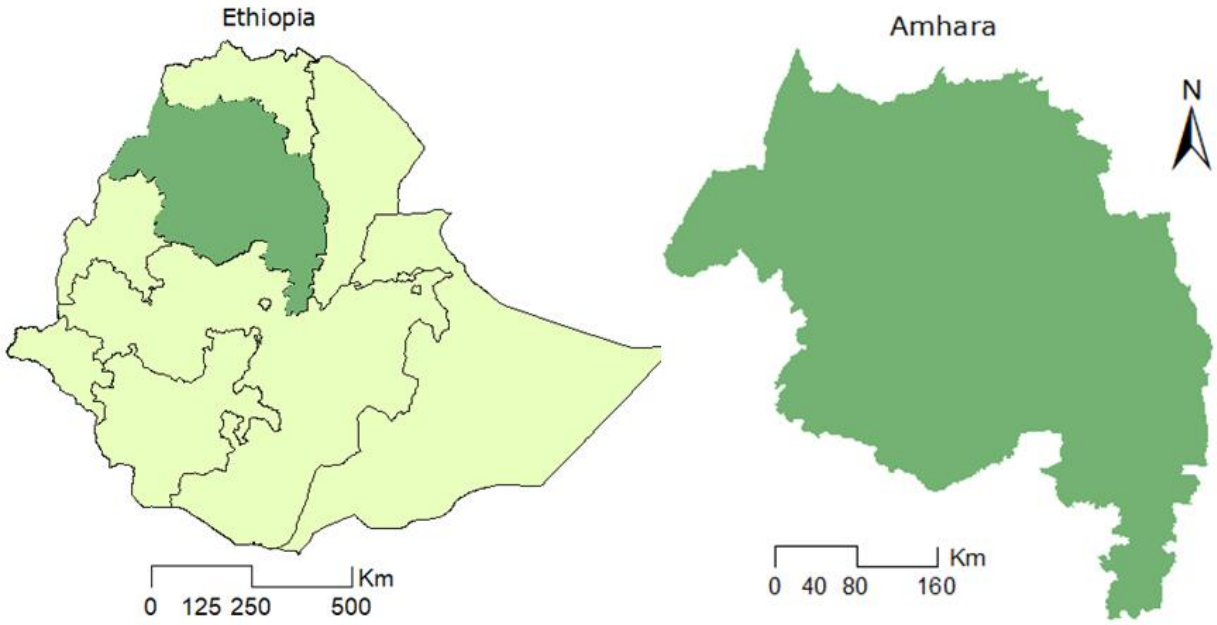


Figure 2. Study area

Table 2. Selected criteria and description

Criterion	Description
Wind speed	One of the most important criteria for wind farming. The higher the wind speed the higher the wind power.
Slope	Wind farm construction, maintenance and installation are affected by the high slope. The higher the slope the higher cost of construction, and maintenance of wind farms.
Aspect	Slope orientation relative to the direction of the wind is an important criterion when it comes to making full use of the wind potential.
Landcover	Land cover is one of the critical factors for wind farm suitability analysis.
Power grid lines	Wind farms closed to power grid lines reduce the construction of new power grid lines. However, it has a negative effect on human health due to the electromagnetic field generated by power transmission lines.
Airports	Wind farm closed to airports affects aviation routes, communication system and navigations, which leads to collisions.
Protected areas	Wind turbine noise and rotating blades influence animals' and birds' habitats. Wind turbine collisions with birds and bats frequently result in serious injuries and deaths. Additionally, wind farms have a detrimental effect on wildlife because spinning turbines alter air pressure. By creating buffer zones and choosing better wind turbine locations in regions with lower wildlife populations, the effect of wind turbines on wildlife could be reduced.
Main roads	Wind farms distance from the main roads has a positive and negative effect. Wind farms closed to the main roads reduce transportation cost during construction, and reduce the cost of construction and maintenance of new roads. Whereas the wind farm is closed to the main roads, the roads negatively affect road transportation because of loud noises.

Table 3. Suitability categories of criteria

Criteria	Suitability class	Range	Score/scale
Wind speed	Unsuitable	<3m/s	0
	Very low	3-4m/s	1
	Low	4-5m/s	2
	Moderate	5-6m/s	3
	High	6-7m/s	4
	Very high	>7m/s	5
Slope	Unsuitable	>15%	0
	Very low	12-15%	1
	Low	9-12%	2
	Moderate	6-9%	3
	High	3-6%	4
	Very high	0-3%	5
Aspect	Low	E, SE	2
	Moderate	N, NE, S, SW	3
	Very high	W, NW, FlAT	5
Landcover		(Water, crops, built-up area, cloud cover, and Trees as) (Flooded and vegetation)	
	Unsuitable	Rangeland Bare ground	0
	Moderate		3
	High		4
	Very high		5
Power grid lines	Unsuitable	<0.5km	0
	Very low	60-90km	1
	Low	30-60km	2
	Moderate	10-30km	3
	High	5-10km	4
	Very high	0.5-5km	5
Airports	Unsuitable	<3km	0
	Very low	50–100km	1
	Low	20–50km	2
	Moderate	10–20km	3
	High	5–10km	4
	Very high	3–5km	5
Protected areas	Unsuitable	<2000	0
	Very suitable	>2000	5
Main roads	Unsuitable	<3km	0
	Very low	50–100km	1
	Low	20–50km	2
	Moderate	10–20km	3
	High	5–10km	4
	Very high	3–5km	5

2.3. Determination of criteria weights

Many criteria affect the location of a suitable wind farms. However, each has a different weight that has significant to determine a suitable location for the wind farm. In this study, BWM was used to determine the weights of criteria. In MCDM problems, BWM is one of the most successful approaches for determining the weights of criteria [23]. The expert first determines the best (e.g., most desirable, most important) and worst (e.g., least desirable, least important) criteria, then compares the best criterion to the other criteria, and the other criteria to the worst criterion. The weights of the criteria can be computed using Equation (1).

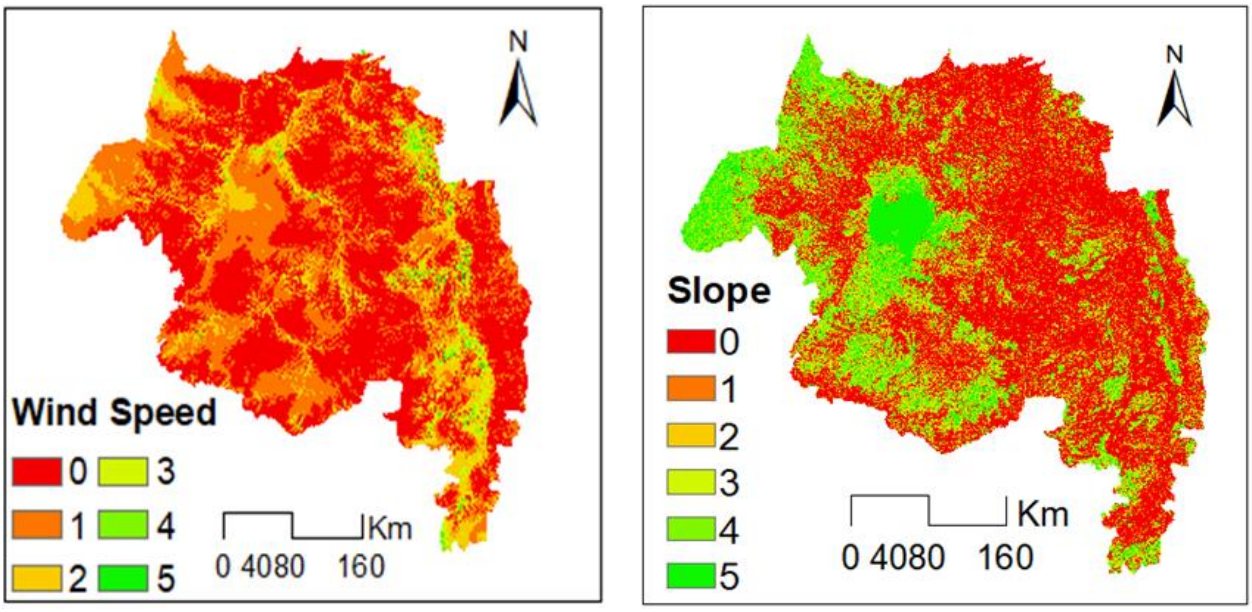
Min ξ^L such that

$$\begin{gathered} \left|W_B - a_{Bj} W_j\right| \le \xi^L, for\ all\ j \\ \left|W_j - a_{jW} W_W\right| \le \xi^L, for\ all\ j \\ \sum_j W_j = 1 \\ W_j \ge 0, for\ all\ j \end{gathered} \tag{1}$$

Where,
ξ^L ; Consistency ratio
W_B: weight of best criteria
W_W: weight of worst criteria
W_j: weight of criterion

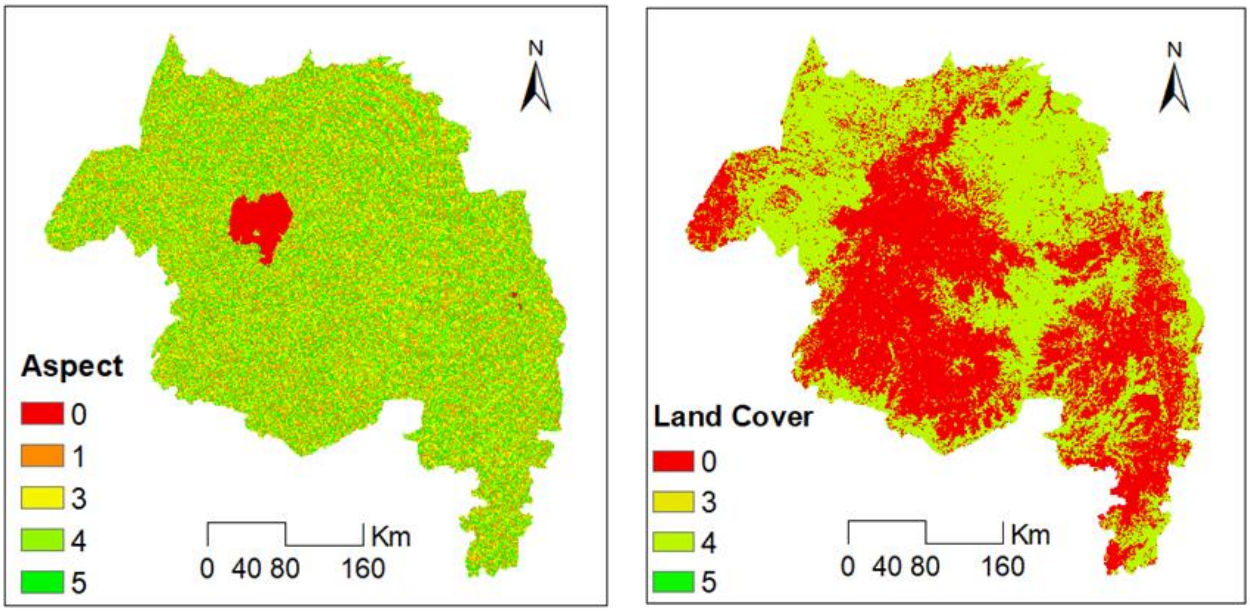
A Bj: preference for the best criterion over criterion j
a_jW: preference for criterion j over the worst criterion

The weights and consistency of the criteria were computed using the BWM-Solver tool of Excel following the general steps; (1) Select required decision criteria, (2) Determine the best (most significant) and the worst (least significant) criteria by expert's form identified criteria, (3) Pairwise Comparison best to others and others to worst by assigning preference value between 1 and 9 and (4) Computing the optimal weights of selected criteria.



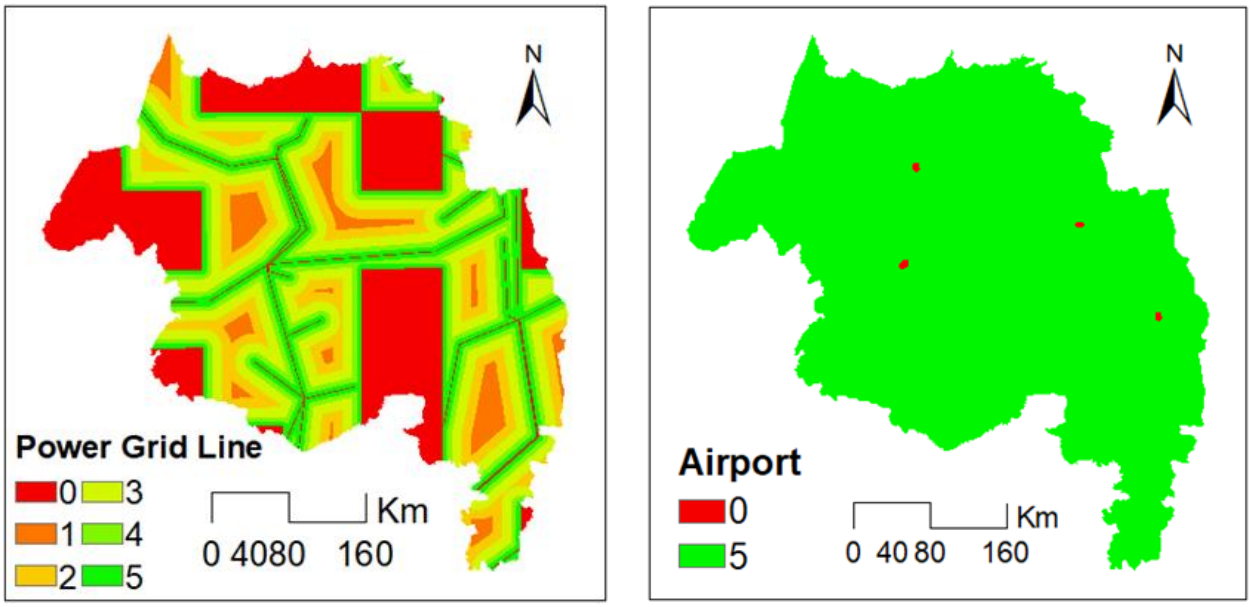
(a) (b)

Figure 3. Criteria reclassified map; (a) wind speed (b) slope



(c) (d)

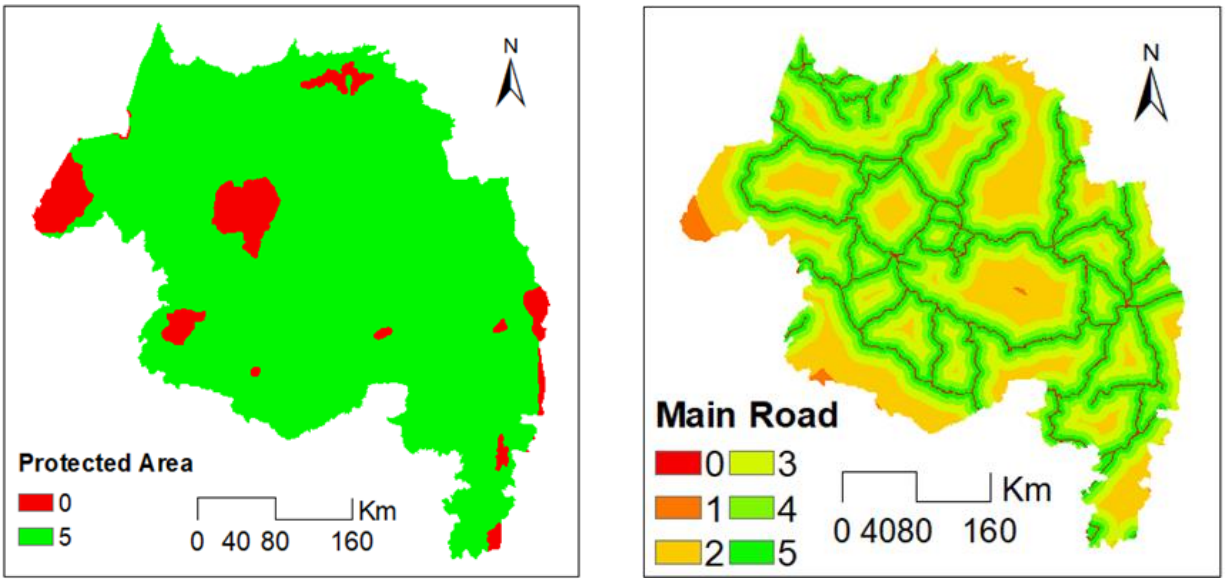
Figure 4. Criteria reclassified map; (**c**) Aspect (**d**) land cover



(e) (f)

Figure 5. Criteria reclassified map; (**e**) power grid lines (**f**) airport

The consistency ratio of decision-making ranges between 0 and 1; completely consistent and completely inconsistent respectively. In this study, the value for high consistency is expected to be less than or equal to 0.41. As indicated in Table 6 the consistency ratio of four experts while computing the weights of criteria was 0.047, 0.081, 0.146, and 0.066; which indicate the consistency ratio within the prescribed acceptance limit. During the implementation of BWM, the best criterion was wind for all experts as shown in Table 4. However, the worst criterion was different; expert 1 selects the main roads, expert 2 and 3 select the protected areas, and expert 4 selects the airports as worst criteria as shown in Table 5. Based on the average weight of the criteria wind speed and protected areas were the best and the worst criteria respectively. Calculated weights of criteria by four experts as shown in Table 6.



(g) (h)

Figure 5. Criteria reclassified map; (**g**) protected area and (**h**) main roads

Table 4. Pairwise comparison for assessment criteria (Best to others)

Expert	Best to others	Wind speed	Slope	Aspect	Land cover	Power transmission line	Main roads	Protected areas	Airports
1	Wind speed	1	2	3	4	5	6	7	8
2	Wind speed	1	2	3	3	4	8	7	4
3	Wind speed	1	3	4	4	4	7	7	4
4	Wind speed	1	6	9	5	3	9	9	5

Table 5. Pairwise comparison for assessment criteria (others to worst)

Expert	1	2	3	4
Others to the Worst	Airports	Main roads	Protected areas	Protected areas
Wind speed	8	8	7	9
Slope	7	6	6	1
Aspect	6	5	4	1
Land cover	5	4	4	3
Power grid lines	4	3	4	8
Main roads	3	2	3	1
Protected areas	2	1	1	1
Airports	1	3	3	1

Table 6. Determined weight of criteria

Criteria	Experts				Average
	1	2	3	4	
Wind speed	0.314	0.340	0.389	0.332	0.344
Slope	0.180	0.141	0.041	0.199	0.140
Aspect	0.120	0.105	0.059	0.133	0.104
Land cover	0.120	0.105	0.107	0.100	0.108
Power grid lines	0.090	0.105	0.178	0.080	0.113
Main roads	0.033	0.060	0.059	0.066	0.055
Protected areas	0.052	0.037	0.059	0.057	0.051
Airports	0.090	0.105	0.107	0.033	0.084
ξ^L	0.066	0.047	0.081	0.146	

3. Results and Discussion

In this study, the wind speed was identified as the most important criteria for locating wind farms followed by slope, power grid lines, land cover, aspect, airports, main roads, and protected areas. The wind farm suitability map was produced based on eight criteria using a weight overlay analysis. Figure 4 shows the wind farm suitability map produced using GIS with BWM.

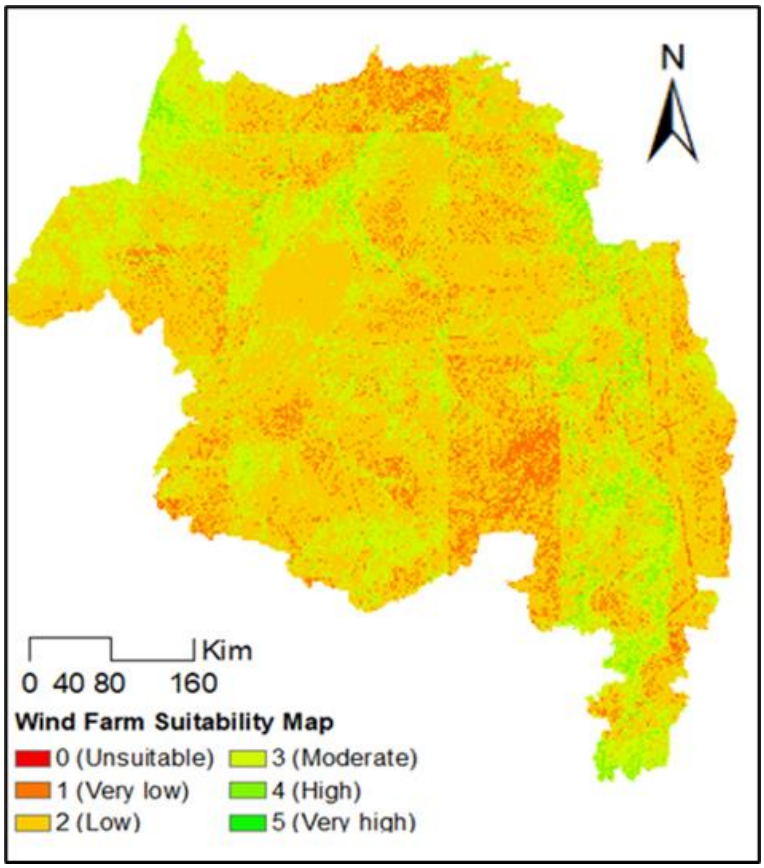


Figure 4. Wind farm suitability map

The generated wind farm suitability map using weighted overlay analysis is represented in the same value range (0 to 5) as the input reclassified criteria maps. The larger the values the more suitable the area for the location of the wind farm. The value for the criteria attributes which was considered as a constraint was 0.

In the result, the most suitable locations have been identified and presented on a suitability map. Areas that have pixel value equal to 5 (very high), 4 (high), 3 (moderate), 2 (low), 1 (very low), and 0 (unsuitable). The suitable area for the wind farms is located in the eastern and western parts of the Amhara region.

4. Conclusion

The GIS-based wind farm suitability analysis model with BWM was developed and used to analyze the suitability of wind farm locations in the Amhara region by taking into account multiple criteria. The suitability analysis was based on eight criteria; wind speed, proximity to power grid lines, slope, aspect, land cover, protected areas, airports, and proximity to main roads. Experts' opinions were used to determine the weight of the criteria. The study shows that BWM can be used in combination with GIS to determine the best location for wind farm development. In addition, the result of wind farm suitability analysis can be helpful for decision-makers during sustainable land use planning, environmental management and protection.

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Author contributions

Zelalem Getachew Ayalke: Conceptualization, Methodology, Data curation, Software, Writing-Original draft preparation. **Aziz Şişman:** Visualization Reviewing and Editing

Conflicts of interest

The authors declare no conflicts of interest.

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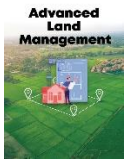

Examination of sustainable land management at the urban scale

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Abstract

The rapid and uncontrolled growth of the world population is a pressure factor on natural resources and lands. This pressure causes the uncontrolled use and consumption of both natural resources and lands. In the last century, cities have been growing both in terms of population and area, and agricultural lands have been transformed into urban areas. This means the shrinkage of agricultural lands and there are worrying consequences for the future of our world. In order for the world to be a more livable place and to meet the needs of future generations, it is inevitable that the sustainability approach should be adopted in every field. Preventing the narrowing of agricultural lands and using urban lands by managing them correctly is related to how correctly the land management is applied. However, when land management is considered together with the basic principle of sustainability, it can contribute to the future of our world and minimize the pressure factors. In this study, by looking at land management with the basic principle of sustainability, examinations were made on the Izmir Tire city sample and sustainable suggestions were made for urban lands through zoning implementations and parcellation plans. As a result, it was emphasized that zoning implementations and land requiring expropriation should be planned from the perspective of sustainable land management and brought to the city.

1. Introduction

Land; “part of the earth”, “a certain part of the earth that is not covered by water”, “territory of the land” in western languages, and “everything that is the earthly part of the world, under, above or fixed on it, subject to possession and usage rights” [1] has also been defined. Soil, on the other hand, was initially called "the piece of land that is cultivated for nourishment", but over time it was defined as "a finite natural resource that cannot be reproduced, that provides all the necessities of human life, that is faced with deterioration due to the activities of the increasing population and natural events." [2].

As it can be understood from the definitions, human beings have felt the need to dominate/possess (property) the part of the earth they live on and to use and manage it (land management) in order to sustain their own life in the course of historical development. This need has made territorial dominance an indicator of power over time, and since ancient times, states have fought each other to gain or not lose land. The states that dominate have started land measurement studies in order to know the borders of the lands they live in, to use them more qualified, to manage and to plan. This situation led to the emergence and development of the concept of cadastre.

2. The Emergence of Land Management

Since the land basically has more than one feature and function, the correct use of all these features and functions has led to the need for a qualified management policy. A well-functioning land administration is only possible with good land policy and management [3]. According to the definition first put forward by Dale and McLaughlin, land management; It is the decision-making process in which land resources are allocated in accordance with the needs and wishes of human beings within the framework of political and social theories, legal and administrative regulations [4]. Land management according to the International Federation of Surveyors (FIG); defined as the process by which the use and development of Land resources is managed [5]. According to the definition made by the United Nations Economic Commission for Europe (UNECE), land management; It is all of the actions related to the management of land for sustainable development, both economically and environmentally [1].

As it can be understood from the definitions, land management is the process of managing the actions that are put forward or planned to be put on the land, and these actions should also be sustainable. With this approach, it is concluded that land management policies should be considered together with the concept of sustainability, since land is a finite natural resource.

2.1. The concept of sustainability and sustainable land management

The rapid increase in the world population has increased the pressure on the correct use of natural resources over time and this pressure has increased in environmental problems with industrialization [6]. The pressure on natural resources and the environment, along with population growth and industrialization, has led experts to seek solutions at the local and global level. In this context, the limitation of the Bruntland Report (Our Common Future) to the use of natural and cultural resources as “meeting the needs of the present without compromising the ability of future generations to meet their needs” [7] brought the concept of sustainability to the agenda.

Sustainability literally means "the ability to be permanent". The purpose of sustainability; It is the preservation of today's skis, which exist in physical, social, economic and ecological terms, without being consumed, and their transfer to future generations [8]. The development of lands, which are defined as a finite natural resource in accordance with the purpose of sustainability, without being consumed and their transfer to future generations, has led to the concept of "Sustainable Land Management".

Land management according to the sustainability principle expressed in 1992 Rio Earth Summit Agenda 21, which is considered a turning point all over the world; It has been expressed as “all actions related to the management of the land for sustainable development, both economically and environmentally”.

Sustainable land management; problems related to land use, such as meeting the needs of nutrition, shelter and subsistence, providing a quality life, protecting natural habitats, protecting and developing the environment and natural resources, determining the most suitable land uses for the continuity of the economy, providing and developing technical infrastructure. It plays an important role in the development of the necessary policies, plans and decisions to detect these and similar problems [9].

3. Studies On Sustainable Land Management

Boansi [10] mentioned that the complexity of Ghana's urban land use planning is a major challenge for managing urban growth and city governance, and made implications for sustainable city development in Ghana using Ejisu Municipality as a case study.

Garouani et al., [11] based on the urban sprawl and serious environmental problems caused by the population growth rate in Fes, one of the oldest cities in Morocco, examined the relationship between urbanization and land use changes and their effects on the cityscape. Satellite imagery and census data were used to identify the different land use change and growth patterns of the city for the period 1984-2013, and the resulting maps show that the amount of urban or developed land increased by approximately 121% between 1984 and 2013, and the agricultural and forest areas of rural areas and on the other hand, decreased by 11% and 3%, respectively.

Malashevskyi et al., [12] have analyzed the preconditions and general aspects of inter-economy land survey in modern conditions of Ukraine, in line with the perspectives of peer land exchange practice, with reference to the fact that land exchange is a common way of streamlining existing land tenure and land use. Measures recommended to be implemented on the basis of land exchange were selected and according to the current legislation of Ukraine, the main types of documents for land management that could achieve a precedent land exchange were defined.

Omollo et al., [13] investigated the extent to which housing developers in Kenya complied with land subdivision planning regulations, a case study of Kisii Township. Although the recommended minimum plot size is 0.1 ha in the Jogoo, Nyamataro and Nyanchwa neighborhoods of Kisii Town, the minimum recommended plot size for the Egesa, Daraja Mbili, Mwembe and Nyamage neighborhoods is 0.05 ha, where 84%, 100% and 88% of the

developers respectively did not comply. However, 83%, 46%, 58% and 63% of the developers found that they did not follow this order.

Masri et al., [14] argue that with the rapid growth of urban environments around the world, there is an increasing need to develop more innovative and efficient land management systems. Stated that the 3D cadastre implementation process was initiated to support better land management services.

4. The Relationship Between Sustainable Land Management, Population and Cadastre

4.1. Pressure of the population on land management

The world population has been increasing exponentially from past to present. So much so that the world population; It was calculated as 461 million in 1500s, 954 million in 1800s, 1.6 billion in 1900s, 2.5 billion in 1950 and 6.1 billion in 2000. The population growth rate was calculated as 0.05%, 0.3%, 1% and 1.7%, respectively [15]. According to the United Nations Population Projection, it is calculated that the world population will reach 9.6 billion in 2030, 10.3 billion in 2040 and 12 billion in 2050. In the related report, it is predicted that the population of Türkiye will be 80.7 million in 2017, 88.4 million in 2030 and 95.6 million in 2050 [16].

Population growth also means more consumption, but this situation is a pressure factor on natural resources and lands. In order to meet the supply (food, water, electricity, living space, service, etc.) brought by the increasing population, states, official institutions, private sector and industrial organizations are taking new steps and developing projects. The pressure of the new living space, especially as a result of population growth, drags the municipalities to work on the revision of the zoning plan, and this causes the allocation of agricultural lands for non-agricultural purposes. According to the Sustainable Use of Agricultural Lands Working Group Report included in the Tenth Development Plan, the agricultural land area in our country has started to shrink since the early 1990s [17]. Salvati et al [18] draw attention to the problem of urban sprawl in the Mediterranean region, suggested that urban sprawl triggers land cover changes and directly affects cropland and forest areas by fragmenting them.

As it can be understood from the research above, population growth primarily targets natural resources and brings along problems in the correct use or management of resources. This situation has led humanity to work on the correct management of resources, and first of all, the necessity of registering the lands has emerged. The idea of registering the lands as both a resource and a living space (private property) led to the start of cadastral studies, which is the basis of land management.

4.2. The History of Cadastre Works in Türkiye

The ownership of most of the lands of the Ottoman State belongs to the state. The right to use the lands was given to those who were useful in wars. These persons, who are defined as living persons, are entitled to receive a certain amount of tax from the farmers who cultivate the land. Over time, this system deteriorated, and the right of use was transferred by taking the dirliks, which were left unclaimed, with the taxes in exchange for cash. As in a land arrangement where the lands belong to the state and there is no private property right, immovable property titles called tahrir were made from time to time in order to make the state contribution fair. This writing information aimed to determine the approximate surface area by defining the boundaries of the allocated land. Allotment documents containing this information have created an assurance for the assigned concessionaire. Residences and workplaces in cities and towns are registered to private individuals. The units responsible for keeping these special records were established title deed offices [19].

Cadastral works were made in Konya with the law called “Consistency of the Law on Restriction and Change of Property”, which was put into effect in 1912.The Republic of Türkiye preserved the existing institutions that were transferred from the Ottoman Empire at the beginning, developed these institutions in time to be compatible with the modern Republic, and made the necessary legal arrangements for this. The reorganization of the Ottoman State Land Administration and the establishment of the land policy and land management of the Republican period were determined as priorities.

Right after the establishment of the Republic, in 1924, the General Directorate of Land Registry was established, and in 1925, the "General Map General Directorate Law" numbered 657 and the "Cadastre Law" numbered 658 came into effect. With these laws, cadastral units were added and the institution was transformed into the General Directorate of Land Registry and Cadastre [20].

With the entry into force of the Cadastre Law, cadastral works started in 1925 primarily in Ankara, İstanbul, İzmir, Bursa and Konya. General Directorate of Mapping supported cadastral studies by producing 1/500, 1/1000 and 1/2000 scale plans in Ankara, Istanbul, Kocaeli and Malatya between 1925-1936.

During the first implementations, new legal regulations were required and the following new legal regulations were made: Law on the Liquidation of Those Who Lost their Values of Land Registry in 1929, Law on the Land Registry Office and the Organization of the Land Registry Guard in 1932, Cadastre and Land Registry Law in 1934, Land Registry Law in 1934, The Law on the Organization and Duties of the General Directorate of Land Registry

and Cadastre in 1936 and Forest Restriction and Cadastre Law in 1937. When these laws are looked at in their entirety, it is understood that they are the legal bases that are the natural requirement of the first thought project and the necessary institutional arrangements. In the "Cadastre and Land Registry Law" dated 1934 and numbered 2613, the first thoughts and principles in 1925 were expressed in more detail. This law also stands out in terms of containing guiding and guiding explanations that will ensure that the implementation takes place without pause [21].

4.3. Land cadastre and land management information system in Türkiye

The Cadastre and Land Registry Law No. 2613 has been implemented only in urban areas within the provincial and district municipality borders since 1934. No significant cadastral work has been done in rural areas. A land cadastre was put into practice in 1950, in the days when mechanized agriculture started in Türkiye, which has large rural areas and limited economic opportunities, only after the Second World War.

Land cadastre studies have gained a new momentum with the establishment of the Land Cadastre and Photogrammetry Department in 1955 and the application of the aforementioned and recommended photogrammetry method since the beginning of cadastral studies with the participation of engineers trained in Türkiye. The first photogrammetric studies were carried out in 1957 and 1958 with the identification photographs created by drawing the parcel boundaries on the enlarged aerial photographs, but since these could not be converted into cadastral plans, this method was abandoned and the standard stereo evaluation method was applied. First, 1/5000 scale photogrammetric maps were produced, and then these maps were converted into cadastral maps with field studies. Starting from 1963, cadastral studies were accepted in a planned manner and as a working group in the State Planning Organization, and Standard Topographic Cadastral Maps were produced within the framework of five-year and annual development plans and programs [21].

Land cadastre studies, which started first in the urban area and then included rural areas, today, the use of advanced technologies such as global positioning systems, electronic tacheometers and digital photogrammetry has enabled the collection of more sensitive land data and accelerated the cadastral renewal studies. With the development of Geographic Information Systems (GIS), cadastral maps have been replaced by cadastral information systems. The Land Registry and Cadastre Information System (TAKBİS) developed by General Directorate of Land Registry and Cadastre in this field is an important breakthrough and start. TAKBİS is also an important step and development for the Land Management Information System (AYBS) as it allows the attribute information of the parcels (neighborhood, location, layout, island, parcel, surface area, quality, etc.) to be queried. However, although there is no effective land administration system in our country, in order to develop a new information system approach called the Turkish Land Administration System (TAİS), the opinions of all stakeholders are sought and similar systems of European countries are examined [22].

5. Method

The aim of this study is to evaluate the land management studies planned and implemented in our country together with the concept of sustainability and to make suggestions on them. Within the scope of the study, the Tire district of İzmir was handled and examined.

Within the scope of the study, the "Küçükmenderes Plain Büyükova Conservation Area" map obtained from the İzmir Provincial Directorate of Agriculture and Forestry and the "Zoning Plans" and "Parcellation Plans" obtained from the Tire Municipality were evaluated from a sustainability perspective.

6. Examination of Sustainable Land Management on the Sample of İzmir Tire

6.1. Geographic location

Tire is one of the southern districts of İzmir, located in the west of our country, and is adjacent to Ödemiş, Bayındır, Torbalı, Selçuk districts and Aydın province. Some of the lands of the Küçükmenderes Plain (Figure 1), which has been declared as Büyükova Conservation Area by the Provincial Ministry of Agriculture and Forestry due to its location, are located within the borders of Tire district [23]. Most of the lands outside the Tire district center are fertile agricultural lands and are of great importance for agricultural development. Good implementation of sustainable land management in both urban and rural areas is important for the future of Tire and Küçükmenderes Plain in order to prevent non-agricultural use of agricultural lands and to support sustainable life in the city center of Tire.

Figure 1. Büyükova Conservation Area Map (Küçükmenderes Plain)

6.2. The First Zonning Planning Works in Tire

The basis of the first planning activities dates back to 1984. In this period, there are city plans that were not approved but tried to be implemented as a draft, and zoning permission was given according to these plans. However, the implementation of the city plans did not take long, and as a result of the planning work carried out by the Ministry of Public Works and Settlement, the 1/1000 scale Implementation and 1/5000 scale Master Development Plans were approved by the Ministry and entered into force in 1984.

The 1984 plans, which were understood to have not responded to the development of the Tire city center in 1996, were included in the revision study and approved by the Tire Municipality Council on 28.02.1997 and entered into force after the suspension period. Over the years, new residential areas have been added to the revision zoning plan sheets approved in 1997, and many changes have been made in the existing plan decisions until today.

When the plans and plan notes were examined, approaches to sustainability such as parks, public spaces and garden distances were identified, but not many explanations were found in terms of sustainability in the plan explanation report. However, when viewed from the general framework, it is thought that the plans have good intentions to support sustainability, especially in terms of ensuring the protection of large park areas and requiring minimum parcel size in some regions.

6.3. Starting Zoning Implementation, Development Readjustment Share (DRS) and Public Partnership Interest (PPI)

After the approval of the zoning plans in the district in 1984, the need for the regulation of urban areas began to emerge with the increase in population. In the 1/1000 scaled Implementation Zoning Plan, new development areas have been determined apart from the existing urban settlement (residential area), and zoning implementation and parcellation plan studies have been started so that these areas can be used in accordance with the zoning plan. The first zoning implementation are generally in the direction of creating new housing areas and the Development Readjustment Share (DRS) deduction has been determined to meet the reinforcement areas (Road, park, parking lot) in the zoning plan. Official institutions and school areas were created with the Public Partnership Interest (PPI) deduction. Official institution areas and school areas created with the PPI continue to exist today due to the shared ownership structure, and the management and evaluation of these lands have been interrupted due to expropriation problems. So much so that there are 102 shareholders in total in an official institution area of 27 thousand m^2, and the number of shares in the land registry by inheritance is increasing day by day. There are cases of expropriation and confiscation without expropriation in many of these immovable properties, and some of the cases still continue today. With the abolition of the Public Partnership Interest (PPI) on July 10, 2019, the problems of expropriation in the areas of official institutions have been prevented.

6.4. Parcellation Plans and Factors Affecting Urban Land Production

Although most of the parcellation plans approved within the scope of the zoning implementations made according to the zoning plan in the district are for residential and commercial purposes, new properties were registered in the land registry by making parcellation studies for the Small Industry in the east of the city center and the Organized Industrial Zone in the north.

Parcellation plan studies differ according to the zoning status, building structure, number of floors, garden distance and Floor Area Ratio (TAKS) and Building Coverage Ratio (KAKS) values of residential/commercial or industrial zones. All of the factors affecting urban land production are summarized below.

6.4.1. Residential and commercial parcels

Although most of the residential and commercial parcels have south-north extensions, the average road widths have increased from a minimum of 7 meters to a maximum of 30 meters. The number of floors generally changed in direct proportion to the width of the road; It has been determined as 2 and 3 floors under 12 meters, 4 floors between 12 and 17 meters, 5 floors at 17 meters and above, 8 floors in boulevards where the road widths are 20 meters and above, and 10 floors in 2 zoning islands located in the city center. It is seen that the property areas are tried to be kept large in direct proportion to the number of floors in the parcels created as a result of the parcellation plan. When this situation is evaluated from the perspective of sustainable land management, it is thought that balancing the increase in building density and number of floors with property size will make positive contributions in terms of urbanization, but at the same time, the Floor Area Ratio (TAKS) and the Building Coverage Ratio (KAKS) should be examined in this context. In residential and commercial areas, 4 separate construction schemes have been adopted as adjacent, split and twin.

6.4.1.1. Adjacent structure

Although there are no TAKS and KAKS values in the adjacent settlement form, the building floor areas are determined according to the garden distances. Generally, the front garden and back garden are either 3 meters or half the height of the building, depending on the parcel depth. In areas with a front garden, this distance is generally 4 meters.

Figure 2. Example of Adjacent Structure

6.4.1.2. Discrete structure

There are two different TAKS and KAKS calculations in the form of discrete structuring. TAKS 0,40 – KAKS 0,40 x Number of Floors was applied to the building blocks where there is no statement in the zoning plan. In the zoning islands that have a statement in the plan; 0.36/1.08 in 3-storey building blocks, 0.30/1.20 in 4-storey building blocks, 0.30/1.50 in 5-storey building blocks, Precedent 1.60 in 8-storey building blocks and Precedent in 10-storey building blocks It is set at 2.00. In the mountainous area in the southernmost part of the city and in the flat area in the northernmost part of the city, the 3-storey construction style and the precedent ratio of 0.60 were determined, and the density of construction in these areas was tried to be kept low.

There are also two different applications in garden distance applications in the form of separate arrangement. Since the first period parcellation plans after 1984 were prepared according to the 4 meters front garden distance design, although the current legislation decisions say that the front garden distance cannot be less than 5 meters, the implementation in these areas is continued as 4 meters according to the zoning plan note. In building blocks where the front garden distance is 4 meters, the side garden distance is 3 meters and the back garden distance is 3 meters depending on the parcel depth or half the height of the building.

Figure 3. Example of Discrete Structure

6.5.1.3. Twin structure

The twin order structure is based on the logic of applying the split order in the form of twin blocks. According to this logic, as a result of the parcellation plan of two separate parcels located adjacent to each other, since the dimensions of the parcel front were not suitable for the separate arrangement, a note was added to the zoning plan in these regions, thus paving the way for structuring in the form of twin layouts. In this form of construction, TAKS 0.40 – KAKS 0.40 x Number of Floors is applied.

Figure 4. Example of Twin Structure

6.4.2. Industrial Parcels

6.4.2.1. Industrial parcels within the implementation zoning plan

These are the Implementation Development Plan parcels under the control of the municipality. These parcels are at least 5 thousand m^2 in size as per the plan grade. The building equivalent ratio has been determined as 0.40 and the building heights are 6,50 meters on 2 floors, excluding technological buildings. The front yard distances vary as 10-15-25 meters depending on the road the parcel faces. Side garden distances are all 5 meters.

6.4.2.2. Small industrial area parcels

The second different form of industrial parcels is the Small Industrial Area. This area is under the responsibility of the Municipality, but under its own administration. Within the scope of the parcellation plan in the region, zoning blocks based on the island parcels have been created and the construction precedent is 1.00. The construction height is a maximum of 7.00 meters. In the region where the front garden distance is 7.00 meters, a minimum of 6 meters of side garden space should be left between the independent structures.

6.4.2.3. Organized industrial area parcels

The third form of industrial parcels is the Organized Industrial Zone. This area is under the responsibility of the Organized Industry Directorate under the Ministry of Industry. According to the plans approved by the Ministry of Industry, the minimum parcel area is 3 thousand m^2, the minimum parcel front is 30 meters and the parcellation plan has been approved. The building precedent for industrial parcels has been determined as 1.00. Garden distances are determined according to the property area table in the plan notes.

7. Conclusions and Recommendations

Sustainable land management emerges as an important element and approach to the liberation of cities and rural areas as a result of rapidly increasing population and uncontrolled consumption of natural resources. The growth of cities by destroying agricultural lands day by day is not sustainable for the future. Instead, the necessity of managing urban lands with the right approaches from the perspective of sustainable land management in cities is a necessity for cities.

The foundation of land management was laid with cadastral studies in our country and supported by zoning implementation. Subdivision plans created as a result of zoning implementations should both produce new building areas and create sustainable and livable areas. Subdivision plans for sustainable lands should be kneaded with sustainable techniques and should be open to interdisciplinary recommendations. So what is trying to explain from the interdisciplinary recommendations?

As it is known, the discipline of surveying distributes the remaining areas after the Development Readjustment Share (DRS) interruption on the basis of the minimum parcel front, depth and area determined by the zoning plan or legislation, within the scope of the subdivision plan, in a way that is closest to the regions where it is located and, if possible, detached. So, how much does this distribution method, which is made by looking at the parcel dimensions and the areas of the owners after the cut, supports sustainability? Or is this perspective sufficient to support sustainability? No, it is not. Because the concept of sustainability is a comprehensive approach that is kneaded by different disciplines and in a way, each discipline develops new studies in its own field. Opinions and opinions should be sought from fields such as architecture, urban planning, landscape architecture and sociology in order to support sustainability for concepts such as minimum parcel dimensions and areas, mass designs, calculations regarding TAKS and KAKS, and minimum garden area and garden distances per capita, especially during the parcellation phase. It should be ensured that subdivision plans, one of the most important elements of land management, evolve into a sustainable land management approach.

Meşhur [24] argued that "The gains or losses caused by the forms of production of zoning parcels should be questioned by considering the urbanism and architecture dimension of planning. In this context, although the understanding of producing zoning parcels that dominates the current implementation process seems to serve the interests of the immovable owners in the short term, it creates a serious quality problem in the context of ignoring the formation of urban space, which affects both the value of the immovables and the quality of the urban environment in the long term. It is observed that it creates negative effects". This study is thought to be guiding in terms of revealing the importance of considering the subdivision plan processes from the perspective of the discipline of architecture.

The official institution areas created as a result of the PPI cut within the scope of the legislation in the past have become the problematic areas of today and this situation has been clearly seen in the district of Tire, which is the study area. Official institution areas, in which dozens of people are shareholders with the PPI cut, are against the logic of sustainable land management. In the areas created with the PPI, public investments cannot be realized and are subject to lawsuits by the shareholders. In order to prevent such situations, the PPI deduction was abolished from the legislation, but the immovables created in the past have not been used or subject to a public investment until today.

With the sustainable land management approach, official institution areas etc. created with the cut of PPI immovables should be included in the investment program by the relevant institutions and organizations, and they should be expropriated and brought to the public and the city. Considering that the most important factor supported by sustainable land management in cities is sustainable urbanization, it is of great importance that public investments are implemented without interruption for livable cities.

It is not possible to draw an optimistic picture for the future of the world unless precautions are taken and the understanding of sustainability is not adopted in all areas. Therefore, it is necessary to adopt sustainable land management as a basic principle both in the city and in the countryside before it is too late, and this basic principle should form the basis of all land-related studies such as cadastre and parcellation plan.

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Author contributions

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Conflicts of interest

The authors declare no conflicts of interest.

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Elimination of unqualified additions that distort the silhouette of the historical places: Artuklu example

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Abstract

The Mardin-Artuklu urban protected area has a unique historical texture, topography and sociological richness, which is rarely seen in the world, with its vibrant urban texture that has continued in the long historical process. The increase in the number of reinforced concrete structures and add-on techniques over time in this well-established residential area has led to the deterioration of the qualitative stone texture. These deteriorations have increased especially after the 1950s and have led to its present appearance. Due to the use of reinforced concrete, the process of deterioration in the historical-urban texture has manifested itself with many negative effects. In the process of being a livable example of the concept of "tourism attraction", which is mentioned in the national strategy plans, especially in the development and other upper-scale plans of the area, reinforced concrete structures constitute one of the most important problems in its inclusion in the permanent heritage list. In this study, it is aimed to examine the importance of the demolition of reinforced concrete structures and their annexes, which are not suitable for the historical and cultural texture within the Artuklu Urban Site Boundaries in the Artuklu District of Mardin City, in revealing the historical texture of the area, through various examples in the Artuklu Site Management model management plan. In the current study, archival research, observational detection, photographic documentation and interview methods were used to determine the physical and socioeconomic contributions of demolition works. As a result, the importance of the demolition of the reinforced concrete structure and its annexes in revealing the historical texture of the area is examined with some examples, and various suggestions are presented according to the system in the management plan.

1. Introduction

Site Management is defined with the terms "management area" and "management plan" in the Law No. 2863 on the Protection of Cultural and Natural Assets, with the update in 2004. The term area management refers to a roadmap that expresses the analysis of the current situation of the area, the development of the predictable situations that will affect the future state of the area and the policy objectives to be carried out in a sustainable concept of protection, and the monitoring of the implementation processes [1-8]. It is aimed to make sustainable policies for the protection of the areas to be implemented with the site management plans to be made in archaeological sites, urban sites and ruins, to protect them with a new understanding and to evaluate them. The site management policies to be implemented should be carried out by embodying them on a common axis through

coordinated communication with local governments, other public institutions, non-governmental organizations, etc. The implementation of the strategic plans to be determined can also be achieved with this coordination [6-8]. For this reason, gradual planning (short, medium and long term) in the area where the site management plan will be made and their implementation are stated in the plans of relevant institutions, organizations and non-governmental organizations [9-11]. Site management plans in the world and in Turkey should also include recommendations for the needs of local people regarding the site [12-16]. In order to obtain predictable results in these decisions, practical applications of public institutions and organizations and other stakeholders, especially the local people living in the area, and economic sustainability and financial support should continue uninterruptedly [17]. In this context, Artuklu Urban Protected Area is one of the areas where a management plan is needed in recent years. In this context, a mutual cooperation protocol was signed between the Ministry of Culture and Tourism and the Mardin Metropolitan Municipality, and the necessary studies were initiated for the preparation of the Artuklu Urban Site Management Plan, including the Artuklu Urban Site and related areas. The Artuklu (Mardin) Site Management Plan Boundaries were determined with the Authority's Approval of the Ministry of Culture and Tourism dated 12.02.2021 and numbered 1123378. The Artuklu (Mardin) Management Plan Planning Area is 446.74 Ha in total. Artuklu Site Management Plan, which is a strategic plan, differs from other plans in that it includes tourist carrying capacity and predictable visitor management plans, as well as preserving the cultural heritage in the area and suggesting methods. The most important issues included in the action plans in site management are that the city has a unique historical texture, topography and sociological richness within the scope of a rare city in the world with its lively urban texture that continues in the long historical process, and that it has recently lost this feature with the addition of various unqualified structures and add-ons to the historical texture (Figure 1).

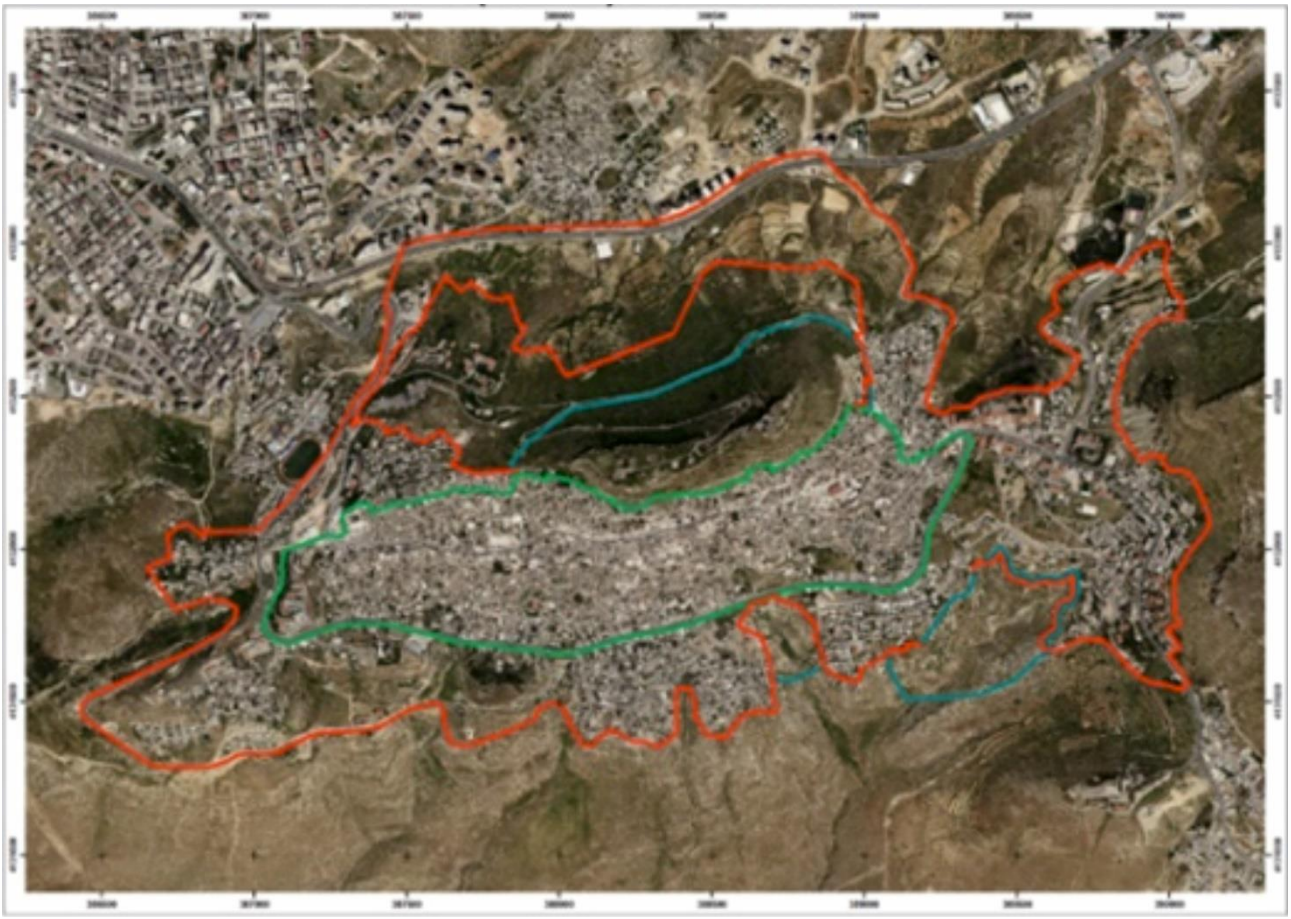

Figure 1. Artuklu Site Management Plan Boundary

The old city center was declared as a historical site in 1979, and it was included in the Unesco World Heritage tentative list in 2000, while the old city center of Mardin was being renovated with the help of central and local government resources, on the other hand, on a neighborhood scale, were transformed with spatial attachments which of the majority of reinforced concrete structures were added to the historical buildings by the user. When the additions used in traditional buildings and today's add-ons are considered, it will be understood that it emerges as a product of vital comfort and concerns. However, the intertwining of traditional building and reinforced concrete structures causes a contrasting appearance. For this reason, the traditional texture and silhouette of the city is deteriorating. This architectural style, consisting of contrasts, developed organically and created a new form.

If we start from the stories about the articulation process of reinforced concrete add-ons to stone structures, which were created by daily life concerns, it will be seen that these life practices actually facilitate daily life and shape these forms of households according to themselves. In other words, the socio-cultural structure of Mardin and the change in this structure are part of the transformation. As can be seen in many periods of history in Mardin, the existence of extended families rather than the nuclear family structure and the effects of these families made it inevitable to make reinforced concrete or other additions. We provide this from the information obtained from the building users and the local people about the construction process of the reinforced concrete annexes during the registration process. Over time, the increase in the population of the household has enabled the articulation of different units within the house or the creation of independent areas, with the effect of ownership. These are in the form of opening and adding a new floor or section, or adding many stairs, WCs or kitchen-bathrooms to a building at different times.

In summary, with the increasing population, the stone houses, which are tried to be revised with reinforced concrete, are surrounded by daily living spaces away from historical and cultural concerns. Arrangements such as h=free brought with the revision zoning plans that support this have caused irreparable damage to the city, especially the silhouette. The increase in concrete buildings in the area called Yenişehir after 1990 has attracted the population in Old Mardin to more comfortable and livable alternative areas. Regarding the issues that contain the internal problems of the city, especially local governments, regarding the solution of this problem and other problems in the area, since the 2000s, there has been a planned plan for the solution of these problems by accelerating the activities of restoring the city's old silhouette, restoration, street rehabilitation and revitalization of idle bazaars and settlements. In this context, other stakeholder institutions, especially the Mardin Metropolitan Municipality, continue to work hard to reveal the silhouette of the Historical City of Mardin. In this study, it is aimed to examine the importance of the demolition of reinforced concrete structures and their annexes, which are not suitable for the historical and cultural texture within the Artuklu Urban Site Boundaries in the Artuklu District of Mardin Province, in revealing the historical texture of the area, through various examples in the Artuklu Site Management model management plan.

2. Material and Method

In the current study; reinforced concrete structures to be demolished in the Urban Site were determined, and the physical applications were observed and photographed on site. In order to understand how the current situation of the area was before the implementation, photographs were obtained from the Mardin Metropolitan Municipality KUDEB unit about the pre-implementation conditions of the spaces. The collected photographs were examined in comparison with the current situation photographs of the spaces. It has been determined that the removal of unqualified additions on the buildings, the changes in the general appearance and texture of the city. The physical and visual-aesthetic current conditions of the reinforced concrete buildings and annexes to be demolished/constructed were comparatively examined.

In the second stage, various interviews were received from local residents regarding the settlements in the Artuklu Urban Site. In addition to interviews with 22 households and 28 residents of the urban site, interviews were also received with Kudeb employees regarding the process of clearing the Urban Site from reinforced concrete annexes and revealing the historical urban texture. The advantages and disadvantages related to the contribution of demolitions to the city and the settlement problems of the residents in the urban protected area were discussed with the interviewees. Interview answers were recorded and analyzed by coding method. The study, which is based on a participatory approach technique based on social evaluations, consists of open-ended questions and evaluations. The answers given by the grouped subjects were evaluated separately.

2.1. Main basis for demolition of unconventional buildings within the scope of the site management plan

The change and transformation that emerged with modernization takes a faster form today and makes its impact felt. As a result, the disappearance of residential areas and the speed of their destruction continue in the same way. These rapid destructions on architectural structures cause great damage to the historical and cultural identity texture of a city and leave the most important elements of the city in danger. These structures, which are historical documents, contain important features of the culture, art, architecture and social texture of their period and carry them to the future. Therefore, it is important to protect these areas, which are important parts of cities. Mardin-Artuklu Urban Site is an important area that reflects and carries its historical, cultural and architectural characteristics in its original form and spirit. It is important to preserve the texture of site in the Site Management Plan. A view of the Mardin is presented in Figure 2.

Figure 2. Mardin (1918)

Conserving and carrying to the future the complementary structures and elements of different periods that constitute the unique texture and identity of the city, which are located within the Mardin Urban Site and Artuqid Site Management Boundaries, are related to the assurance and implementation of the Universal Criteria and National Criteria. Authenticity, which is considered as a criterion for conservation management in the international arena, includes the definition of being original. Various researches are carried out based on identity, locality and their continuity, which have become important in recent years. Local Identity is a general concept that specifically refers to small-scale areas. It is the concept that conveys positive statements about the place where they live, especially the positive living space, to the local people living here. When we look at the Artuklu Urban Site, the features of this place are unique and separate from other places. All of the differences in Artuklu constitute the local identity of the city. In addition, all these qualities of the city represent the spirit of this place, and the spirit of this place contains its own meaning and memory. The entirety of the images of the city can be evaluated under the concept of "local identity". Therefore, the removal of the city from reinforced concrete structures will ensure the emergence of local identity elements as a whole.

3. Results

3.1. Demolition process of unqualified additions in the urban site within the scope of the site management plan

Mardin Province, Artuklu District, Mardin Center Conservation Master Plan was approved by the Council Decision dated 08.01.2020 and numbered 2020/10, the plan consists of an area of 340 hectares in total, including the Urban Protected Area (100 Hectares) and the Interaction Area (240 Hectares). Mardin, one of the most strategic and important cities of Northern Mesopotamia in the historical process, is an important city that reveals this aspect in terms of its current city center. In the city center, which has survived under the influence of many different cultures, religions and ethnic groups, this rich cultural diversity constitutes the most important element of values regarding the transfer of the tangible and intangible cultural heritage to the future, which carries the traces of the communities. We come across examples of architectural structures, which are the most important of the material cultural elements of various cultural layers, in Artuklu City Center. The richness of buildings with monumental features such as churches, monasteries, mosques, madrasas, Turkish baths, fountains and abbara from different periods constitute the basic texture of the city. In addition to these, mansions, shops and houses are important examples of buildings. Most of these structures are registered as registered cultural assets within the scope of the law numbered 2863 and constitute the examples of the traditional urban fabric of Mardin. Reinforced concrete structures, which are the opposite of these building groups and exhibit unqualified features, spoil both the originality and silhouette of the city.

In the process, the multi-storey construction of reinforced concrete structures in the Urban Protected Area was contrary to the texture of the historical city. This problem is tried to be done with a sustainable policy within the scope of the “Historical Mardin Transformation Project”. With this project, many reinforced concrete structures and add-ons in the urban protected area are demolished and the texture of the city is provided. In addition, some reports and determinations have been prepared by the Mardin Metropolitan Municipality in order to reveal the historical and cultural identity of the city, to preserve the traditional structures and to revitalize the city in terms of tourism. In these determinations, 240 reinforced concrete structures and attachments were prioritized and presented to the Şanlıurfa Cultural Heritage Preservation Regional Board. The Board took a decision on the demolition of these 240 buildings and contributed to the removal of the reinforced concrete structures and annexes identified within the scope of the "Mardin Urban Transformation and Development Project" from the urban protected area. Although these structures are generally concentrated in the areas within the scope of the

pedestrianization project of the 1st Street and the Revitalization of the Historical Bazaars, in addition to the 240 structures that can be evaluated within the scope of demolition in many parts of the city, approximately 1000 reinforced concrete additions that are contrary to the historical texture have been identified. To begin with, the reinforced concrete structure consisting of 3 blocks and 5 floors in each block, known as the Old Public Works Lodgings among the public, located across the Mardin stadium, and the 4-storey Old Ziraat Bank Lodging in Şar Neighborhood and the 3 floors of the 5-storey building next to it, which are reinforced concrete, were expropriated and the reinforced concrete annexes were demolished. In addition, the demolition of the YSE lodgings located on Yeniyol Street and in the area designed as a parking lot in the KAIP (Conservation Plan) and the 2 floors of reinforced concrete of the 4-storey building that disrupts the silhouette of Ulu Mosque have been completed. The demolition of the structures determined by the Conservation Implementation and Inspection Bureau (KUDEB) affiliated to the Department of Zoning and Urbanization is carried out in a controlled manner. As long as the necessary financial funds and appropriations are available, the demolition of all contrary structures that disrupt the historical and cultural silhouette of the urban site will continue. In the project carried out by Reinforced Concrete and Mardin Metropolitan Municipality, the demolition of reinforced concrete annexes and structures is to reveal the historical and traditional city texture. Many buildings and landmarks were destroyed on the grounds that they distorted the silhouette, and these demolitions are carried out in accordance with the rules within the framework of the decision and recommendations of the Cultural Heritage Preservation Board (Figure 3-11). Demolition work is still ongoing (Figure 12).

Figure 3. Example of Building Demolished/To be Demolished within the Scope of the Artuklu Site Management Plan

Figure 4. Example of a Building Demolished/To be Demolished within the Scope of the Artufactured Site Management Plan

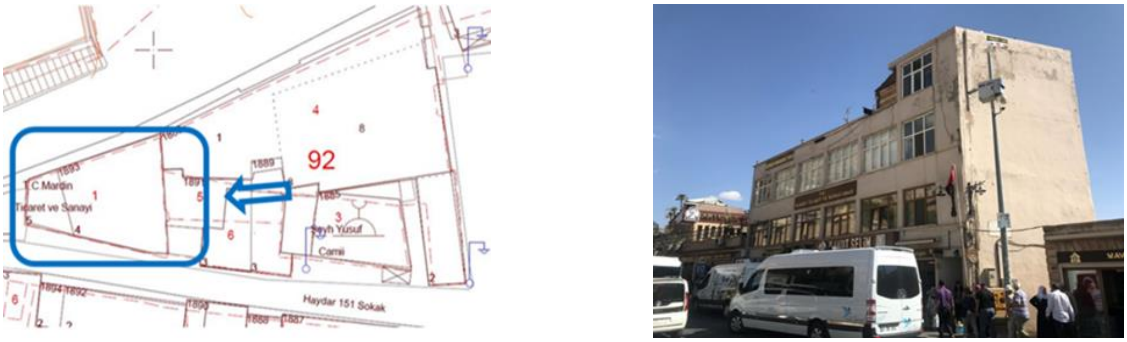

Figure 5. Examples of Structures to be Demolished/To be Demolished within the Scope of the Artuklu Site Management Plan

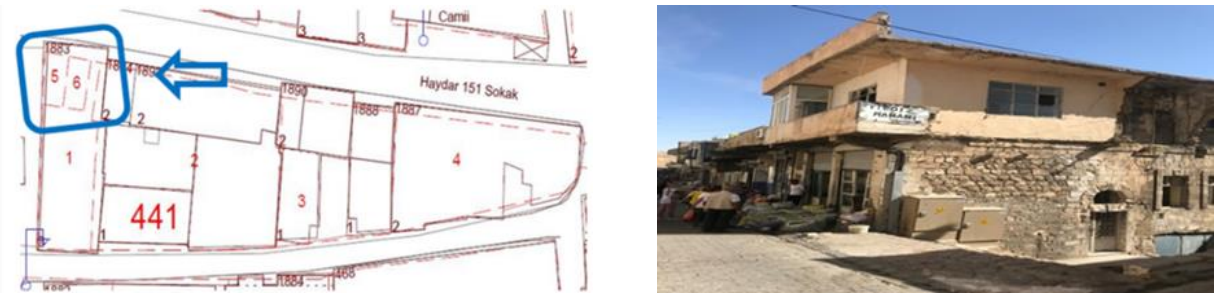

Figure 6. Example of a Building Demolished/To be Demolished within the Scope of the Artufactured Site Management Plan

Figure 7. Example of Building Demolished/To be Demolished within the Scope of the Artufactured Site Management Plan

Figure 8. Example of a Building Demolished/To be Demolished within the Scope of the Artuklu Site Management Plan

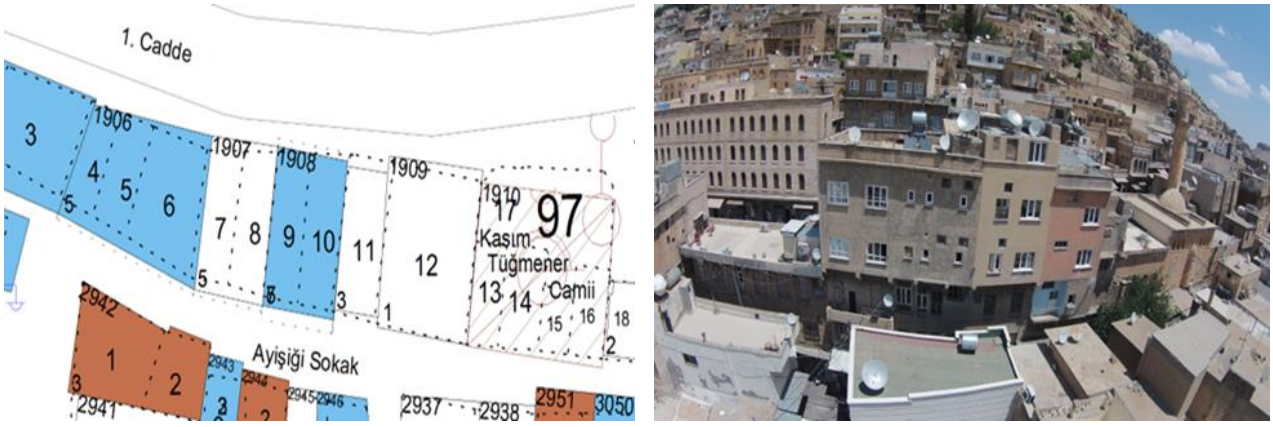

Figure 9. Example of Structure to be Demolished/To be Demolished within the Scope of the Artuklu Site Management Plan

Figure 10. Artuklu, Şar Neighborhood, Urban Protected Area, Former Public Works Lodgings

Figure 11. Artuklu, Şar Neighborhood, Urban Protected Area Building Distorting the Silhouette of the Ulu Mosque

Figure 12. Demolition example Mardin Metropolitan Municipality - Kudeb Archive

Some add-ons with period annexes were designed in accordance with the conservation plan. The reason for this is to preserve the architectural structure of the city. The fact that the ground and lowest floors of some reinforced concrete houses are covered with plaster has caused them to be described as historical masonry buildings. In such structures, the historical texture is reached after the plaster is removed, making it easier to remove the reinforced concrete additions. The aim here is to make it look like medieval history. Converting the

whole texture to its medieval state will undoubtedly make a big impact and ensure sustainability. In the demolition interventions in the area, the teams consisting of experts related to the area carry out the demolition in accordance with the rules, based on the decisions taken by the Cultural Heritage Preservation Board (Figure 13-15).

Figure 13. Before and after demolition of 45 block 5 parcels

Figure 14. Before and after demolition of block 83, parcel 1

Figure 15. Before and after demolition block 69, parcel 24-25

Another project carried out by the Mardin Metropolitan Municipality within the boundaries of the Artuklu Urban Site is street rehabilitation projects. The façade improvements of the routes preferred by the local people and tourists, in particular, aim to make the city suitable for its essence with the demolition of the areas. These works are carried out by making the facades, doors and windows of the buildings suitable for the texture with simple repairs. Cement-based joints and plasters on these facades are properly removed and the streets are transformed into originality. In addition to these, the concrete and briquette walls that were added later were removed and stone walls suitable for the texture were built instead. The metal or reinforced concrete poles located in the Urban Protected Area were also pulled underground to remove the visual pollution. The side street, which starts from the Diyarbakır Kapı Mahallesi route and goes towards the Mardin Museum, has been included in the tourism route as a cultural street.

3.2. Socioeconomic consequences of demolition process of reinforced concrete structures in the urban protected area within the scope of the site management plan

As a result of the evaluation of the interviews with the residents of the Urban Protected Area, it was determined that the removal of the reinforced concrete structures and annexes against the texture in the Mardin Urban Protected Area was satisfactory, and that the local governments managed to include this project in their strategic plan and this work was positive in maintaining the service flow. It was concluded that the satisfaction rate of the shopkeepers and city residents living in Upper Mardin, that is, the urban protected area, was 94%, and that most of the entire population was satisfied. Based on these results, it is concluded that the historical texture of the city has emerged and tourism carrying and input capacities have improved. This shows the conclusion that the demolition work is fit for purpose.

4. Discussion and Conclusion

In this study, the process of clearing the Historical Mardin Urban Site and the historical area, which is defined as archaeological and whose boundaries are specified in the Artuklu Site Management Plan, from reinforced concrete annexes is mentioned. The contributions of these practices to the historical and cultural texture of the city are investigated. Archival research, observational detection, photographic documentation and interview methods were used to determine the physical and socioeconomic contributions of demolition works.

In the findings obtained as a result of the study; It has been determined that the removal of the reinforced concrete structures and add-ons in the Mardin Urban Protected Area, which is contrary to the texture, is pleasing, and the local administrations have succeeded in solving this problem. Based on these results, it has been concluded that the historical texture of the city has emerged and tourism carrying and input capacities have developed. This shows that the demolition work is fit for purpose. In addition, another determination obtained in the results of the study; The negative feedback regarding the physical appearance of the city regarding the reinforced concrete structures in the Mardin urban site is that this issue was included in the plan and that many historical buildings were restored on the axis of tourism economy. In addition, the characterization of "reinforced concrete structures and annexes" as "unqualified concrete blocks" in the Conservation Development Plan has created a legal basis at the institutional level and it is seen that the demolition process of reinforced concrete structures has accelerated as soon as possible. The insistence of this issue in the Management Plan also provided the formation of the necessary motivation process, and the destruction economy created by this process enabled many people in the city to become an economic source of income.

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Author contributions:

Lale Karataş: Conceptualization, Methodology, Software **Aydın Alptekin:** Data curation, Writing-Original draft preparation, Software, Validation. **Murat Yakar:** Visualization, Investigation, Writing-Reviewing and Editing.

Conflicts of interest

The authors declare no conflicts of interest.

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