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Article

Rumeli Railway estates in the historical peninsula in the light of archival documents; Sirkeci example[1]

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ABSTRACT

This study aims to examine the impact of the Rumeli Railway, built by the Ottoman Empire in the second half of the 19th century, on the transformation of the urban space in the Sirkeci District by evaluating the cooperation and conflicts between the state, foreign investors, and local actors and the political, social, and urban spatial effects of the construction process. The Industrial Revolution began a process of major changes and reforms across the world. These changes led to radical reform worldwide while closing and opening an era in economic, social, and technological terms. The revolution first started in the UK and then spread to Northern Europe and North America. Steam-powered machines and vehicles are among the reasons for the beginning of the Industrial Revolution. The discovery of steam-powered trains made the construction of railways essential. The Ottoman Empire also made use of this innovation and built the Rumeli Railway in the second half of the 19th century. As the majority of the railways were built by the Ottoman Empire in the 19th century, the Rumeli Railway was funded by foreign investors; many written sources describing the processes of obtaining their privileges, plan projects describing the construction processes, and many official correspondences describing the events during the construction process are available in the Turkish Republic Presidency State Ottoman Archives (OA). This study examines the expropriation processes carried out in the historical peninsula in the Sirkeci District during the construction of the Rumeli Railway in the light of archival documents.

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INTRODUCTION

Like most of the 19th-century railways constructed by the Ottoman Empire, the Rumeli Railway was also funded by foreign investors; therefore, there are many written sources describing the processes of obtaining concessions, plans, and projects describing the construction processes, and many official correspondences describing what happened during the construction process in the Turkish Republic Presidency State Archives, Ottoman Archives (Cumhurbaşkanlığı Başkanlığı Osmanlı Arşivi), shortened as OA in the article[2]. In this study, the expropriation processes carried out in the historical peninsula during the construction of the Rumeli Railway are examined in the light of archival documents, and the results of the construction of the railway in the

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Sirkeci district are examined both in terms of the economic, political, and social dimensions and the transformation of the urban space and physical environment.

In the documents of the Turkish Republic Presidency State Ottoman Archives, the entrance of the Rumeli Railway from Edirne to Istanbul, the Rumeli side of Istanbul, and finally the historical peninsula and its distribution in these regions can be seen on the maps (Figures 1-4).

Literature

The archival documents are the main source of the original part of the study. In 1874, the booklet printed in Istanbul about the contract for the Rumeli railways, "Actes De La Concession Des Chemin De Fer De La Turquie D'europe," (Anonymous, 1874) the book published by the Ottoman government to raise public awareness "La Question Des Chemins De Fer De La Turquie D'europe Devant L'opinion Publique," and the local newspaper of the period, "La Turquie," constitute the main sources on the subject. Engin's (1993) study is one of the most important sources dealing with the Rumeli Railways in a holistic manner. Emre Madran (2002) provides a broad perspective on the conservation understanding of the period, while Quataert's (1985) article "Railways in the Ottoman Empire in the 19th Century" is another important source. Tekeli's publications (Tekeli, 1985; Tekeli, 2012) about the Tanzimat period, along with old maps and many sources in the references, which describe the social, political, economic, and physical situation of the city during the period, shed light on the study.

The Ottoman Empire prioritized military and political objectives over commercial ones when building railway lines. The purpose of building the Rumeli Railways was purely political and military. This route was seen by the Tanzimat administrators as a means of political integration with Europe, intervening with the states' instability, especially during the uprisings in the Balkans, and emphasized the need to build the Rumeli railway. In addition, this railway

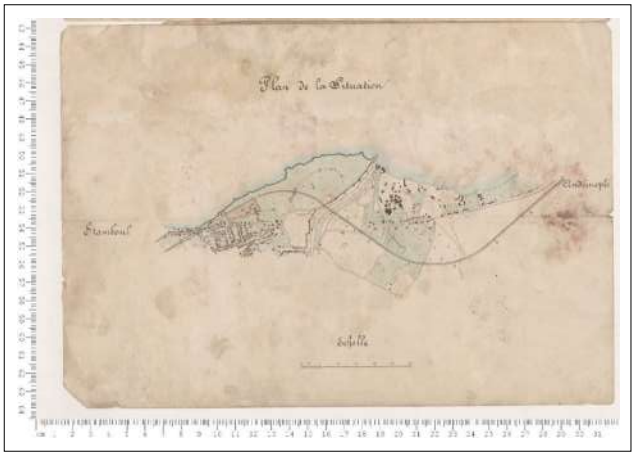


Figure 1. Entrance of the Railway from the Yedikule city walls (Ottoman Arcihve, 1870).

Figure 2. Edirne-Istanbul railway plan (Ottoman Arcihve, 1868).

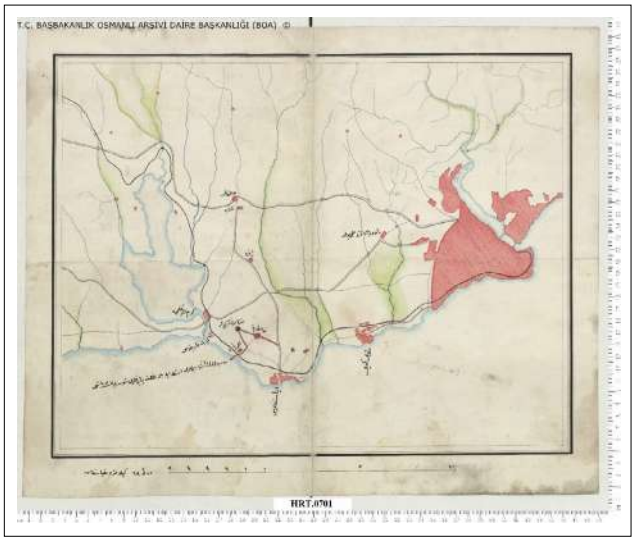


Figure 3. Map showing trains and highways on the the Rumeli (European) side of Istanbul (Ottoman Archive, 1923a).

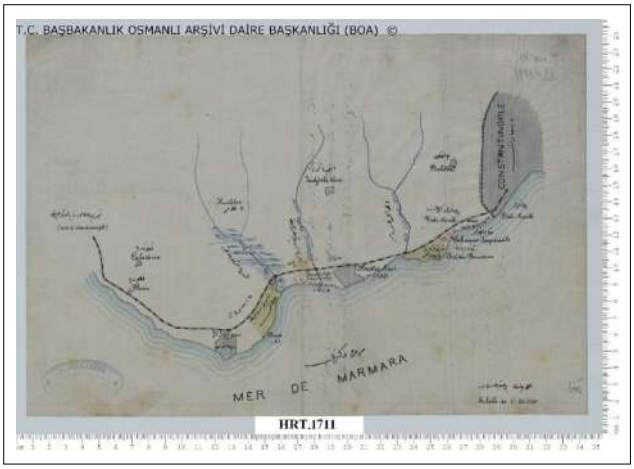


Figure 4. Istanbul, Yedikule-Florya Railway map, (Ottoman Arcihve, 1923b).

was also intended to increase state revenues by utilizing the rich resources in European territories (Engin, 1993).

Construction Process

In 1855, the Ottoman government made a call to European capital circles through the press, announcing that it wanted to build a railway between Istanbul and Belgrade and was waiting for applications from investors. The first response to this call came from the British parliamentarian Mr. Labro, who stated that a railway designed to connect the Black Sea, the Mediterranean, and the major cities of Rumeli to Istanbul would be very advantageous for the Ottoman Empire in commercial, financial, political, and military terms. Labro's proposal was accepted and a treaty was signed on 23 January 1857. However, the agreement was terminated because Labro could not raise the necessary capital and could not start operations. The Ottoman government signed contracts with two other companies, but both attempts were unsuccessful.

Towards the end of 1868, the Ottoman Empire began a new search. Meanwhile, Russia, which had emerged from the Crimean War, was preparing for a new war with the Ottoman Empire, and the Ottoman Empire wanted the Rumeli railways to be built as soon as possible in order to protect itself from a possible Russian attack. Unlike Russia, European states support the project. The Rumeli Railway would increase the defense power of the state and, at the same time, increase the economic advantages of the Ottoman Empire on the India - Europe route (anonymus,1875).

Austria was the biggest supporter of the Ottoman state in the construction of the Rumeli Railways. In 1866, after its defeat in Sadova against Prussia, it gave up hope in the West and started to look for its future in the Balkans and its conflicts with Russia, which had the same ambitions, intensified. Austria is now aligning itself with its old rival in the west and, with its back to the Germanic world, intended to take Serbia under its tutelage and from there to Thessaloniki. Rumeli railways will be an important tool in achieving this goal.

The last concession for the Rumeli Railways was granted to Baron Hirsch, a Brussels banker, on 17 April 1869 (Engin, 1993). The deal was brokered by Davut Pasha, but it turned into a process in which the state suffered great losses. The concession period of the line, which started in July 1876, is 99 years. Its route would start from Istanbul, pass through Edirne, Plovdiv, Dedeagac, Burgas, and Thessaloniki, and reach Sava. This line would later be connected with the Serbian lines. The total length of this line was 2,500 km, and the projected construction period was seven years. The completion time between Istanbul - Plovdiv and Edirne - Dedeagac was four years. The state undertook to pay a guarantee of Francs 14,000 per kilometre for the construction of the line.

Although the Yedikule-Küçükçekmece line had been completed, construction work had not yet started on the other parts of the Rumeli railways. In other words, only 15 km of railway could be built 21 months after the contract was signed on 17 April 1869, and 15 months after the concession edict dated 7 October 1869. Although the shortage of materials and technical staff due to the Franco-Prussian War also played a role in this failure, still very little work was done. Moreover, it does not seem logical that Yedikule would be the last station of the railway that would connect Istanbul to Europe. It is difficult to transport passengers and cargo from there to market places, and it also had no connections to a port. The most suitable place for the starting point is Sirkeci, but there were still doubts because the Sarayburnu area was inside the palace. For the railway to pass through there, many pavilions would have to be demolished, gardens would have to be disturbed, and the smoke from the trains would have to be tolerated. It was also considered strange for a foreign company to run a train through the palace. However, it also seemed necessary to extend the line to Sirkeci, and the construction company was in favor of extending the line to increase its revenue. If the starting point was Sirkeci, it would be possible to accelerate the construction of the railway in other neighborhoods because the connection of the railway with the Sirkeci pier would enable the railway material brought by ships from Europe to be brought to shore safely. From there, it would be possible to quickly reach Küçükçekmece and beyond (Engin, 1993). For this purpose, the company representative M. Autrey prepared a report on the route in December 1870 and submitted it to the Nafia Nezareti. According to Autrey's statement, the Sirkeci-Yedikule line would pass through the palace garden, between Yalıköşkü and the New Bridge. Buildings that the state wishes to preserve would be left untouched as far as possible. Bahçekapısı and the neighborhoods beyond it were not visited, leaving only the minimum area for the station. The route between Yedikule and Gulhane also passed through fire-damaged zones to avoid expropriation. It was deemed necessary for the company to keep the Daya Hatun Mosque, one of the three mosques in the main station area. Because the company wanted to employ many Muslims at the station, they thought that they would be able to perform their prayers in this mosque. Although the Medical School in the palace garden was located in the station area, it would not be evacuated for the time being and only a corner of it would be affected. It was also seen that the factory belonging to the shipyard in this area should be demolished. The route to be followed by the Yedikule-Sirkeci line was to be as follows: Narlıkapı-Yerli bostan-Langa Bostanları-Yenikapı-Kumkapı-Çatladıkapı-Balıkhane Kapısı. From there, one would enter the Palace garden. Some parts of the castle walls around Samatya and Yenikapı and Çatladıkapı were to be demolished. In the palace garden, the line would follow

the seaside, but some parts of the Marble Pavilion and two old buildings belonging to the Bâb-ı Seraskeri would have to be demolished (Engin, 1993).

The announcement that the railway would pass through the palace garden caused the public and some intellectuals of the era to react. While petitions of complaint written by the public can frequently be found in the Ottoman archives on the subject, the newspapers and humor magazines of the period also contain various articles and cartoons, examples of which are given in the following sections of the study. According to them, it was not proper to block the beauty of a unique place like Sarayburnu. This beauty should be embellished, not sacrificed, by building railway facilities there and they argued against filling the city with noise and smoke. If there was a necessity in terms of port, it was possible to bring the line from Langa and Sultanahmet Square to the vicinity of Bahçekapı with a tunnel or to extend it from Edirnekapı to Eyüp and from there to the vicinity of Ayvansaray, following the city walls. Another possibility was to build a harbor on Küçükçekmece Lake. In addition, the tram company also opposed the Sirkeci-Yedikule line, thinking that it would reduce its income (Engin, 1993). Approximately 1,000 buildings had to be demolished for the construction of the railway line through the garden of Topkapı Palace (Engin, 1993). Although there were those who opposed the extension of the line to Sirkeci on the grounds that it would be inappropriate for a foreign company to enter the palace garden, the environmental pollution it would create, and the impact on the revenues of the connected tram company, the line was put into service on 21 July 1872 due to the order of Sultan Abdülaziz (Engin, 1999). Two wooden sheds were built as passenger waiting rooms in Sirkeci. Proposals for the actual station building were presented by Baron Hirsch in 1872 and 1873. However, the decision to build the station building in Sirkeci was taken only on 11 February 1888. Sirkeci Station was built by architect A. Jasmund and opened on 3 November 1890. With the death of Grand Vizier Ali Pasha, a great supporter of the Rumeli Railways, it was decided that Baron Hirsch would complete the lines as he wished and the remaining lines would be built by the state (Table 1). The lines Hirsch is obliged to complete are the following:

Table 1. Rumeli Railway stages (Engin, 1993)

Istanbul – Edirne 319 km
Dedeagaç- Edirne 149 km
Edirne – Sarımbey 243 km
Selanik – Mitroviçe 361 km
Tırnova – Yanbolu 105 km
Banja Luka – Avusturya 102 km

Debates on Conservation of the Construction of the Rumeli Railway

Emre Madran comments on the conservation understanding of the period in the Ottoman Empire as follows: "In the Ottoman state, as of the end of the 18th century and the beginning of the 19th century, when the field of construction started to change, repair activities in the empire were not organized as a separate institution. The people and institutions involved in new construction activities and the financial and administrative considerations that applied to new construction also applied to repair activities. There was no general conservation awareness and practices. Only the objects used were naturally preserved. 'Usability,' 'ability to maintain its function,' and 'availability of financial resources for repair' were the main factors affecting repair decisions. The opposition between destruction and repair is interesting. The institution of 'foundation' was the most important factor in the formation, repair, maintenance, and continuity of buildings" (Madran, 2002).

The 19th century was a period in which the Ottoman Empire attempted to modernize in many areas. The reforms made while opening the economy to capitalist relations are a clear indication of the concern for westernization. With the Regulations on Asar-ı Atika, the first of which was put into effect in 1869, along with other regulations, a new legal basis began to emerge. Emre Madran noted that there was a use-oriented repair system before the Westernization period, but that many of the regulations that form the basis of today's zoning and conservation law began in the Tanzimat period. Between 1848 and 1917, along with the institution of waqfs (religious foundations) and new regulations in the fields of construction and repair, various legal regulations on antiquities and conservation were enacted. In the first half of the 19th century, there were various laws that indirectly concern the field of conservation or regulations aimed at improving the institution of the foundations. However, it was only in the second half of the 19th century that the legal basis for real protection was established and organized with a modern point of view of the period (Madran, 2002).

In the 19th century, the Ottoman understanding of conservation was mostly directed towards monumental buildings and archaeological artifacts (Madran, 2002). The growing interest in archaeology and history in Europe led to an increase in the number of excavations in the Ottoman Empire and the importance and development of museology, but archaeological excavations were only carried out by foreigners in Ottoman lands. The Asar-ı Atika Legislation is described as a defense of the state against the European plunder of cultural heritage. Although the Foundation system experienced problems, it continued to be effective in the preservation of monumental buildings. In the archival documents examined (Table 2), correspondence regarding the protection of some archaeological artifacts unearthed during the construction of the railway was identified (OA, MF.MKT. 1167/69,1329).

Table 2. Archival document From the Ministry of Education to the Ministry of Trade and Public Works about antiquities unearthed during the construction of the railway (Ottoman Archives, 1911).

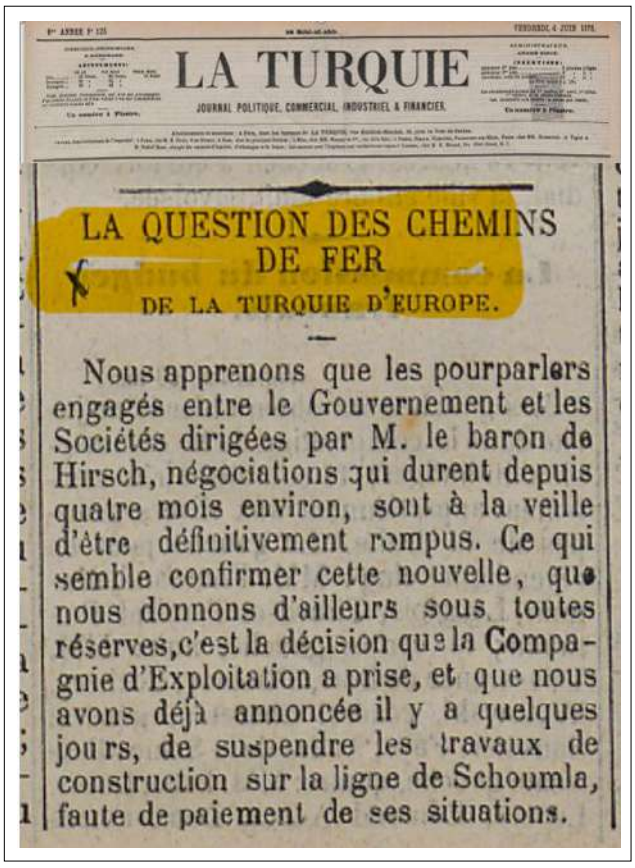
Fund Code	Location Number	Date	Document Summary
MF. MKT.	1167-69	H-05-3-1329	The construction of the double line, which was decided to be extended from Sirkeci to Ayastefanos, was started by the company, and since some capitals and other engraved or inscribed stones were found in the places where the line passes within the walls, it will appear in the commercial excavations and belong to the museum. The excavated historical artifacts should not be damaged and should be immediately taken under protection and reported to the museum.

As it can be understood from the document (Table 2), it was requested that the historical artifacts were not to be damaged and they were immediately taken under protection and reported to the museum. In this regard, a high-level correspondence was sent from the Ministry of Education to the Ministry of Trade and Public Works, and the railway company received an official warning. Although many documents survive regarding the conservation understanding of the period regarding the expropriation and demolition of coastal palaces other than the Sepetçiler Pavilion, the most striking example is the fact that no document has been found regarding the partial demolition of the Bukoleon Palace, which is a very important Byzantine structure, or the loss of the Byzantine Sea Walls and important city gates. The fact that there are only written documents regarding the transportation of the artifacts excavated raises questions about the fate of the excavated artifacts. The most striking example of the fact that the filling made with sleepers, which was detected after the cleaning carried out within the scope of the 2020-2021 Years Bukoleon Palace Museum and Restoration Implementation Work of the Istanbul Metropolitan Municipality made at Bukoleon Palace in 2020-2021, is the most striking example of filling made for the railway; many Byzantine structures, such as city gates, etc., remain under the filling.

During and after the Tanzimat period, the press became the most important national and international means of communicating the political, economic, social, and urban breakthroughs of the Ottoman State. The Ottoman Empire published some articles in newspapers about the railway construction as an important breakthrough in order to attract the public's perception in a positive direction, but humor magazines or independent publications of the period criticized the railway's passing through the city walls or the fact that the Ottoman economy, which already had limited funds, made such an attempt due to both the large-scale concessions granted to foreign investors and the unnecessary length of the railway since the expropriations made were covered from the treasury. There were various opinions and concerns about the construction process and extension of the railway line to Sirkeci and the opposition of the tramway company to the extension of the line, which thought that their income would decrease, in newspaper La Turquie (Figure 5 and Figure 6).

Launched in 1870, Teodor Kasab's humor magazines Diyojen and Çıngıraklı Tatar attracted much attention and had an impact on large communities. However, criticism against the government could not be prevented, and the humor press began to be censored by the state (Subaşı & Çaylı, 2017). Diyojen referred to the Rumeli Railway as a ferry/vapor in No. 15, August 3, 1872.

In Figure 7, the humour magazine Çıngıraklı Tatar satirised this situation in a caricature on April 30, 1873 (Oymak, 2013).



LA TURQUIE

JOURNAL POLITIQUE, COMMERCIAL, INDUSTRIEL & FINANCIER.

LA QUESTION DES CHEMINS DE FER

DE LA TURQUIE D'EUROPE.

Nous apprenons que les pourparlers engagés entre le Gouvernement et les Sociétés dirigées par M. le baron de Hirsch, négociations qui durent depuis quatre mois environ, sont à la veille d'être définitivement rompus. Ce qui semble confirmer cette nouvelle, que nous donnons d'ailleurs sous toutes réserves, c'est la décision que la Compagnie d'Exploitation a prise, et que nous avons déjà annoncée il y a quelques jours, de suspendre les travaux de construction sur la ligne de Schoumla, faute de paiement de ses situations.

Figure 5. La Turquie article dated 3 February 1871 (Anonymous, 1871).

5me Année 1871. Un numéro 1 piastre. Vendredi, 3 Février

LA TURQUIE

JOURNAL NATIONAL

LE CHEMIN DE FER DE ROUMÉLIE ET LA SOCIÉTÉ DES TRAMWAYS.

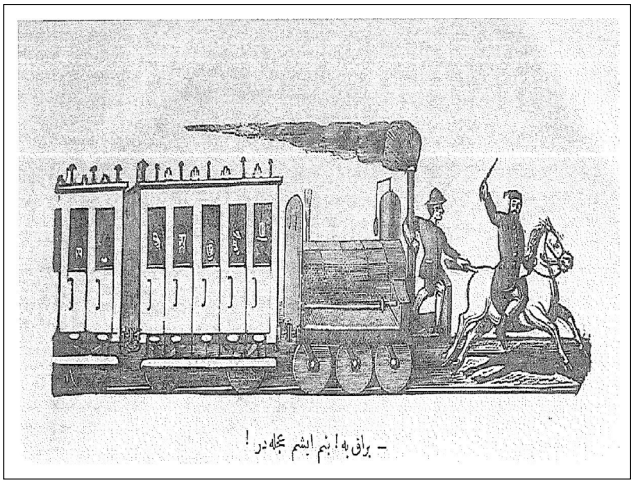
On s'entretient beaucoup depuis quelques jours du projet de prolongement du chemin de fer de Roumélie dans l'intérieur de la ville jusqu'à Bahtché-Capou, où l'on se propose d'établir la station principale, indépendamment de celle déjà établie à Narli-Capou, près de Yedi-Coulé.

Ce projet a donné lieu, nous assure-t-on, à une protestation de la part de la Société des Tramways dont le privilège serait atteint si ce prolongement venait à être exécuté.

Cette question intéresse au plus haut degré la population de notre ville. Aussi croyons nous remplir un devoir en l'examinant sous le double point de vue de l'intérêt public et des droits acquis à la Société des Tramways.

Ce dernier point est déjà irrévocablement résolu par une disposition de l'acte de concession portant que, *ni une compagnie, ni un particulier ne pourra établir un service régulier de*

Figure 6. La Turquie article dated 4 June 1875 (Anonymous, 1875).



– یاڤی به! بنم ایشم عجله در!

Figure 7. Çingirakli Tatar, 30 April, 1873 (Oymak, 2013) (The caption reads "Move, I'm in a hurry!).

The Effect of Rumeli Railway on Urban Space in Sirkeci Neighbourhood Through Archival Documents

The word "expropriation" means the taking of buildings, land, facilities, etc., from their owners for a price and making them public property. This was inevitable when the Rumeli railway was being built. The construction of the Sirkeci-Yedikule line required the demolition of many buildings along this route.

A commission was established under the chairmanship of Ethem Pasha, Minister of Nafia, for the expropriation works (Engin, 1993). Table 3 gives some examples of documents related to the Rumeli Railway expropriations identified as a result of the studies conducted in the Turkish Republic Presidency State Ottoman Archives (OA).

Documents taken from OA are given with their fund numbers. These documents have been selected to shed light on the study in general terms and show that the payments of the expropriation fees to be made for the construction of the Rumeli Railway (Table 3) were made from the State Treasury and that the execution was carried out by the Ministry of Public Works of the period. In addition, when the date intervals are examined, it is understood that some expropriation fees were made long after the construction of the railway. In this context, it can be interpreted that the Ottoman Empire, suffering from a shortage of funds, had some difficulties in paying these fees.

Another set of archival documents provides important information about the expropriations. The document states that the Ministry of Nafia and the construction company prepared a plan together on the line extending from

Table 3. Table with examples of documents related to railway expropriations from OA. (Ottoman Archives, 1873d; Ottoman Archives, 1892; Ottoman Archives, 1904)

Fund Code	Location Number	Date	Document Summary
A.}MKT.MHM.	456/64	H. 15.04.1290/ M. 12 June 1873	Notification to the Ministry of Nafia to discuss the payment by the Treasury of the cost of the real estate and lands purchased at Sirkeci Pier and Kumkapı for the Rumeli Railway line.
BEO	126/9393	H. 01.06.1310/ M. 21 December 1892	Payment of land compensation to individuals who owned real estate on the Rumeli Railway construction (Finance; 9393).
BEO	2384/178772	H. 24.05.1322/ M. 6 August 1904	Payment of Ovadis Arakliyan Efendi, a subject of the Austrian State, for the land expropriated for the Rumeli Railway at Sirkeci Pier (Finance; 177546).

Yedikule to Sirkeci, and that a commission was established by the Şehremaneti on R. June 1287 (M. June/July 1871) with a budget of 400,000 Ottoman liras provided by the Ministry of Finance, and that the expropriations of private and state properties coinciding with the railway line were carried out. It is also written in the document that the commission recorded the expropriations made in the books and marked them on the map, and the lands that did not coincide with the railway line were sold to their suitors after the expropriations were completed. It is understood that the records of expropriations were kept by a special commission established by the Şehremaneti, and that this commission determined the houses on the route where the line would pass and recorded them on the map. Some of the expropriations were found to be excessive when they did not correspond to the route of the line. As a result, some of them were sold to their suitors by the commission established. The rest were either exploited by the locals or used by the railway company, as it is understood from the documents (Ottoman Archives, 1889).

When the maps of Ekrem Ayverdi (1970) and Goad in the Sirkeci district are overlapped with the documents, the existence of the streets in the documents is clearly seen (OA, Evd. 4525). The expropriated buildings include a variety of buildings such as mansions, plots of land, fountains, and mosques. According to a document in the Ottoman Archives, Daye Hatun Mosque, Emir Mosque, and Elvan Mosque were also expropriated during the construction of the railway (Ottoman Archives, 1873c). In addition to these, the İncili Pavilion and Yalı Pavilion, important palace buildings, were also demolished. The Botanical Garden belonging to the Topkapı Palace in Gülhane was also moved from there.

Ottoman Monumental Buildings and Fountains Demolished/Expropriated in Sirkeci for the Construction of the Railway Through Archival Documents

The construction of the Rumeli Railway started in 1869, with the permission of Sultan Abdülaziz. During the construction of the railway line, Sirkeci and Yalıköşkü at the eastern end of the Golden Horn Walls; at the same time, all of the coastal palaces on the walls surrounding the Topkapı Palace from the sea direction were destroyed except for the Sepetçiler Pavilion (Semiz, 2014).

The Ekrem Hakkı Ayverdi map and the documents from OA corroborate each other. It is understood that monumental buildings such as the Yalı Pavilion factory, the Daye Hatun, Emir, and Elvan mosques, as well as the Botanical Garden of the Mekteb-i Tıbbiye in Hasbahçe located in the garden of the Topkapı Palace, were on the route of the expropriations to be made for the Rumeli Railway, and therefore, decisions were taken to move them to different locations. As can be seen from the dates of the documents, the expropriations were carried out in quick succession (Figure 8, Table 4).

Yalı Pavilion (Cebeci Pavilion) and Yalı Pavilion Factory

Yalı Pavilion was located in Sirkeci, in the Eminönü district, where the walls of Topkapı Palace reached the Golden Horn. Yalı Pavilion (also known as Cebeciler Köşkü) or Yalı Kasr-ı Hümayunu, which was built in 1592 in the last years of the reign of Murad II (1574-1595), replacing a pavilion

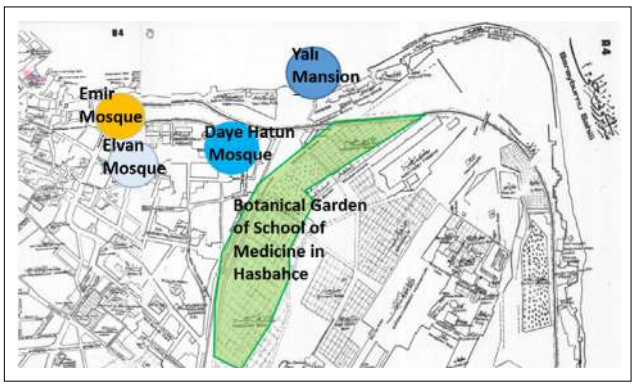


Figure 8. The main monumental buildings and Topkapı Palace Botanical Garden expropriated on Ekrem Hakkı Ayverdi's map.

Table 4. Archival documents of the main monumental buildings expropriated in Sirkeci. (Ottoman Archives, 1873a; Ottoman Archives, 1873b; Ottoman Archives, 1873c; Ottoman Archives, 1874a)

Fund Code	Location Number	Date	Document Summary
A.}MKT.MHM.	449-61	H. 10.1.1290/ M. 10 March 1873	Production is shifted to Zeytinburnu and Tersane-i Amire factories, and Yalıköşkü, the factory and the surrounding land are handed over to the Rumeli Railway Company.
A.}MKT.MHM.	451-55	H. 05.02.1290/ 4 April 1873	Evacuation of the Yalı Pavilion Factory, which was allocated for the Rumeli Railway.
A.}MKT.MHM.	456-38	H. 12.04.1290/ M. 9 June 1873	Daye Hatun, Emir and Elvan mosques were demolished during the construction of Sirkeci station of Rumeli Railway.
A.}MKT.MHM.	472-15	H. 18.11.1290/ M. 30 December 1873	Due to the overlap of the Botanical Garden of the School of Medicine in Hasbahçe with the Rumeli Railway line, the plants and trees in this garden were transferred to the botanical garden of Galata Palace.

first built by Beyazid II (1481-1512) and was the closest palace structure to the harbor, played an important role in the political history of the empire and the ceremonial life of the palace. Yalı Pavilion was one of the most picturesque pavilions on the shores of Sirkeci and Sarayburnu. In the drawings of Topkapı Palace by foreign artists, the porticoes are depicted with crowds watching the navy in the harbor in front of their very wide canopies and curtains. The pavilion was externally square with a lead-covered roof and a small dome in the center of the roof (Figure 9, Figure 10). There was a portico around the building resting on marble columns 3 meters apart. A large hall was entered through the portico.

There were palace houses around Yalı Pavilion and Sepetçiler Pavilion, which were very close to each other.

In the history of Tayyarzade Ata, it was recorded that in the 19th century, civil servants worked in this neighborhood and there was a department related to the construction and repairs of the palace.

In the first quarter of the 19th century, Bostancıbaşı Notebooks show that there were many large residences on the coast between Yalı Pavilion and the customs in Eminönü. Yalı Pavilion was demolished during the construction of the Rumeli Railway (Kuban, 1994).

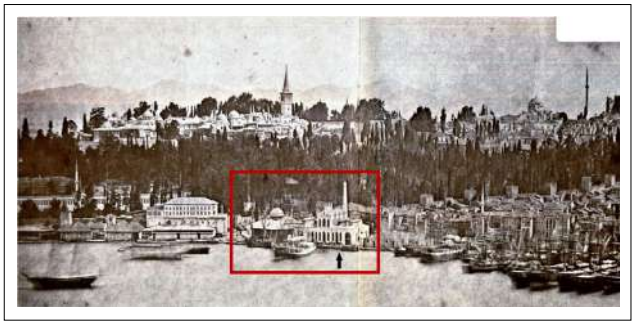


Figure 9. Yalı Pavilion (not yet demolished) and the Machinery Factory, photographed by James Robertson (1853-1856) (Eldem, 1979).

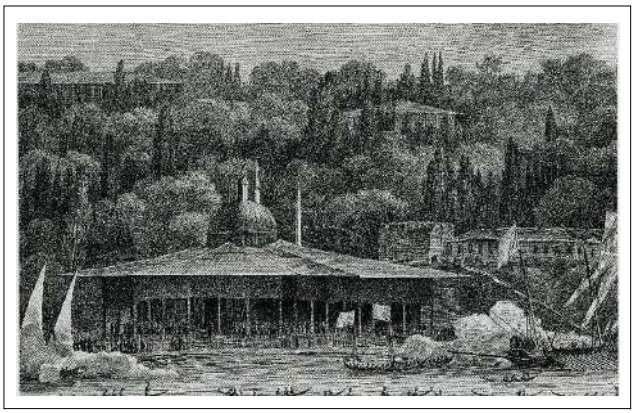


Figure 10. An engraving of Choiseul Gouffier depicting the Yalı Pavilion (Soyluer, 2017).

The Yalı Pavilion Iron Factory was established in 1850 to ease the burden of the iron and steel industry in Zeytinburnu as a product of the industrialization initiatives that intensified during the reign of Sultan Abdülmecid (Figure10). Due to the Crimean War, which broke out during the production activities in the factory, the factory was transformed into a repair workshop and a machine factory where steam engines were manufactured in order to carry out maintenance and repair operations of the ships belonging to the allied navy damaged during the war. When the Yalı Pavilion Iron Factory was converted into a machine factory, a state-owned iron factory was established in Galata in 1856 to fill the shortage in this field. The British Government put the factory up for sale at the end of the Crimean War, and the Ottoman Empire bought this strategically important factory. The machinery and parts of the steamships of the Ottoman navy began to be manufactured and repaired there. The factory compound was transferred to the Rumeli Railway and demolished in 1873 (Figure 11), (Soyluer, 2017).

Şevkiye Pavilion (Serdab Pavilion)

Serdab Pavilion was built between 1789-1791 by Sultan Selim III for his mother Mihrişah Valide Sultan, replacing the Şevkiye Quarry that was previously located there (Figure 12, Figure 13). The pavilion is also referred to as "Serdab Pavilion" and "Yeni Pavilion." The pavilion was destroyed

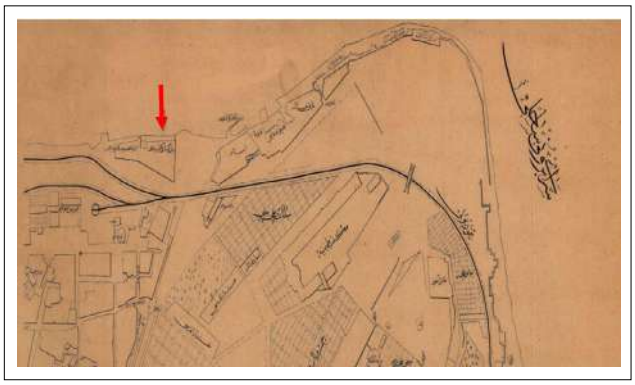


Figure 11. A map from 1875 showing the current state of the Yalı Pavilion Machinery Factory after the railway line passed through (Soyluer, 2017).

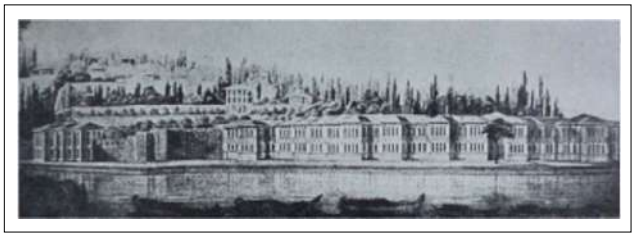


Figure 12. 18th-century view of Şevkiye Pavilion from the coast (Eldem, 1969).

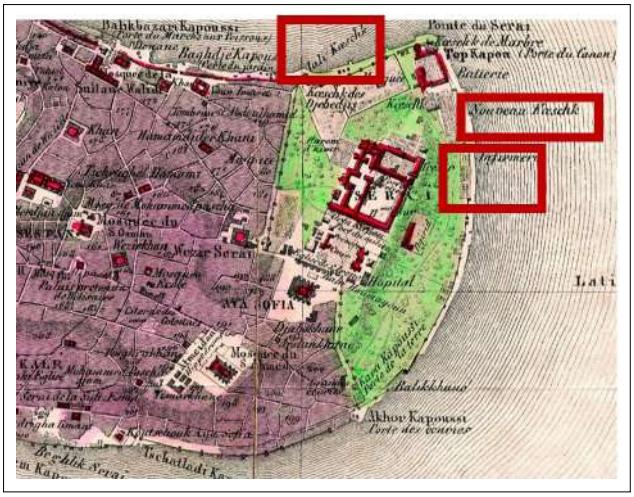


Figure 13. The pavilions on the coastline can be seen in the Kauffer et Joseph de Hammer 1836.

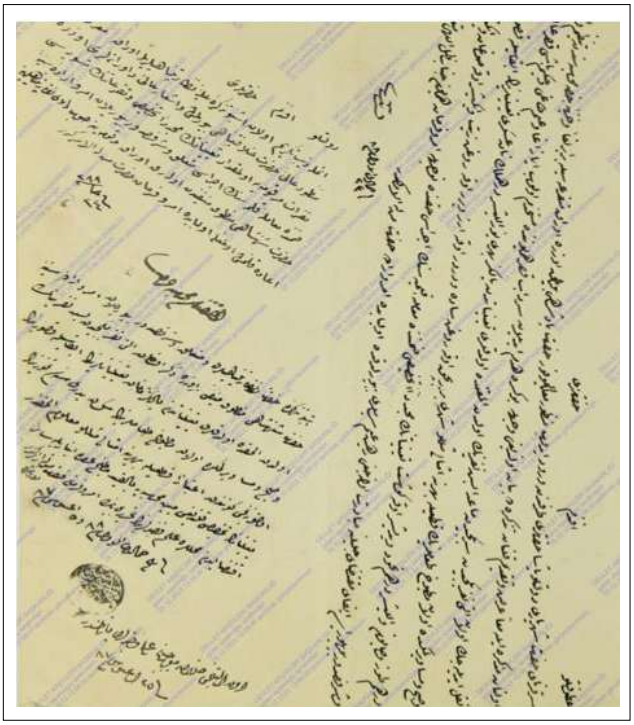


Figure 14. Ottoman document proving that Şevkiye Pavilion (Serdab Pavilion) was demolished for the Rumeli Railway (Ottoman Archives, 1871b).

during the construction of the railway line passing through the Palace grounds in 1871 (Tanman, 1994). Located next to the Topkapı Coastal Palace in Sarayburnu, Eminönü district of Istanbul, this pavilion was built by Valide Sultan, the mother of Sultan Selim III, between 1789-1791. This pavilion was named Şevkiye Pavilion because of the Şevkiye Quarry, which was previously located there. It was also known as Serdab Pavilion and Yeni Pavilion.

Şevkiye Pavilion was built on the walls of Marmara and consisted of a wooden-walled floor and a basement with masonry walls. It is believed that the pavilion was built in the form of a divanhane with an iwan, which is common in Ottoman civil architecture. The divanhane, which extends on the east-west axis, had an elliptical plan and was covered with a dome. It also had a rectangular iwan. It can be seen that this dome was hidden under the lead hipped roof of the pavilion. On the south side of the hall, behind a small gap, there was a room belonging to the sultan and a symmetrical room to the valide sultan. These two rooms were separated from the main hall by protruding forward from the façade. Small rooms were also placed between these parts of the pavilion, which has a plan type with three iwans. The basement floor had a marble floor, and it is learned from the notes of travelers that there was a pool with a fountain in the middle and fountains connected to it.

The pavilion was named Serdab, and people from the harem went there to cool off in the hot summer months (Eldem, 1969). It was demolished for the Rumeli Railway (Figure 14, Table 5).

İncili Pavilion

İncili Pavilion, one of the most important structures of the series of coastal pavilions, was located within the boundaries of Topkapı Palace (Figure 15, Figure 16). It was also known as Sinan Pasha Pavilion in historical texts. The chronicles of the period provide extensive information about the construction and opening of the pavilion. The

Table 5. The copy of the Ottoman document proving that the Şevkiye Pavilion (Serdab Pavilion) was demolished for the Rumeli Railway (Ottoman Archives, 1871a)

Fund Code	Location Number	Date	Document Summary
A.}HHİ	50-27	H-24-05-1288/ M.15 August 1871	Since the demolition of the Serdab Pavilion began due to the train passing through Topkapı Palace, the transfer and transfer of six guards assigned there to other pavilions, and the allocation of rations to them like their counterparts, since the other guards, except the sergeant, did not receive the rations they had received from the hand.

Figure 15. An engraving from the first half of the 19th century depicting the İncili Pavilion (Jouannin & Gaver, 1840).

Figure 16. The substructure of the İncili Köşk that survived to the present day.

pavilion, built by the architect Davud Aga, shows that the style of Mimar Sinan continued in Ottoman architecture (Figure 17). Semavi Eyice wrote about the demolition of the Pavilion, "...When it was planned to bring the Rumeli Railway to Sirkeci, Abdülaziz allowed the railway to pass right along the coast and through the garden of the palace. This permission led to the destruction of the Sinan Pasha Pavilion along with the pavilions and palaces on the coast..." (Eyice, 2000).

In addition to these buildings, the Emir Mosque, Daye Hatun Mosque, and Elvan Mosque in Sirkeci were expropriated, and the botanical garden of the School of Medicine in Hasbahçe was also moved (Figure 14). According to a document dated 12 June 1906 in the archive regarding the transfer of the plants and trees of the botanical garden of the School of Medicine in Hasbahçe (Ottoman Archives, 1874b) to the botanical garden of Galata Palace due to the overlap with the Rumeli railway line, it is understood that not all of the plants in the Topkapı Botanical garden were actually moved to the garden of Galatasaray Sultani.

طوپ قاپی سرایندہ :

ایجیلی کوشك

طوپ قاپی سرایینك سورلری اوزرندہ پایلان (ایجیلی کوشك) عجری اونجی عصرده پك معروفدی . بنائك معماری ، دورلك بویوك معمارلرندن داود آغالیدی. اوچنجی مراد ، آخور قاپی اسکله‌سی جوارنده « دریا سیری » ایچین وزیر اعظم سنان پاشادن برکوشك ایسته‌دی . سنان پاشا ، « سر معماران عالم داود آغا » یی چاغیردی . کوشکك انشاسی ایچین لزومی

سنان پاشانك یاپدیردیغی ایجیل کوشك

(زوالدن ، تورکیه)

اولان مالزمه‌یی کندی تدارك ایتدیردی . مصارفی کندی یاپدی . آز برزمانده کوشك اکمال ایدلدی (۹۹۹) . زمانك استادلری معرفتیله کوشکك داخلی و خارجی تزییناتی اتمامه چالیشدی . کوشکك ایچریسی کاشی کار ومقرنس حلکاری زراندود نقوش ایله تزیین اولوندی . « حریر قالیچه‌لر ودوخته نهالیلر وزراندود زوالیلر وجواهر ومروارید ایله مرصع و مجوهر طوپ آویزه‌لر و آینه‌لرله » کوزلر قاماشدیراجق بر حاله کتیریلدی . قبه‌سنه قوناں یالدیزلی علملر اوزاقدن کوزلری قاماشدیریوردی .

— ۱۱۹۷ —

اوچونجی مراد کوشکی حیرتله سیرایتدی :

— تولیدی ، شو قصر سرای عامره داخلنده یاپیلمش اولیدی ؟

دیدی . فی‌الحقیقه ، سرایك ایچنده بویله متفرق بنالر وکوشکلر واردی . تکمیل سرای پرومنتظم بریلان اوزرینه یاپیلمامشدی.

اوکون ، صدراعظمه اوچ ، قپودان پاشایه ایکی ، معمار داود آغا ایله شهرامینه وصدر اعظم کتخداسنه ، آغالره وسائره‌یه برر خلعت کیدیریلدی .

اوچونجی مرادك اوکنه ، کشاد وسمنده سرپیلمك ایچین آلتون وکوموش تپسیلر دولوسی آلتون وجیل آچه کتیریلدی .

Figure 17. Ottoman newspaper article on the history of the Incili Pavilion. Milli Mecmua. (1926).

Railway Construction and Byzantine Monumental Buildings in Sirkeci

Bukoleon Palace

Bukoleon Palace was a coastal palace right next to Ss. Sergius and Bacchus Church (now Küçük Ayasofya Mosque) in the Çatladıkapı region of the historical peninsula, between

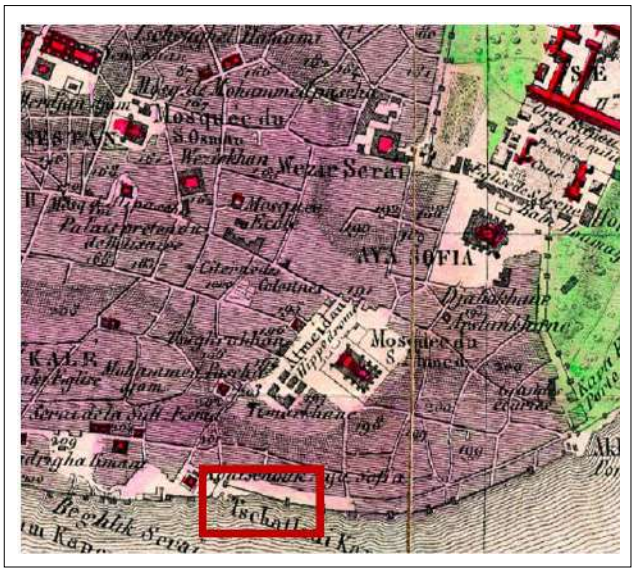


Figure 18. Bukoleon Palace on the coastline can be seen in (Kauffer et Joseph de Hammer, 1836).

Figure 19. Marmara Walls / Bukoleon Palace and the plan showing the intersection of the remains of the city walls and other structures extending to Çataltıkapı in the west with the railway (Mamboury & Wiegand, 1934).

Figure 20. The current situation of Bukoleon PalaceIstanbul Metropolitan Municipality, Directorate of Cultural Asset Projects Archive, "Bukoleon Palace Museum and Restoration Application Work for the Years 2020-2021" Work.

today's Kumkapı and Cankurtaran neighborhoods (Figure 18). The western part of the palace was destroyed during the construction of the railway (Figure 19).

A comprehensive excavation and cleaning work was carried out at Bukoleon Palace within the scope of the "2020-2021 Years Bukoleon Palace Museum and Restoration Implementation Work" of the Istanbul Metropolitan Municipality (Figure 20). In this study, the filling made for the Rumeli Railway was identified. It can be seen that the filling was supported by sleepers used in the railway (Figure 21). This is the most striking example of the fact that many Byzantine structures were under the embankment during the construction of the railway (Figure 22).

Effects of the Rumeli Railway on Land and Sea Walls

The construction of the Rumeli Railway caused serious losses to the Sea Walls. During the construction of the

Figure 21. The current situation of Bukoleon PalaceIstanbul Metropolitan Municipality, Directorate of Cultural Asset Projects Archive, "Bukoleon Palace Museum and Restoration Application Work for the Years 2020-2021" Work.

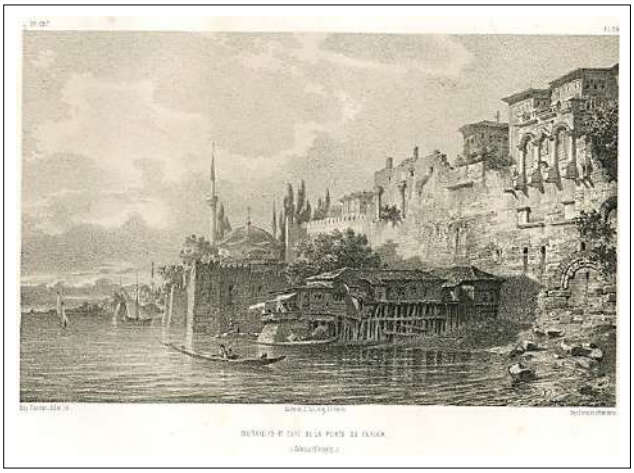


Figure 22. Bukoleon Palace (Eugene Flandin, 1853).

railway line, which runs parallel to the Marmara shore and ends in Sirkeci after passing through the outer garden of the Palace, the Marmara Walls in Yedikule, Samatya, Davutpaşa, Yenikapı, Kumkapı, Çatladıkapı, Sarayburnu sections, and around Sirkeci and Yalıköşkü at the eastern end of the Golden Horn Walls, experienced serious losses (Ahunbay, 1994).

Expropriations for Rumeli Railway in Sirkeci District Through Archival Documents

Sirkeci, one of the most important districts of the historical peninsula, is surrounded by Bahçekapı in the west, Sarayburnu in the east, and Cağaloğlu in the south. Historically, it has held great commercial and social importance, first because it is close to the port, and later, due to the construction of Sirkeci Train Station. This study aims to better understand the physical changes of the city together with the economic and social effects of the expropriations made for the railway. The physical transformation of the Sirkeci region as a result of the expropriations made with the arrival of the Rumeli Railway has been analyzed by overlapping the archival documents and the maps of the period.

In the Ottoman state, property within the walls (on the historical peninsula) was either state or foundation property. The only way to ensure the continuity of the lands and structures owned by transferring them from generation to generation was possible with the establishment of foundations. For this reason, all of the buildings in the historical peninsula were built under a foundation. In Ömer Lütfi Barkan and Ekrem Hakkı Ayverdi's book titled "Istanbul Vakıfları Tahrir Defteri 953:(1546)", it is stated in relation to foundations that "...The foundation system, which provided continuity and validity for centuries (until doomsday), was preferred by Grand Viziers, Pashas, and wealthy people who took part in the administration because it provided legal opportunities to family members (partly preventing state intervention). A foundation was a kind of public sharing and secret ownership. For this reason, there was not a single point or a single square meter of land in the historical peninsula that was excluded from the foundation system..." (Barkan & Ayverdi, 1970).

For this reason, in all of the expropriation documents examined, all properties such as mansions (houses) (called menzils in archival documents), mansions, bathhouses, shops, and lands belonged to a foundation and were either used by the owner of the property or were made available for rent. In this section, while keeping track of the disappeared and existing buildings, we will also examine how much money was spent on the expropriations, how much land was expropriated, and the situation of the inhabitants living there. The main source to be used to investigate funding is the documents in the Presidential Ottoman Archives. Before moving on to these documents, it would be useful to examine the terms used in the documents and their meanings.

Gedik was a concession granted in the Ottoman period for a specific matter. Rights and privileges were granted to craftsmen in particular to enable them to trade and practice their trades on their own (Ayverdi, İ., n.d.). It was the license to trade and practice art. The term gedikât, on the other hand, was coined by adding the plural suffix -at to the word gedik in Ottoman Turkish and means gediks. Another term that needs to be emphasized is menzil. The Arabic word menzil has various meanings, and there are many words derived from menzil. The word menzil, which is relevant to the study, means "mansion" (Pakalın, 1993). Another word that appears frequently in the documents is ferag, an Arabic word meaning “to give up” (Ayverdi, İ., n.d.). In the archival documents, it is used in the sense of “relinquishing ownership of places taken in return for a certain fee.” We will often see all these terms in examined archival documents for this study.

For a better understanding, it would be useful to clarify the financial power of the kuruş mentioned in the texts. As is well known, the purchasing power of the kuruş, which was introduced as the basic Ottoman currency of large-sized silver coins in the early 18th century, was greatly reduced after the rapid process of adulteration and inflation. From the first quarter of the 19th century onwards, the kuruş should be considered as a small currency used in daily exchanges. For example, in the second half of the 19th century, the price of 1 okka (1.283 kg) of bread varied between 1 and 2 kuruş in different regions (Ayverdi, İ., n.d.). In the 1870s, as silver became more abundant around the world and its value fell against gold, many European countries abandoned the bimetallic monetary system and adopted the gold standard. The Ottoman Empire also moved to abolish the bimetallic monetary system in 1879. After this date, the minting of silver piastres decreased drastically, but the use of silver piastres continued for payments to the state. For this reason, the late Ottoman monetary system can be characterized as a "lame mikyas" based on the gold lira and to some extent the silver kuruş. The currency based on the parity of 100 kuruş=1 lira was maintained in the Republican period. However, the purchasing power of the kuruş declined further due to rapid inflation, especially during World War I and II. Finally, in the hyperinflationary environment of the 1970s, the kuruş lost its status as a currency that could be used in daily transactions (Pamuk, 2002). In this case, to put it more simply, 1 Ottoman Lira is 100 Kuruş. Payments in currencies indicate that expropriations and rent payments were made cheaply. Because if we consider that 1 bread is 1 kuruş, it is meaningful that the rents are 9 kuruş in general and the state has paid a minimum of 450 kuruş and a maximum of 250,000 kuruş for expropriation.

Table 6. A selection from a document from OA, indicating street names, door numbers, foundations, and property type. (Ottoman Archives, 1887a).

Location	Rent	Cost
1. Sheikh Ebu El-Vefa Trustee Sofu Mehmet Efendi Foundation And Menzil Plot Number 29 In HiSar Street; SaliH Efendi Bin Osman (Osman Oglu Salih) From Financial Scribe (Clerk)	9 kuruş	35.000 kuruş
2. Coal Shop Numbered 7 On The Coal Shop Street From Harameyn Gedikat; Coal Shop Süleyman Aga Waivered his power of attorney.	12 kuruş	23.700 kuruş
3. Charcoal Shop At Number 12 On The Street Of The Evkaf GediKatindan Kömürcü; Abdülkerim Bin Mustafa Transfer	6 kuruş	10.200 kuruş
4. Barber shop number 9 on Çatladikapi Street from Harameyn gedikat;	3 kuruş	7.500 kuruş
5. A Barber Shop Numbered 13 In İskele Square From Harameyn Gedikati; From Hüseyin Aga And Hatice Hanim feragi.	6 kuruş	30.200 kuruş
6. harameyn gedikati, charcoal shop number 1 on kömürcü street; hüseyin aga feragi	6 kuruş	26.800 kuruş

Some document examples of Rumeli Railway expropriations identified as a result of the studies carried out in archival documents are included, and the tables are analyzed in line with the study (Table 6).

These documents concern the abandoned or dilapidated mosques and fountains from Sirkeci to Narlıkapı Pier. The most important detail that stands out is that these structures, which were destroyed after the fire, were demolished for the

Table 7. The Ledger of the list of mosques and charities left to the railway in Sirkeci District (Ottoman Archives, 1887b)

Document Summary: A book listing the mosques and charities abandoned for the Rumeli Railway, from Sirkeci Pier to Narlıkapı.

Location Information: 34181 -

File Attachment:

Document Date: H-9 -03-1305 M.1887

Located in the Elvan Neighborhood in Hoca Pasha:

Destroyed **(burnt)** Yusuf Pasha Fountain

Destroyed **(burnt)** Bostanci Başı Madrasah

Destroyed **(burnt)** Fountain from Sultan Suleiman Khan Foundation

Located in Cankurtaran neighborhood in Ahırkapı:

The Şadırvan Mosque and the masonry water treasury underneath it (cost 186 kuruş), which was present and intact, were demolished and given to the railway line.

The waterway of the fountain outside Ahırkapı: while the water of the fountain was flowing , while it was present and intact, was deteriorated.

Fountain in the vicinity of the Şadırvan Gate: While it was an existing and well-built building with running water, it was demolished and connected to the railway line.

Located in Akbıyık neighbourhood in Ahırkapı:

Wooden fevkani (elevated) Akbıyık School, a tekke (lodhe) under it, a coffin, a fountain, and its other furnishings (others) (price 181 kuruş):

While it existed and was in good condition, it was demolished and went to the railway line.

Located in the neighborhood of Kapı Ağsi Mahallesi:

The garden of Cıgalzade Foundation's trustee - meşruta household in Kapıagası neighbourhood (price 1308 kuruş)

Located in Ayasofya-i Sagir (Little Hagia Sophia) neighbourhood:

A masonry madrasah in the vicinity of the aforementioned mosque: while the madrasah was present and intact, eight of its rooms were demolished and the line was transferred to the railway.

The madrasa's laundry and coffin storage.

The mortuary school of the aforementioned mosque: While the school was existing and flourishing, it was completely demolished and the property was given to the railway line.

Rumeli Railway. After the Hocapaşa Fire, which caused the greatest damage in the region, it is thought that this was used as an advantage for railway expropriations. In addition, it is also known that the expropriation costs of those that were still standing but in a dilapidated and unusable condition were paid to the owners of the foundations (Table 7).

In the Hocapaşa Fire of 1865, 1007 buildings burned in the Sirkeci area. The boundaries of the Hocapaşa Fire coincide with the regions included in the expropriation documents (Figure 23). This raises the possibility that the buildings destroyed after the fire may have been expropriated under the pretext of the railway (Amicis, 1874, trans. B. Akyavaş, 1993).

Figure 23. A map showing the area impacted by the 1865 Hocapasa fire that took place in 1865 (Söğüt, 2015).

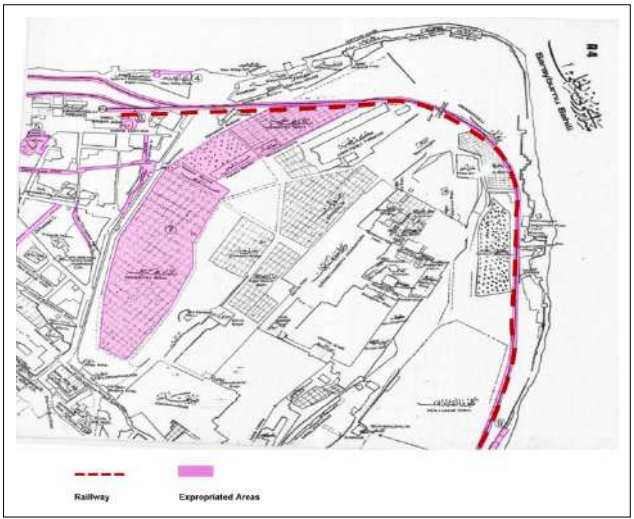


Figure 24. Marked streets and several monumental buildings that expropriated, identified from archival documents on the Ekrem Hakki.

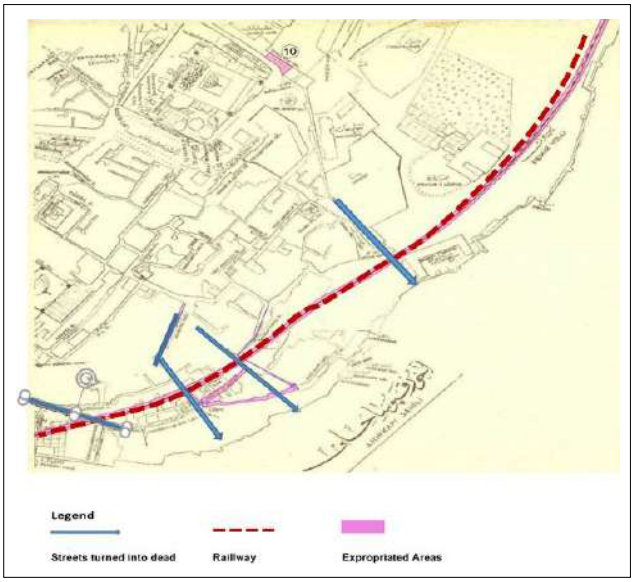


Figure 25. Streets turned into dead ends after the construction of the railway, identified by overlapping the Ekrem Hakki Ayverdi map and archival documents.

The list of streets where the expropriations were made, as a result of the overlapping of the Ekrem Hakkı Ayverdi map, a section of which is given in Figures 24-25, and archival documents, together with the plot numbers of the Ayverdi maps, is provided. As can be understood from this, dead-end streets were formed after the construction of the railway (Table 8, Table 9). These areas, which used to be avenues or busy streets, influenced the social life and demography of the neighborhood. The streets and avenues that cannot be identified on the Ayverdi map may have disappeared completely or their names may have changed. When we look at the expropriated buildings, they were demolished based on whether they were located on the route, without considering the function or the importance of the building. As it is known, neighborhoods developed around mosques during the Ottoman period. Based on this, the demolition of some mosques has led to the disruption of the perception and positioning of several neighborhoods.

In Table 10, we can clearly see the land and houses subject to expropriation, whose street, neighborhood, street number, and door number are determined from the documents; the most important detail of the document is that the property in question changed hands as a foundation and passed to a different foundation. This leads to the following questions: Was it intended that the properties, which were not demolished due to the construction of the railway, would gain value, and was it intended to be collected in one owner by certain individuals and foundations for the purpose of rent-seeking?

Table 8. The table of streets and several monumental buildings identified from archival documents on the Ekrem Hakki Ayverdi map.

District	Avenue - street	Ayverdi map no.
Sirkeci	Vezir iskelesi	B4
Sirkeci	Fabrika sokağı	A4
Sirkeci	Beşirağa cami	A4
Sirkeci	Darüsade ağasi sokak	A4
Sirkeci	Iskele sokak	B5
Sirkeci	Demir kapi yolu	A3-a4
Sirkeci	Izzet efendi sokak	B4
Sirkeci	Orhaniye	A4- b4
Sirkeci	Ismail ağa tekkesi	A3
Sirkeci	Demir kapi caddesi	A4
Sirkeci	Dolambaç(tulumbaci) sokak	B4
Sirkeci	Zone no. 1 vezir iskelesi	B4
Sirkeci	Zone no. 2 emircami-i şerif	B4
Sirkeci	Zone no. 3 vezir cami	B4
Sirkeci	Zone no. 4 yali köşk fabrikasi	A4
Sirkeci	Zone no. 5 elvan çelebi camii	A4
Sirkeci	Zone no. 6 daye hatun camii	A4
Sirkeci	Zone no. 7: school of medicine's botanical garden in hasbahçe	A4

Table 9. The new table of streets turned into dead ends after the construction of the railway, created by author from archival documents on the Ekrem Hakki Ayverdi map.

District	Avenue - street	Ayverdi map no.
Sirkeci	Bayram firin Avenue	A3
Sirkeci	Akbiyik Streer	A3
Sirkeci	Arabacilar Street	A3
Sirkeci	Mumcu Avenue	B3
Sirkeci	Toprak Avenue	B3
Sirkeci	Çatladi kapi Street	B3

The most exciting detail that emerges when the above table and the Goad Map dated 1904 (Figure 26) are analyzed and compared with the documents of the Presidency Ottoman Archives is that many of the buildings that appear to have been evaluated were not demolished. As mentioned in the previous table analysis, the idea that many of these condemnations were carried out for rent-seeking purposes is strengthened (Table 11).

CONCLUSION

In conclusion, it is evident that the construction of the Rumeli Railway within the scope of the study led to a major

Table 10. Records of the property belonging to foundations expropriated by the Rumeli Railway Line between Sirkeci-Narlıkapı (Ottoman Archives, 1887a)

District and Neighbourhood	Avenue and Street	Number Size	Real Estate Type	Old Foundation	New Foundation
1. Hevace Paşada Emir District	Aralık Zükağı	3	Field	Hacı Tevfik Efendi	Hacı İmam Meşruta Fatma Hatun
2. Hevace Paşada Emir District	Aralık Zükağı	3	Field	Hacı Tevfik Efendi	Hacı Zeyneb Hatun Medresesi
3. Hevace Paşada Emir District	Emir Cami Şerifi	1	Mosque	Mahur and Şekibe	Kilon Ali Paşa
4. Hevace Paşada Emir District	Emir Cami-i şerifi	3	Mosque	Müezzin Eyüb Efendi and wife	Kilon Ali Paşa
5. Hevace Paşada Emir District	Emir Cami-i şerifi	3	Mosque	Müezzin Eyüb efendi and children	Kilon Ali Paşa
6. Hevace Paşada Emir District	İskele and İzzeddin	15 and 6	House	Fodlacı İbrahim Ağa	Merzifoni Kara Mustafa Paşa
7. Hevace Paşada Emir District	Emir cami-i şerifi	5	Field	Fatıma Hanım	Hadice Hatun binti Ferhad
8. Hevace Paşada Emir District	Emir Cami-i şerifi	9	House	Hafız İsmail efendi	Hadice Hatun binti Ferhad
9. Hevace Paşada Emir District	Emir cami-i şerifi	2	Field	Abdi Rıfat and Yusuf Cemal	Hamdullah Paşa
10. Hevace Paşada Emir District	Emir cami-i şerifi	6	Field	Tebadan Mustafa Ağa	Defterdar Harir bey

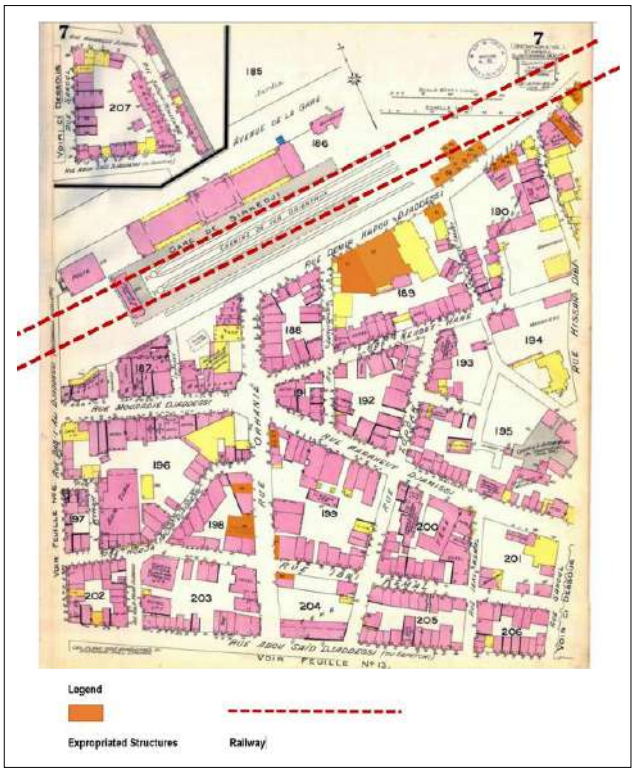


Figure 26. Overlay with the Goad map of 1914 showing the archival documents overlaid on the Goad map.

physical transformation within the city walls. The streets leading to the harbor gate before the expropriations were cut off due to the expropriations, sometimes becoming dead-end streets and sometimes disappearing altogether. The expropriations that started in 1871 and the subsequent efforts to distinguish the remaining properties continued until the end of the 1890s. Although it was known where the railway route would pass through, it is open to debate whether the issue of expropriation was abused for rent-seeking purposes because the right decisions were not taken about the properties to be expropriated. Additionally, the construction of the railway, which was a joint work of the private and public sectors, gives an idea about how the tendering processes carried out by the state worked.

- With the extension of the Rumeli Railway into the city walls, most of the streets that opened directly to the shore or the bottom of the city walls just a year ago were closed and became dead-end streets.
- The building islands were cut off by the railway, and the courtyards of the building islands, which had a contiguous order and continuity, were opened to the outside and became small squares or dead-end streets.
- The technical deficiencies in the construction of the railway led to serious infrastructure problems. Floods caused by rainfall destroyed the railway tracks, and wooden crossings were washed away by the current.
- The extension of the Rumeli Railway into the city walls caused controversy during the period regarding the protection of historical monuments. For the construction of the line, many buildings had to be demolished between Sirkeci and Yedikule. The objections of those whose houses were expropriated were not met by the state, but they were paid high expropriation fees despite very low rents.
- While the Ottoman Empire, which was trying to transform into a form of government that perceived the changing world and changing perspectives with modernization, published some articles in newspapers about the railway construction as an important breakthrough to attract the public's perception in a positive direction, humor magazines or independent publications of the period openly criticized the fact that the railway passed through the city walls or that the Ottoman economy, which was already in a bottleneck, made such an attempt due to both the large-scale concessions granted to foreign investors and the unnecessary length of the railway since the expropriations were covered from the treasury.
- Regarding the expropriation of property belonging to the foundations, a significant portion of the structures scanned and identified on the map are far from the railway and are present in the Goad maps with the same door numbers, meaning that these structures were not demolished even if they were expropriated. This raises the question of whether there was an attempt to remove the non-Muslim population from the region.
- There are some documents identified in the study, which clearly show that the maps prepared for the expropriations of the period were lost and that the buildings were not demolished even though the expropriation fee was paid. This is another indication that this great initiative of that period was improper.
- The expropriation costs of the property belonging to the foundations were paid from the state treasury. This situation dragged the Ottoman Empire, which was already experiencing an economic collapse, into an even greater economic crisis.
- It can be observed that newspapers and periodicals of the period published news in favor of the state both with and without istibdat (censorship). While the Ottoman Empire, which was trying to transform into a form of government that perceived the changing world and changing perspectives with modernization, made some news in the newspapers about the railway construction as an important breakthrough to attract the public's perception in a positive direction, in the humor magazines or independent publications of

Table 11. The new table created by author based on archival documents overlaid on the Goad map.

District	Avenue - Street	Goad Map No	Plot No	Door No
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	24
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	189	45-43-41
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	190	21
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	189	39
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	25-27
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	189	33
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	27
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	3
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	19
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	5
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	190	17
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	11
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	29
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	23
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	190	25
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	31
Sirkeci	Rue Orhanie (Orhaniye)	7	198	9
Sirkeci	Rue Orhanie (Orhaniye)	7	198	15
Sirkeci	Rue Orhanie (Orhaniye)	7	198	7
Sirkeci	Rue Orhanie (Orhaniye)	7	204	4
Sirkeci	Rue Orhanie (Orhaniye)	7	199	6
Sirkeci	Rue Orhanie (Orhaniye)	7	199	20
Sirkeci	Rue Orhanie (Orhaniye)	7	199	20
Sirkeci	Rue Orhanie (Orhaniye)	7	199	22

the period, criticisms were clearly stated about the railway passing through the city walls or the Ottoman economy, which was already in a bottleneck, due to the large-scale concessions granted to foreign investors and the unnecessary length of the railway since the expropriations were covered from the treasury.

- Among the information and documents that shed light on the conservation understanding of the period, many documents have been found regarding the expropriation and demolition of coastal palaces, but no documents have been found regarding, for example, the fact that the Rumeli Railway half demolished the Bukoleon Palace, a very important Byzantine structure, or the losses incurred in the Byzantine Sea Walls and important city gates. A search of the documents of the Ottoman archive of the Prime Ministry reveals only some written documents on the transportation of the excavated artifacts, which raises questions about their fate.

NOTES

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[2]This is the abbreviation in all original archival documents.

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Article

Spatial dimensions of literature: Ethnographic codes for the Prag'da Günler story by Nedim Gürsel

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ABSTRACT

The city, with its social, cultural, physical, and geographical features, can be represented narratively on the axis of interpretations and fictions of reality or imagination. The ethnographic codes of city narratives are physical, structural, and social. They represent the city in various ways and contribute to knowledge in architecture. The research question of this article is, 'Could architecture be reinterpreted through ethnographic narratives of the city?' This question points to a vibrant field of study that investigates the importance and originality of the article and the spatial dimensions of literature. The article addresses a more nuanced perspective on relationships between travel writing and ethnography from a literary approach to narrative analysis and architecture. The article analyses the architectural elements in a literary narrative through qualitative research. It aims to ethnographically examine the story of Prag'da Günler, which emphasizes a European city. Karen O'Reilly's ethnographic method is used for the ethnographic analysis of this story. The ethnographic approach also aims at a certain understanding and appreciation of the spatial dimensions of the literature in the case of Nedim Gürsel. As a result, seeing the city as a writing activity at the intersection of architecture and narrative makes the potential of narratives viable in the reproduction of the city.

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INTRODUCTION

Architecture comprises interdisciplinary relations and incorporates literary and theoretical genres in the expression of architecture, establishing a significant relationship with the narrative aspect of architecture. Architecture and literature are artistic fields that emerge, exist, and sustain with sociality. All realities that exist in the social environment are directly reflected in literary works and the field of architecture. However, both architecture and literature are related in their contexts as part of the social environment (Güner & Gökmen, 2020).

One of the intersections of architecture and literature is the combination of design and creation, in other words,

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the design process rather than the completed products. When looking at the history of architecture, it is possible to see examples such as how architecture and literature have been and continue to interact. For instance, architect and writer Matteo Pericoli (2018) brings together the author candidates in the writing program at Scuola Holden in Turin, Italy, and the architecture students at the Columbia University School of Art in New York, America. The program aims to bring new perspectives to the minds of the writer candidates of the architectural culture that designs around a 'void' (Hacıömeroğlu, 2017).

Even if most of them are fictional, texts that have witnessed history carry many things that have disappeared over time in their memory. Novels, diaries, travelogues, biographies, essays, official documents, letters, and literary descriptions serve as part of the narrative and archives prepared for recording and bringing non-existent cities, societies, and buildings to the history and culture of architecture. Even today, many cities, buildings, and societies that have been destroyed because of wars, natural disasters, diseases, and passing time can be seen in the book pages (Hacıömeroğlu, 2017).

To understand how literature is related to other disciplines, it is needed to analyze the language, literary works, and writers involved. Space plays a crucial role in the relationship between literature and society. The space also influences the emergence of a particular group of literary works. Alongside architecture, literary work is also associated with ethnography. Literary work can be presented as a product of ethnographic field studies, and ethnography can be an identity sign in expressing the quality and content of the literary work (Kükrer, 2020). Learning about societies from literary works through ethnography is remarkable because it reveals the interest in literature. In this context, ethnography can also make it possible to produce architectural knowledge about societies.

Discussions of the 'structural' fiction of literature and the 'narrative' power of architecture analyze different qualitative methods and provide the basis for similar studies (Aravot, 1995; Psarra, 2009; Chatman, 1978). Therefore, this article focuses on the relationship between architecture and narratology and draws attention to the potentials of architectural criticism.

The aim of this article, which seeks to answer the question, 'Could architecture be reinterpreted through ethnographic narratives of the city?', is to discover the ethnographic codes that refer to the city as a narrative in a story. This article explores ethnographic codes in Nedim Gürsel's story *Prag'da Günler* (Days in Prague), based on the author's ethnographical expression of his genuine urban experience. Thus, this article aims to bring an architectural perspective to ethnography by exploring ethnographical city codes for the evaluation of architecture in experience-based narratives.

The method of this study, which takes place at the intersection of literature and architecture, fills an important gap with the ethnographic perspective it offers. In spite of the studies that generally focus on the concepts of space and place in the common ground of architecture and literature disciplines, this gap is filled by proposing instrumental codes and themes for observing the city, experiencing the city, and individual experience. The method is based on Karen O'Reilly's (2005) ethnographic analysis steps (Formulating a research question or hypothesis, Sample selection, Definition of themes, Development of a protocol for coding, Coding, and analyzing the results). The 5-step ethnographic analysis is associated with the steps of this article research and the theoretical framework of the method is created. As a result, especially in the fourth step of the ethnographic analysis, 'Development of a protocol for coding', the research material is divided into pieces, selected into conceptual units specific to the passage, codes have been categorized into code categories, relationships between code-category and ethno-category have been established, and the findings have been interpreted.

Exploring the spatial dimensions of literature is closely related to ethnography. The codes that form the basis of ethnographic analysis are shaped by observing and experiencing the city, and each study is unique. In this study, which is based on Nedim Gürsel's story Prag'da Günler, the presence of ethnographic codes in his narrative is tried to be made visible. In this context, the realities (real meanings and values) offered by the Prague city experience are revealed in the narrative with the established method. At this point, it is necessary to take a closer look at the relationship between Narrative, City, and Ethnography.

Narrative, City, and Ethnography

The narrative is a fundamental way for people to make sense of the world or shape the world (Cobley, 2014). The narrative works to organize the data of life into recognizable patterns, perceived as a representation of place and space (Cobley, 2014). According to Baak (1983), the spaces in the narratives are culturally defined and, therefore, variable; they are mostly openly associated with behavioral attitudes and value judgments (Jahn, 2005).

In his book *Signs Taken for Wonders*, Moretti (1997) explains the relationship between narrative and city according to various authors, based on data from the city: Park, et al., (1925) stated that what is known about the insights of city life is essentially indecent to story and novelists. Park, et al., (1925) and Auerbach & Said (1974) address that the connection between city and literature is penetrated through depiction from literature to city, from city to literature. The information about the city can be embedded in the event itself. To inform about the visual features of the city's architecture, the text has to stop the flow of events, suspend the story for a while, and depict the places and

spaces. But literary depiction is never a copy of anything else. It is a way of establishing and conveying meaning, a means of classification (Moretti, 1997). Cities function as centers where information flows, and where it is used, produced, and distributed in every period of time, and that it brings about spatial transformations and stories (Kaymaz Koca, 2015). The city is a spatial presence; each component, value, and meaning are embodied in objects, houses, and things that can be depicted and sorted in various ways.

According to its nature, narrative text rests on two possible approaches: content analysis and semiotic analysis (O'Reilly, 2005). As claimed by Scholte (1987), semiotic examination of the narrative shifts ethnographic interest from focusing solely on narrative structure or rhetorical tools to the effects of language on ethnographic analysis and explanation.

In 1871, the anthropologist Tylor (1871) defined ethnography in his book *Primitive Culture* as a complex whole that, when discussed in a broad sense of culture or civilization, included knowledge, faith, art, moral values, law, traditions, and other competencies and habits acquired by man as a member of society. The concept of ethnography as a complex whole may help literary works by being aware of culture, reconstructing the foundations upon which the work was built, and making it possible to relive that feeling (Greenblatt, 1990).

Brettell (1986) draws attention to the textual reflection of experience by stating that descriptions in ethnographies and travelogues are a mixture of observation, interpretation, and tendencies. In this context, texts are shown as a sign of the strong link between ethnography and literature. Denzin (1998) states that a social theory is also a theory of writing, and a theory of writing is also a theory of interpretive (ethnographical) work. Based on this, it is possible to say that the interpretive role of writing, the narratives of users/writers who rewrite the city by experiencing it, contains interpretation and ethnographical value. While literature, in which writing is of primary importance, focuses on the city, space, and place as the environment in which the event takes place; the observations, comments, and tendencies of the writer show the connection between ethnography and literature.

Wiles (2020) offers three approaches to the relationship between literature and anthropology. The first refers to the use of literary texts as ethnographic material, the second refers to the view of literary writers as ethnographers, and the third refers to the anthropological examination of literary culture and production practices as a subject. When evaluated through the author and ethnographer, the distinction between narratology and ethnography is somewhat artificial because, in many ways, they are quite similar. Both tend to form a distinction, consciously marginalizing themselves towards the cultures they define and alienating themselves to make the familiar strange and the strange familiar. They both describe the results of their observations and their thoughts about what they observed. Ethnographers who are clearer than novelists and novelists often benefit from the traditions and customs of writers before them (Angelis, 2002).

The ethnographer and the writer have a complex relationship within an ethnographic narrative. Ethnographic novels are of two types, written by a stranger or written by a writer who is in the culture. The writer who writes from within a culture does not have to be consciously anthropological, but in this particular kind of narrative, the writer intuitively touches the story, character, theme, environment, and style of the culture the writer emerges from (Angelis, 2002).

Space is not limited by acceptances and criteria; it is a living and variable organism that continues its adventure since its existence and continues its movement with social, cultural, environmental, and many other orientations. Thus, architecture comes into contact with many sciences, from sociology to anthropology, from geography to philosophy (Ulubay & Önal, 2020). The tools needed to extract data and perform spatial analyses of the data can now be created based on platforms that allow researchers around the world to create new ways for research and even, in some cases, address it (Alves & Queiroz, 2015). According to Lewis (1985), the interdisciplinary study of literary texts as narrative is beneficial because literature often includes both objective descriptions of space and subjective accounts of space, as well as information about spatial patterns and processes (Alves & Queiroz, 2015). The place for reading novels can be done to expand the narrative as material for understanding the daily life of man and to evaluate the 'sense of place' that drives the narrative. On the other hand, there are also differences between the place defined by scientific knowledge and the place related to experience and meaning (Queiroz, 2007).

Although the rhetoric of writing varies, it is not the stories created by the informers that are intended to attract attention, but the events (Rosenwald & Ochberg, 1992). Language is seen as transparent and reflects fixed, singular meanings. There is not a single method or technique for analyzing the narrative (Riessman, 1993). For example, narrative connects spatial representation with storytelling. Storytelling is a way of mapping and directing the writer's viewpoint and its readers in an understandable action in space. The storyteller creates the narrative with decisions such as determining the space to be represented, selecting the elements to be included, and drawing the scale. The literary space is, after all, a real material, geographical place imagined and represented by language (Tally, 2013).

As a result of writers correlating places with specific facts and events, narratives reflect the various processes of places in a social environment. Experiencing the city, and the place by visiting and incorporating the original

qualities of the place into a fictional narrative, emerges as a different representation of the social characteristics of the place. In addition to the lack of identity and quality concerns, narratives can also contain ethnographic references to the city, and place experienced. Narratives shaped by the writer can be transformed into materials in which social, cultural, and spatial knowledge brought by the experience is processed. Thus, it is meaningful for architecture to use ethnographic codes in analyzing the narrative in this article.

The City in the Narratives of Nedim Gürsel

Nedim Gürsel is a writer who has had a dynamic relationship with the city throughout his life. The author moved away from his hometown with his family and relocated to a different provincial city. He attended Galatasaray High School as a boarder, which exposed him to urban life at a young age. Thus, his journey from one city to another began early on (Bal, 2021).

Nedim Gürsel was asked to be imprisoned for seven and a half years in 1970 because of his article on Gorki and Lenin in the journal *Halkın Dostları*. This situation obligated the author to go to France. When Nedim Gürsel returned to Turkey in 1979, he was exposed to accusations such as state security and obscenity regarding the book subjects after the 12 September 1980 coup. The exile imposed on the writer for these accusations separated him from his place of residence, Istanbul (Sivri & Kuşça, 2015).

Nedim Gürsel transfers different geographies, beliefs, cultures, and ways of life to his readers. Öztürk (2019) reminds us of Gürsel's phrase 'Cities have become a part of my subjectivity with their geography and history; they are not imaginary or invisible cities, as in Calvino's (2013) famous book; they are cities that have been seen and lived' and he emphasized that Gürsel's interest in cities is unlimited and endless. In addition, Gündüzalp (2019) claims that Gürsel had all the material that could be used for fiction removed from his life and had now become a literary language and a piece of art.

Bal (2019) states that in Gürsel's narratives, the city has ceased to be a backdrop and has become a predominant theme, sometimes as a main hero. According to Nedim Gürsel, city components are one of the features that make the city a livable place. In Gürsel's stories and novels, heroes travel the city as a city aficionado. In the narrative, they often benefit from city components and include the daily lives of the heroes. In these examples, which are dominated by depictions due to the influence of the writer's travel and essay writing, the social and economic reasons for the change of the city have not been adequately emphasized. The cities and city components that give their name to the stories and novels of Nedim Gürsel constitute an important significance in the book names.

Andaç (2014) stated in his book *Anonimleşen Edebiyat* that the life of Nedim Gürsel was shaped on a narrative and commented that there is a narrative in his discovery of the earth and his story of the journey. Gürsel develops his narrative on the axis of going to write more. The wealth of subjects and observations, a variety of spaces and places, the depth of emotion and thought, and the intensity of gaze and expression are the gains of these leaving. Spatial and textual journeys are the mains of his travels; he is aware that he is turning to writing when choosing to go.

Gürsel, a prolific writer, combined the concept of the city with his impressions of history, geography, art, and politics while he worked in the fictional field which included autobiographical elements (Bal, 2021). All the cities involved in his life have guided Gürsel's literary life. The city has not only been a place but also a character in his narratives. In his novels, the artistic structure of the city, the change in history, the components it contains, the traces it carries from social and political events, and the modernization efforts shown to keep up with economic change are frequently encountered.

Within the scope of this article, Gürsel's book *İzler ve Gölgeler* is discussed. The book is multi-layered and engaging between the 'travel narrative' and the essay. The author invites the reader to follow in the footsteps of writers, poets, and artists by using numerous contemporary narrative techniques such as review, memoir, diary, paste, intertextuality, and life-changing, objective storytelling in the work. The narrative is like a map because of the intertwined depiction of the cities in which the lives of the people in *İzler ve Gölgeler* are reflected in a realistic approach. Gürsel tries to inform the reader about many issues related to this city and its people and to convey what they see with a realistic approach with the objectivity of the historian. He uses preliminary information, images, historical events, and individuals. In the narratives of the journey, telling the reader about the unknown and informing takes place with the writer's flawless depiction technique. The description in the content of the narrative is more important than storytelling (Genç & Tilbe, 2008).

In his book *İzler ve Gölgeler*, Gürsel describes the reflections of unforgettable writers, thinkers, poets, and historical personalities who live in a certain time and city and integrate with those cities. He follows the traces of artists who dedicated their lives to the cities where they lived like a shadow in various urban places such as cafes, squares, and streets. The artists and cities described in the book are as follows: Baudelaire in Brussels, Caravaggio in Rome, Kafka and Arcimboldo in Prague, Pushkin and Dostoyevsky in Saint Petersburg, Gogol and Dostoyevsky in Ukraine, Ivo Andric in Bosnia, Ismail Kadare in Albania, Apollinaire in the Rhine, Borges in Buenos Aires, Louis Armstrong and Tennessee Williams in New Orleans, Matisse and Tahar ben

Jelloun in Tangier, Nazım Hikmet on the Caspian coast and Loti in Istanbul. In Nedim Gürsel's book *İzler ve Gölgeler*, which reveals the relationship between the city and the author in a unique way, 20 stories take place being: 'Büyük Ayna Oteli, Adını Kana Bulayan Ressam, Prag'da Günler, Basel'in Çanları, Deli Petro'nun Kenti: Sen Petersburg, Beyaz Geceler, Buğday ve Gökyüzü, Dalgın Bir Dalgıçkuşu, İvo Andriç'in Coğrafyasında, Radimlija'nın Taşları, Tiran'da Tango, Kederli Düşüncenin Dansı Tango, Buenos Aires ya da Sevgilisi Olmayan Gölge, Savaşın Yüzü, Irmak Kent ve Arzu Adında Bir Tramvay, Ak Memeler Karnavalı, Tanca'da Günler, Hazar Denizi'nin Kıyısında, Pierre Loti'nin Evinde, Pierre Loti İstanbul'da.' Among these stories, *Prag'da Günler* is dealt with as research material to be analysed as part of this article. The reason for choosing the story "Prag'da Günler" from the book is that, compared to the other stories in the book, it has more data addressing the formation of urban imagery in the mind and is more focused on experiencing a city.

MATERIAL AND METHODS

This article is research on the discovery of architecture in narratives through experiences of the city. In this scope, to question the data from the field, it is observed that the selection of research material is an example of travel writing based on city experiences.

According to Hymes (1973), ethnography and literature must surely be seen as indispensable to each other, mutually contributing to what is at the base of the same enterprise of cultural interpretation. From early in the twentieth century up to the present, as Pratt (1986) has shown, the mix of personal 'narration' and cultural 'description' established in narratives continues to shape the presentational strategies of ethnographies. According to Brettell (1986), the form of the account itself—a guidebook, an itinerary for those on the grand tour, a journal, a narrative, or a series of letters to a real or fictional person back home—is an important consideration in any attempt to evaluate the observations it contains. Considering the relationship between narratology and ethnography in Nedim Gürsel's stories, the close connection with reality is associated with ethnography. In this context, Nedim Gürsel's book *İzler ve Gölgeler*, where he usually builds his stories on the cities he visits and lives, has been selected as research material. The story of Prag'da Günler, which tells the story of a European city with an emphasis on the powerful city, is found suitable for ethnographic analysis. This story, with its multi-layered structure of experience and evaluation of the city, is covered in five chapters: 'First Day: Yağmurun Sesi (The Sound of Rain), Second Day: Cinin Anlattıkları (What Jinn Tells), Third Day: Sokaklarda (On the Streets), Fourth Day: Kafka'nın Dünyasında (In Kafka's World), and Fifth Day: Paul Leppin'in Prag'ı (Paul Leppin's Prague).'

The method of the study is based on O'Reilly's (2005) ethnographic analysis method, which tries to define themes before coding them. In general, studies that use qualitative coding, category, and themes are often used instead of each other. In this article, the theme will be used to express a wider scope before coding, while the category will be used as a step in the coding process. From this point of view, it can be said that place, space, and cultural codes are present in the narrative experience. Therefore, this article focuses on the relationship between the city and ethnography, while the author does not explore his text as ethnography.

According to Ezzy (2013), data collection, analysis, and writing are integrally linked in ethnographic research (O'Reilly, 2005). In ethnographic analysis, two types of data from the text are mentioned: content and semiotic (O'Reilly, 2005). Content analysis has a variety of definitions and applications. Semiotic analysis refers to analyzing the text in terms of both the meanings they express and the meanings they evoke. Content analysis is more popular in culture, media, communication, literary studies, and politics rather than in sociology and anthropology (O'Reilly, 2005). For this study, ethnographic analysis is close to content analysis of its species to focus on its basic and initial meanings, not semiotic analysis, which focuses on the side meanings and connotations of words and concepts. Content analysis has the potential to provide more ethnographically realistic objective data by dealing with the codes and categories of semiotic analysis while dealing with what shows and what is shown. In her book, O'Reilly (2005) states that Altheide (1996) derives the term ethnographic content analysis, which is more alternate and repetitive but more implicit in the coding process, rather than traditional content analysis. Therefore, content analysis is preferred as a more useful method to determine which codes are available for the themes of cities, places, and cultures. Because the method of this study focuses on the production of codes according to themes for the analysis of information from the field. The experience-based structure of the *Prag'da Günler* story provides an example of ethnographic content analysis that reveals codes from the field with its ethnographic quality. The following ethnographic analysis stages of Karen O'Reilly (2005) are followed as a theoretical method:

- Formulating a research question or hypothesis
- Sample selection
- Definition of themes
- Development of a protocol for coding
- Coding and analyzing the results

O'Reilly's (2005) ethnographic analysis steps are used as a preliminary for the development of the method that made coding possible for this article in Figure 1.

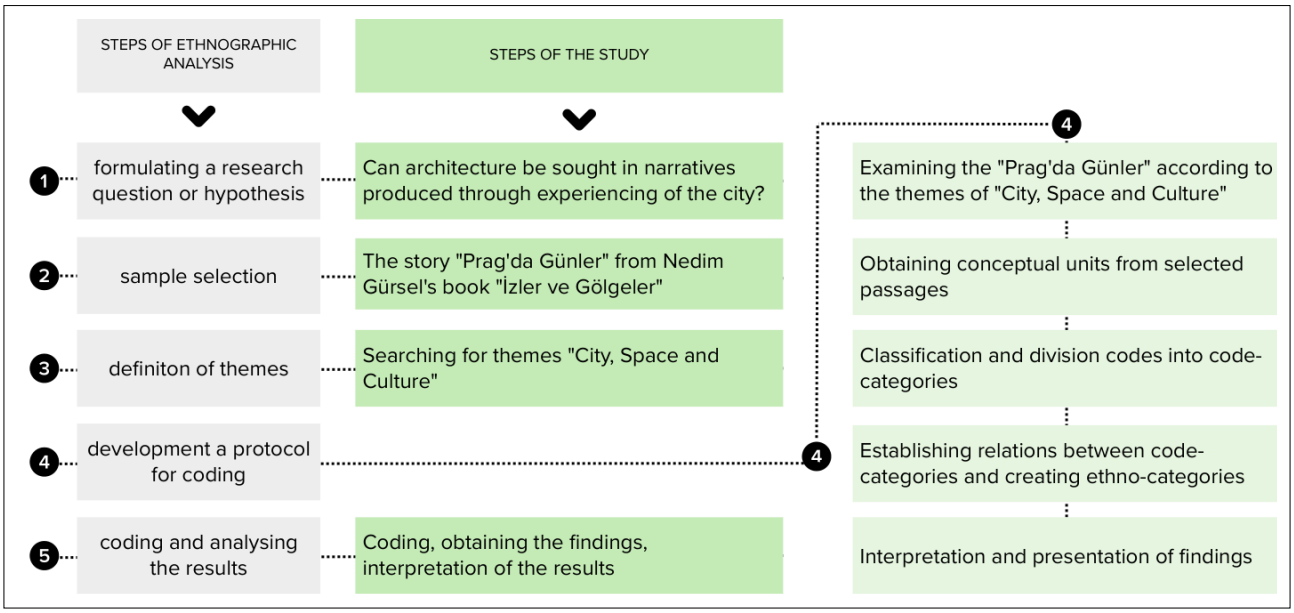


Figure 1. Steps of the ethnographic analysis and study approach.

The story of *Prag'da Günler* is analyzed according to the ethnographic analysis steps in Figure 1, and the architectural knowledge of the city is revealed textually. The steps for developing a protocol for coding are taken from O'Reilly (2005); to make sense of the data, the researcher uses a combination of inductive and deductive reasoning processes, constantly moving between the concrete data set and abstract concepts, and again between definitions and interpretations (Corbin & Strauss, 2008).

While in the development of the protocol for coding, context or environment, situations and definitions, perspectives, ways of thinking about people and objects, processes, activities, events, strategies, relationships, and social structure, and the narrative flow are usually centered. In this study, the themes of 'city, space, culture,' which are especially significant for architecture, abide. These themes looked for in the text are the common themes of both ethnography and architecture. The steps in the creation of the protocol for coding in ethnographic are as follows:

- Examining *Prag'da Günler* according to the themes of 'City, Space and Culture': All five chapters of the 29-page story are read multiple times and passages expressing, defining, describing, and evoking the city, space, and culture are concluded in each section.
- Obtaining conceptual units from selected passages: In the selected passages, concepts, words, or phrases that form the themes are drawn and removed. With this simplification, the conceptual units are generated.
- Classification and division of conceptual units into code-categories: Based on themes of city, space, and culture, conceptual units consisting of ideas, connotations, descriptions, qualities, or buildings are collected and classified and large information units containing many conceptual units are produced.
- Establishing relations between code-categories and creating ethno-categories that depend on themes: Ethno-categories are created by combining code-categories that are related to each other. This stage is the abstraction or simplification to find the basic pattern or finding that arises by answering research questions.
- Interpretation and presentation of findings: The resulting ethno-categories are put together following the themes and presented systematically.

In this context, the protocol for the coding process is conducted following the themes shaped by the discipline of architecture. Accordingly, the findings and interpretations provide a new perspective on architecture.

Protocol for Coding in Ethnographic Analysis: The *Prag'da Günler* Story

The ethnographic analysis of city codes allows us to explore the architectural projection of a city in the narrative. In this study, which followed the ethnographic analysis method, the themes to be encoded are determined as 'City, Space, and Culture' by examining Nedim Gürsel's story Prag'da Günler. In determining these themes, concepts that are effective and common on the axis of architecture and literary disciplines have been selected. The themes (city, space, culture) chosen for narrative research within the discipline of architecture are among the common research topics of both disciplines. Themes have the potential to be shaped according to the narratives' own axis and context (Bal, 2016). At the same time, in ethnography, the analysis

of themes are areas that can be specialized with contextually appropriate content for cultural portraits. In this context, the themes taken as the basis for this study are the themes that stand out in the representation of experience in Gürsel's story Prag'da Günler.

The ethnographic analysis of the *Prag'da Günler* story is shown in the following steps according to the protocol for the coding part in Figure 1. Color codes are created for ease of reading and for tracking the inferences of the story. The color yellow indicates the expressions with intense spatial code connotations, and the color green indicates the expressions with more cultural connotations for Figure 1 and 2.

Examining the Story *Prag'da Günler* According to the Themes of 'City, Space, and Culture'

Following the themes intended to be investigated, passages having 'city, space, and culture' are detected in the story. The following figure is an example of a reading to obtain units of analysis from the story (Figure 2).

Obtaining Conceptual Units from Selected Passages

The passages detected after the examination are collected in the left column of Figure 3. Examples of passages in the figure include references from all five chapters of the *Prag'da Günler* story. Conceptual units suitable for themes from passages are boldly stated. A list of the conceptual units derived from the selected passages appears in the right column next to the book paper. The coding in the below image is redefined through conceptual units on the *Prag'da Günler* story based on themes which are city, space, and culture.

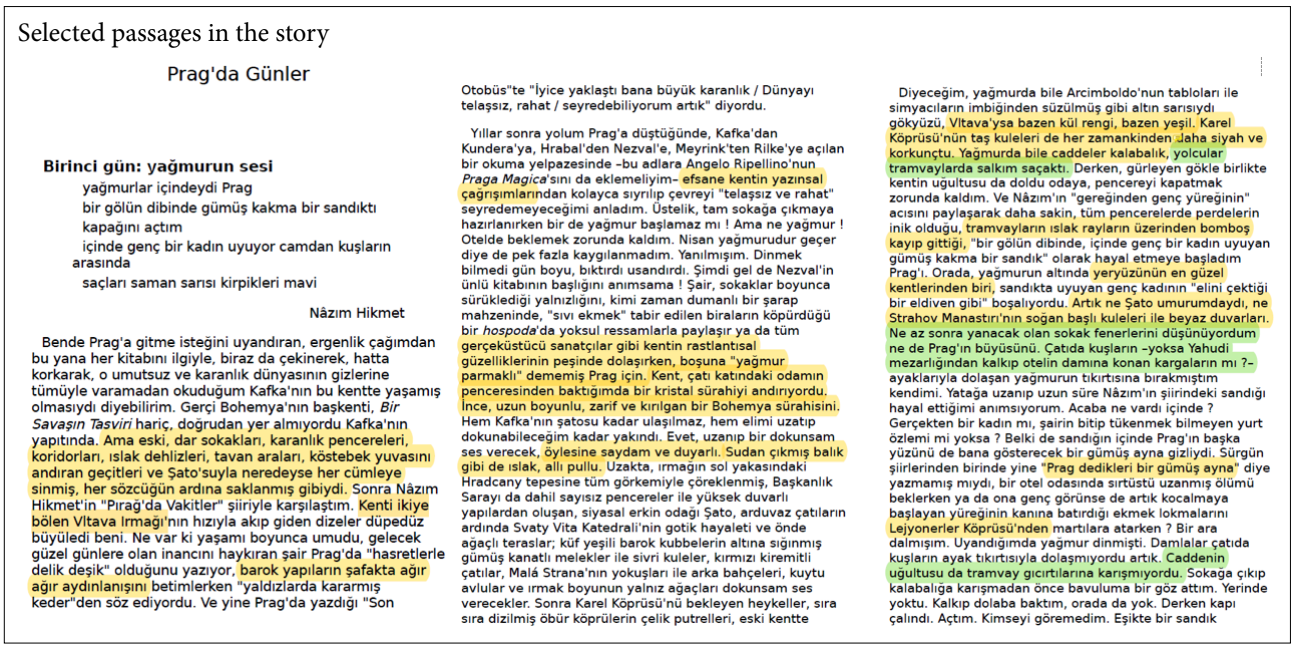
Classification and Division of Conceptual Units into Code-Categories

The conceptual units are determined in the story. Conceptual units are merged and classified, and code-categories are created. In the next step, code-categories are classified, and then ethno-categories are created. For this story, after deep reading, these categories are determined with the architectural view. In the concept cluster formed by conceptual units, concepts that show architectural, urban, and cultural similarities are brought together and categorized. These categories have formed the categories that are uniquely produced and have high potential within the scope of the study. For example, different types of buildings such as bridges and castles form a group, while characteristics such as the changing of the city, being scary, and mysterious come together to form another group. In this context, the conceptual units and code-categories are shown in Table 1.

Establishing Relation between Code-Categories and Creating Ethno-Categories

In this step, code-categories are classified, and fewer ethno-categories are created (Table 2). The creation of large pieces from small parts has made it easier to relate to the theme. When code-categories relate closely to each other, they are included in the same classification, resulting in a few ethno-categories. The small number of ethno-categories makes it easier to interpret and extract meanings from the data.

When creating ethno-categories, it is important to establish a relationship between the city, space, and culture themes determined at the beginning of the study, code-categories, and ethno-categories. Code-categories and ethno-categories


Selected passages in the story

Prag'da Günler

Birinci gün: yağmurun sesi

yağmurlar içindeydi Prag
bir gölün dibinde gümüş kakma bir sandıktı
kapağını açtım
içinde genç bir kadın uyuyor camdan kuşların arasında
saçları saman sarısı kirpikleri mavi

Nâzım Hikmet

Bende Prag'a gitme isteğini uyandıran, ergenlik çağımdan bu yana her kitabını ilgiyle, biraz da çekinerek, hatta korkarak, o umutsuz ve karanlık dünyasının gizlerine tümüyle varamadan okuduğum Kafka'nın bu kentte yaşamış olmasıydı diyebilirim. Gerçi Bohemya'nın başkenti, *Bir Savaşın Tasviri* hariç, doğrudan yer almıyordu Kafka'nın yapıtında. Ama eski, dar sokakları, karanlık pencereleri, koridorları, ıslak dehlizleri, tavan araları, köstebek yuvasını andıran geçitleri ve Şato'suyla neredeyse her cümleye sinmiş, her sözcüğün ardına saklanmış gibiydi. Sonra Nâzım Hikmet'in "Prag'da Vakitler" şiiriyle karşılaştım. Kenti ikiye bölen Vltava Irmağı'nın hızıyla akıp giden dizeler düpedüz büyüledi beni. Ne var ki yaşamı boyunca umudu, gelecek güzel günlere olan inancını haykıran şair Prag'da "hasretlerle delik deşik" olduğunu yazıyor, barok yapıların şafakta ağır ağır aydınlanışını betimlerken "yaldızlarda kararmış keder"den söz ediyordu. Ve yine Prag'da yazdığı "Son Otobüs"te "İyice yaklaştı bana büyük karanlık / Dünyayı telaşsız, rahat / seyredebiliyorum artık" diyordu.

Yıllar sonra yolum Prag'a düştüğünde, Kafka'dan Kundera'ya, Hrabal'den Nezval'e, Meyrink'ten Rilke'ye açılan bir okuma yelpazesinde –bu adlara Angelo Ripellino'nun *Praga Magica*'sını da eklemeliyim– efsane kentin yazınsal çağrışımlarından kolayca sıyrılıp çevreyi "telaşsız ve rahat" seyredemeyeceğimi anladım. Üstelik, tam sokağa çıkmaya hazırlanırken bir de yağmur başlamaz mı ! Ama ne yağmur ! Otelde beklemek zorunda kaldım. Nisan yağmurudur geçer diye de pek fazla kaygılanmadım. Yanılmışım. Dinmek bilmedi gün boyu, bıktırdı usandırdı. Şimdi gel de Nezval'in ünlü kitabının başlığını anımsama ! Şair, sokaklar boyunca sürüklediği yalnızlığını, kimi zaman dumanlı bir şarap mahzeninde, "sıvı ekmek" tabir edilen biraların köpürdüğü bir *hospoda*'da yoksul ressamlarla paylaşır ya da tüm gerçeküstücü sanatçılar gibi kentin rastlantısal güzelliklerinin peşinde dolaşırken, boşuna "yağmur parmaklı" dememiş Prag için. Kent, çatı katındaki odamın penceresinden baktığımda bir kristal sürahiyi andırıyordu. İnce, uzun boyunlu, zarif ve kırılgan bir Bohemya sürahisini. Hem Kafka'nın şatosu kadar ulaşılmaz, hem elimi uzatıp dokunabileceğim kadar yakındı. Evet, uzanıp bir dokunsam ses verecek, öylesine saydam ve duyarlı. Sudan çıkmış balık gibi de ıslak, allı pullu. Uzakta, ırmağın sol yakasındaki Hradcany tepesine tüm görkemiyle çöreklenmiş, Başkanlık Sarayı da dahil sayısız pencereler ile yüksek duvarlı yapılardan oluşan, siyasal erkin odağı Şato, arduvaz çatıların ardında Svaty Vita Katedrali'nin gotik hayaleti ve önde ağaçlı teraslar; küf yeşili barok kubbelerin altına sığınmış gümüş kanatlı melekler ile sivri kuleler, kırmızı kiremitli çatılar, Malá Strana'nın yokuşları ile arka bahçeleri, kuytu avlular ve ırmak boyunun yalnız ağaçları dokunsam ses verecekler. Sonra Karel Köprüsü'nü bekleyen heykeller, sıra sıra dizilmiş öbür köprülerin çelik putrelleri, eski kentte Diyeceğim, yağmurda bile Arcimboldo'nun tabloları ile simyacıların imbiğinden süzülmüş gibi altın sarısıydı gökyüzü, Vltava'ysa bazen kül rengi, bazen yeşil. Karel Köprüsü'nün taş kuleleri de her zamankinden daha siyah ve korkunçtu. Yağmurda bile caddeler kalabalık, yolcular tramvaylarda salkım saçaktı. Derken, gürleyen gökle birlikte kentin uğultusu da doldu odaya, pencereyi kapatmak zorunda kaldım. Ve Nâzım'ın "gereğinden genç yüreğinin" acısını paylaşarak daha sakin, tüm pencerelerde perdelerin inik olduğu, tramvayların ıslak rayların üzerinden boşboş kayıp gittiği, "bir gölün dibinde, içinde genç bir kadın uyuyan gümüş kakma bir sandık" olarak hayal etmeye başladım Prag'ı. Orada, yağmurun altında yeryüzünün en güzel kentlerinden biri, sandıkta uyuyan genç kadının "elini çektiği bir eldiven gibi" boşalıyordu. Artık ne Şato umurumdaydı, ne Strahov Manastırı'nın soğan başlı kuleleri ile beyaz duvarları. Ne az sonra yanacak olan sokak fenerlerini düşünüyordum ne de Prag'ın büyüsünü. Çatıda kuşların –yoksa Yahudi mezarlığından kalkıp otelin damına konan kargaların mı ?– ayaklarıyla dolaşan yağmurun tıkırtısına bırakmıştım kendimi. Yatağa uzanıp uzun süre Nâzım'ın şiirindeki sandığı hayal ettiğimi anımsıyorum. Acaba ne vardı içinde ? Gerçekten bir kadın mı, şairin bitip tükenmek bilmeyen yurt özlemi mi yoksa ? Belki de sandığın içinde Prag'ın başka yüzünü de bana gösterecek bir gümüş ayna gizliydi. Sürgün şiirlerinden birinde yine "Prag dedikleri bir gümüş ayna" diye yazmamış mıydı, bir otel odasında sırtüstü uzanmış ölümü beklerken ya da ona genç görünse de artık kocalmaya başlayan yüreğinin kanına batırdığı ekmek lokmalarını Lejyonerler Köprüsü'nden martılara atarken ? Bir ara dalmışım. Uyandığımda yağmur dinmişti. Damlalar çatıda kuşların ayak tıkırtısıyla dolaşmıyordu artık. Caddenin uğultusu da tramvay gıcırtılarına karışmıyordu. Sokağa çıkıp kalabalığa karışmadan önce bavuluma bir göz attım. Yerinde yoktu. Kalkıp dolaba baktım, orada da yok. Derken kapı çalındı. Açtım. Kimseyi göremedim. Eşikte bir sandık

Figure 2. Examining the story Prag'da Günler.

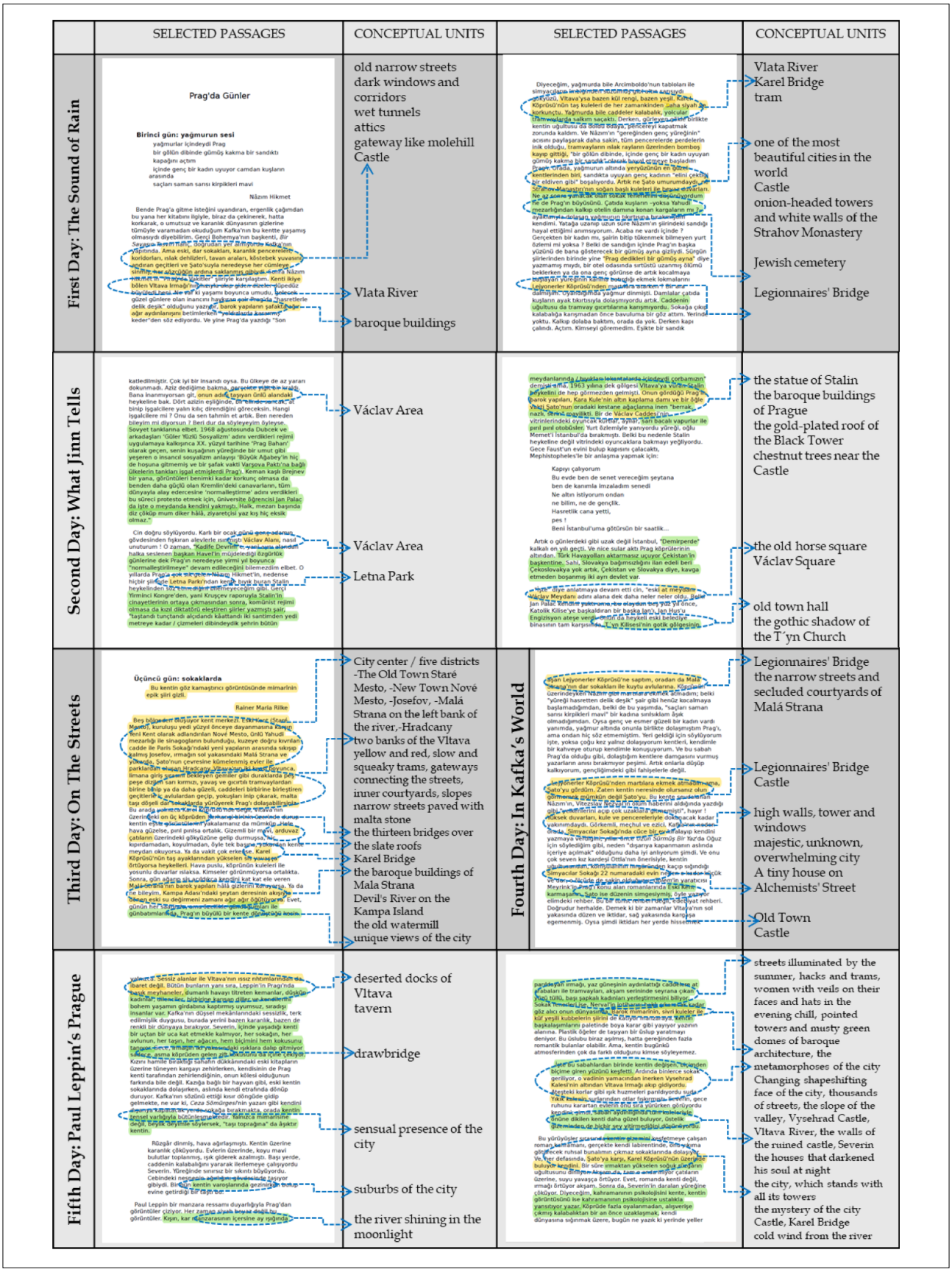


Figure 3. Selecting conceptual units from selected passages.

Table 1. Production of code-categories from conceptual units

Conceptual Units	Code-Categories	Conceptual Units	Code-Categories
dark windows and corridors attics onion-headed towers and white walls of the Strahov Monastery the gold-plated roof of the Black Tower inner courtyards the slate roofs pointed towers and musty green domes of baroque architecture the walls of the ruined castle high walls, tower and windows wide steps stairs of St. Jan hill	Part of the building	wet tunnels gateway like molehill gateways connecting the streets the thirteen bridges over the Vltava the towers of Malá Strana Castle onion-headed towers and white walls of the Strahov Monastery T´yn Church Karel Bridge Legionnaires' Bridge, which crosses the island archway Vysehrad Castle tiny house The old watermill drawbridge	Building type
old narrow streets narrow streets paved with malta stone the narrow streets and secluded courtyards of Malá Strana Thousands of streets Saxons Street narrow Prokopska Street Alchemists' Street Bretislavova Street Nerudova Street slopes	Avenue/street/courtyard	Václav Area the old horse square Václav Square The five districts of city center: The Old Town (Staré Mesto); Nové Mesto, which is called the New Town even though it was founded seven centuries ago; Josefov, tucked away between the street that curves to the north where the famous Jewish cemetery, synagogues are located and new buildings on Paris Street; Malá Strana on the left bank of the river; Hradcany, consisting of houses and parks clustered around the Castle Great Monastery Square Letna Park egg marketJewish cemetery Deserted docks of Vltava tavern	Open public space
the statue of Stalin the statues on the bridge	Artwork	Severin	Artist
yellow and red, slow and squeaky trams the tram stop in Malá Strana hacks and trams	Vehicle / area	the baroque buildings of Prague old town hall the metamorphoses of the city suburbs of the city	History
one of the most beautiful cities in the World the river shining in the moonlight streets illuminated by the summer changing, shapeshifting face of the city the city which stands with all its towers the houses that darkened his soul at night unique views of the city the city which is majestic, unknown, overwhelming cold wind from the river sensual presence of the city women with veils on their faces and hats in the evening chill	Description	chestnut trees near the Castle two banks of the Vltava the left bank of the Vltava St. Jan hill the left bank of the Vltava the slope of the valley Vltava River Kampa Island Devil's River	Natural texture

are created specifically for this article. They originate from the relationships between codes and categories in narratology. Code-categories indicate smaller units of larger conceptual units. According to the methodology of this study, all categories are also steps of the methodology. Code-categories consist of concepts and concept groups that are prominent in the story under study. Categories with ethnographic value are called ethno-categories.

Interpretation and Presentation of Findings

The interpretation of the findings includes an abstraction that goes beyond codes to the broader meaning of data and extracting meanings from data (Creswell, 2013). *Prag'da Günler* is a story that emerged after the writer experienced Prague. Using the author's experiences as material, the data from the city was included in the story, which added an ethnographic quality to it. The architectural themes looked for in the story are determined by city, space, and culture. These themes appeared as a result of coding in which they are included as conceptual units in the text.

The interpretation and presentation of the findings are based on Table 2. In this scope, 10 code-categories have been determined. The code-categories listed on the left and ethno-categories on the right are related to the topics shown

Table 2. Relationship between code-categories and ethno-categories in the Prag'da Günler story

Code-Categories	Ethno-Categories
Part of building	ARCHITECTURAL
Building type	ARCHITECTURAL
Avenue/street/courtyard	ARCHITECTURAL
Open public space	ARCHITECTURAL / GEOGRAPHICAL
Artwork	ARCHITECTURAL
Artist	LITERARY
Vehicle / area	GEOGRAPHICAL
Description	LITERARY
History	LITERARY
Natural texture	GEOGRAPHICAL

in Figure 4. Axes originating from different code-categories and following the same themes and ethno-categories are the same color. For example, since both parts of the building and building type code-categories reach an architectural ethno-category through space, they are shown with the same color as the axis. However, when open public space has branched out and also gone to the city, it is expressed in a different color axis. These themes are the intersection of the code-category and ethno-category.

The code-categories that are part of the building, building type, avenue/street/courtyard, open public space, and artwork are classified in the 'architectural' ethno-category. The vehicle/area, open public space, and natural texture code-categories came together in the 'geographical' ethno-category. The artist, description, and history code-categories constituted the 'literary' ethno-category. The open public spaces code-category is classified in both the architectural and geographical ethno-categories. The ethno-categories are classified by the themes of 'city, space, and culture' determined at the beginning of the study. An ethno-category can be included in multiple thematic analyses.

Two of the five axes leading to the 'architectural' ethno-category are directly associated with the theme of 'space', while two are associated with the theme of 'city', and one is seen only as linked to the theme of 'culture'. The avenue/street/courtyard and the open public space have become architectural ethno-categories through both themes of city and space. Two of the four axes leading to the 'geographical' ethno-category are related to the theme of 'city', one is related to the theme of 'space', and the other one is with the theme of 'culture'. The 'literary' ethno-category is associated with the theme of 'culture'.

The deduction made from the diagram suggests that the architectural ethno-category exhibits the strongest connection with themes, followed by the geographical ethno-category. While these two ethno-categories connect with three themes, the literary ethno-category only connects with culture. In this context, it can be said that in the relationship between literature and architecture, architectural and geographical ethno-categories have more ethnographic content than the literary ethno-category.

In the story Prag'da Günler, the code-categories "part of building, building type, avenue/street/courtyard, open public space" are associated with the theme of space because they define a void and determine the private-public nature of the experience. Each of the code-categories refers to the space and the suggestion of the void that constitutes it. The code-categories "avenue/street/courtyard, open public space, vehicle/area, natural texture" are directly associated with the theme of city as they emphasize the multifaceted identities of the city such as structural, natural, social, etc. The code-categories "artwork, artist, vehicle/area, description, history" are associated with cultural background as story-writing environments that reflect the

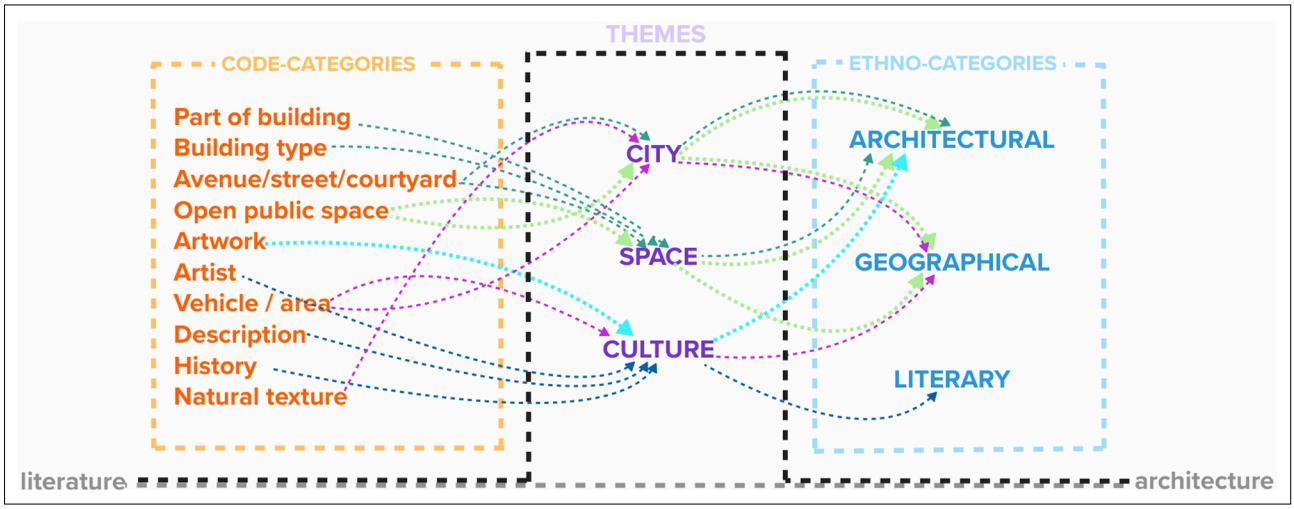


Figure 4. Diagram for the relationship between code-categories and ethno-categories based on themes.

unique spirit of the city. For this reason, they are associated with culture, which will serve all kinds of cultural interests in the past-future interface.

The fluid relationship between categories and themes is expressed with a dashed line. This is because these relationships aim to make readers intend to think about and establish new relationships. Nevertheless, if this relationship is evaluated in the story Prag'da Günler, which is selected within the scope of the study, it is observed that the relationships between themes and categories are not constant according to the narrative language of the story. The relationship between literature and architecture may vary according to the author's language, experience, and even the perception profile of the reader. Each code, which is perceived and imagined by the reader with the linguistic perspective presented by the author, is collected in the context of themes and categorized into ethno-categories. In the case of this story, the author's experience of the city of Prague is collected under three ethnographic categories. Accordingly, the architectural and geographical ethno-categories communicate with all themes in some way as they constitute the space of the story. The literary ethno-category stands out with the theme of culture, pointing to the essence of ethnography. Because the literal aspect of the story is strengthened by the author with cultural sub-readings. The author seems to have expressed the ethnographic values that come from the codes related to the urban experience and that relate to the meta-themes through ethno-categories.

CONCLUSION

Narratives as travel writing constitute a source of data for defining and exploring urban identity. Travel writing is an ethnographic narrative because it refers to places, spaces, and events. Urban places in the narrative are architectural references that are very important in creating the narrative identity of a particular city in literature.

The *Prag'da Günler* story, which is based on city experiences, is more constructed through descriptions, definitions, and explanations rather than events. In the story, Prague is a hero who stands out within the narrative and has shaped the identity of the narrative. Experiencing Prague provides the writer with information about both the current situation and the history of the city. With the reflection of this information, the narrative has become an expression of the visible and known face of the city. Urban events, such as urban places, are very important in defining Prague's identity in the narrative.

Nedim Gürsel's story Prag'da Günler, which is revealed based on experience, is subjected to a re-reading through ethnographic content analysis. Codes, code-categories, ethno-categories, and themes obtained in the reading based on the steps of the ethnographic analysis method reveal that the story is an ethnographic fiction.

The codes examined in the story are the form of transfer of information collected by the ethnographic analysis method. Although these codes and categories have a subjective direction, they constitute the ethnographic aspect of the narrative that comes from the field as part of social life and culture. The code-categories that emerge for the Prague impression in this story are part of the building, building type, avenue/street/courtyard, open public spaces, artwork, artist, vehicle/area, description, history, and natural texture. The ethnographic narrative makes it possible to define Prague through these categories.

To elaborate on the relationships between code-categories, themes, and ethno-categories: code-categories, which are formed by concepts and conceptual units in the story, are connected to ethno-categories through themes from the story. There are no sharp boundaries between code-categories and ethno-categories, but they are connected to each other through themes. Themes (city, space, culture) act as both a transitional element and a bridge between literature at one end and architecture at the other. In the story Prag'da Günler, it can be clearly observed that the knowledge gained by the author through his experience of the city is more in contact with the themes of architectural and geographical ethno-categories. The code-categories shaped around the urban experience are clustered in architectural and geographical ethno-categories through the themes. This shows that the experience is not only an architectural but also a geographical undertaking. In addition, the code-categories artist, description, and history are connected to the literary ethno-category through the theme culture. In other words, it can be said that the literary ethno-category is less visible in the story, and among the concepts and conceptual units that characterize the city and make up the code-categories, those related to the theme of culture are closer to the literary ethno-category.

While architectural and geographical ethno-categories are related to all themes, the literary ethno-category is related to the theme of culture in this story. Although all ethno-categories express the atmosphere of the city holistically, the fact that the architectural ethno-category is more connected with themes shows that architecture is an important tool in generating ethnographic data from the city. The fact that the literary ethno-category is only related to the theme of culture can be explained by the fact that expressions based on experience in the narrative are more physical. Ethnographic analysis of the narrative provides a contextual and semiotic preliminary for ethnographic research. Ethnography, which is a holistic and deep analysis, is an effective method of producing knowledge by considering architecture and literature together.

The conclusion to be drawn from this is that it is an illusion

to think that only literary ethno-categories can be found only in literature. For it is necessary to look for architecture in literature and to imagine that architectural-geographical categories can also exist in literature. At least in the context of this article, the potential for thinking in spatial dimensions has been demonstrated.

As a result, this article is an example of how the existence of rich narratives is made visible through ethnographic analysis of the story Prag'da Günler. Code-categories, ethno-categories, and themes make visible the connection between narratology and architecture. Steps of ethnographic analysis in the text become a way to think about the relationship between architecture in a literary text; these stages create the route for analysis. In conclusion, it is possible that the conceptual levels of ethnographic analysis in the evaluation of literary data (narratives and discourses) in architecture are diverse. The ethnographic analysis can indeed yield valuable insights, acknowledging limitations, and reflecting potential benefits.

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Article

Places of memory and place attachment: A study at the neighborhood scale in Istanbul

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Memory; place attachment; places of memory.

ABSTRACT

Places of memory are often locations where individuals connect with their own life stories. In this respect, places of memory can strengthen people's attachment to place. However, due to various reasons, some places of memory are lost as a result of rapid and wide-ranging transformations in the city, leading to interruptions in the continuity of memory. Beginning with the question, "Do rapid and wide-ranging changes in the city affect individuals' places of memory and place attachment?", this study examines the changes experienced in Istanbul through existing and lost places of memory at the neighborhood scale.Three field studies were conducted in the Kuzguncuk Neighborhood, Küçükyalı District, and Postane Neighborhood, located on the Anatolian side of Istanbul, each with distinct physical and demographic structures related to the sea. A total of 150 respondents, fifty from each area, answered survey questions. Data were analyzed using the SPSS program. The effects of changes triggered by land fill in coastal areas of Istanbul over time have also been observed in the residents' places of memory. The most mentioned places of memory include coastal and sea-related areas, parks and gardens, religious buildings, shopping buildings, educational buildings, transportation buildings, cafes and restaurants, cultural buildings, and accommodation buildings. Significant relationships emerged between place attachment values and variables such as duration of residence, educational status, and employment status, varying across different areas. However, no significant relationship was found between place attachment values and age or gender across the three areas. Among the three areas, the conservation zone of Kuzguncuk experienced the least change and showed the highest place attachment values.

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INTRODUCTION

Places of memory, where memory is preserved and transmitted, provide physical and social continuity alongside the meaning and attachment they have for people. The rapid change in today's life is also reflected in cities. This change, involving demolition and reconstruction processes, causes many places that are important for the common urban memory and have direct or indirect relations with the events stored in it to be lost, thus interrupting the continuity of the urban memory.

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With regard to urban change, Rapoport (2004) notes that the result of a forced, comprehensive, and rapid change that is unwanted by the public can be disruptive and destructive. Slower changes, which can be called creative adaptation, work better. Some innovations are rejected, while others are adapted and incorporated into the cultural system.

- Do rapid and widespread changes in the city affect individuals' places of memory and place attachment?
- What factors influence individuals' place attachment?
- Are individuals' places of memory they have experienced?

The study, initiated with these questions, aims to reveal the effects of urban changes on places of memory at the neighborhood scale and on residents' place attachment, as well as to examine the factors influencing places of memory and place attachment. To investigate the effects of rapid and profound changes in the city on its residents, the study focuses on changes caused by landfill projects along the coast of Istanbul. According to the study by Uzun & Akyuz (2019), Tuzla and Maltepe are the two districts with the largest coastal landfill areas on the Anatolian side of Istanbul. These two districts together account for 50% of the coastal landfill areas on the Anatolian side. With a landfill area width of 600 meters, the most significant change in the coastline on the Anatolian side has occurred in Maltepe (Uzun & Akyuz, 2019). In light of this data, the study was conducted in neighborhoods located along the coast in the districts of Maltepe and Tuzla, which have the most extensive landfill areas on the Anatolian side. In contrast to Küçükyalı and Postane neighborhoods, which have been subjected to extensive changes, a third area was considered as a control area, and Kuzguncuk neighborhood, a more preserved neighborhood, was selected. In the research, many studies available on memory and place attachment in the fields of environmental psychology, sociology, and architecture were analyzed; however, here memory spaces are discussed from an architectural perspective. Lefebvre (2014), in his work The Production of Space that enables us to perceive space as a means of social production, explains space with three interconnected and interactive concepts: spatial practice, representations of space, and spaces of representation. While creating the study, Lefebvre's (2014) Spatial Triad model, which distinguishes the spaces as perceived, designed, and experienced, was utilized, based on the assumption that the places where people live, know their stories, and can find an intersection with their own life stories are included in the collective memory.

Theoretical Background

In this study, which aims to question the change in the city through places of memory, Pierre Nora's perspective on places of memory is in the background. Henri Lefebvre's concept of experienced space was also used while analyzing the data obtained from the three field studies. Rapoport's (2004) view of creative adaptation was also taken into account while analyzing the changes experienced in terms of workspaces. While some innovations are rejected, others are adapted and incorporated into the cultural system (Rapoport, 2004). The changes in the specified neighborhoods have been analyzed in terms of places of memory and place attachment values of the surveyed groups.

Memory and Memory Types

Psychological literature defines memory as a multi-stage process for retaining acquired information, encompassing specific pieces of information or past experiences that can be recalled. Psychological studies highlight a three-layered structure of memory, consisting of sensory memory, short-term memory, and long-term memory. Sensory memory captures stimuli briefly until attention is directed, and those stimuli requiring attention move to short-term memory, which has a limited capacity. Repeated information in short-term memory is transferred to long-term memory (Buttler & Mcmanus, 1998). Long-term memory is divided into episodic memory and semantic memory, distinguished by the terms "remembering" and "knowing." Autobiographical memory, a substructure of episodic memory, involves recalling events from one's life and self. It interacts with and provides information to semantic memory (Gülgöz, 2023).

Memory has been explored across disciplines, with philosopher Bergson (2015) identifying motor mechanisms (habit-based memory) and independent recollections (remembering past events). Social anthropologist Connerton (2019) defines individual, cognitive, and habitual memory. Individual memory, according to Egyptologist Assmann (2018), is shaped by details extracted from social elements. The concept of collective memory recognizes memory as not solely an individual characteristic but collectively determined. Halbwachs (2018) asserts that individual memory requires social reference points, reconstructing the past based on present experiences. Social frameworks, such as family and social classes, contribute to forming individual and collective memory. Collective memory, though subject to change, persists in various spatial elements, from monumental structures to ordinary street names (Basa, 2015). Halbwachs (2018) emphasizes that the strength and duration of collective memory derive from group cohesion, acknowledging individual perspectives within the collective memory.

Places of Memory

According to Nora (2006), places of memory are important meeting places with historical, ethnographic, psychological, political, and eternal dimensions. Places of memory in a city where memory is preserved and transmitted provide physical and social continuity with the meaning and attachment they have for people. Place provides the

conditions for the preservation of our memories, the formation, and representation of common thought. With social place, communities can form their own identities, and in the absence of social place, a community lacks the basis to form its identity. Memory always exists together with perception, movement, and space (Özaloğlu, 2017). According to Nora (2006), just as history is connected to events, memory is connected to places. He said that the main reason for the existence of the places of memory is to stop time, to prevent forgetting, to determine the status of objects, to immortalize death, to make the intangible tangible. The sense of continuity is rooted in space (Nora, 2006).

Public spaces with historical testimonies are places where collective urban memory is more concentrated, depending on the strength and fluidity of their transmission. Spaces where social bonds can be established can form points of resistance in front of urban transformations (Basa, 2015). Lefebvre's (2014) Spatial Triad model mentioned earlier enables us to perceive space as a means of social production, by explaining it with three interconnected and interactive concepts: spatial practice, representations of space, and spaces of representation. Spatial practice creates a society's own space. It tightly combines everyday reality and urban reality within the perceived space. We can discover the spatial practice of a society by deciphering space. Modern spatial practice can be defined by the everyday life of a low-income tenant living in the city. Representations of space, that is, conceived space, is the space of scientific artists who identify what is experienced and perceived with what is designed. Spaces of representation, the space lived through the images and symbols that accompany the space, that is, the spaces of the inhabitants, the spaces of the users, are the spaces that are dominated and exposed (Lefebvre, 2014).

Table 1 summarizes Lefebvre's (2014) approach to the production of space. In the study, Lefebvre's process of perceiving, designing and experiencing space as a social production was utilized. It is accepted that the places where people live, know their stories, and can catch an intersection with their own life stories are included in the collective memory. The question of whether the places of memory in the collective memory are the places that people experience was sought to be answered. In terms of places of memory, the situation of experiencing the space was investigated.

Table 1. Henri Lefebvre Spatial Triad

Spatial Triad		
Perceived Space	Physical Space	Spatial Practice
Conceived Space	Mental Space	Representations of Space
Lived Space	Social Space	Spaces of Representation

Place Attachment

Place attachment can be explained as individuals establishing an emotional relationship with a place and feeling a connection to it. In the field studies conducted, it is seen that people establish bonds with the houses and the neighborhoods they live in, with the places they visit for recreational purposes, landscapes, forests, lakes, wild nature, or summerhouses (Lewicka, 2010). Studies in the field of social sciences have yielded different findings reflecting the relationship between the changing dimensions of place and place attachment. Research shows that the concept of place attachment does not only describe the emotional relationship established with places but how the concept of place attachment differs according to changing scales of place should be taken into account (Göregenli, 2018).

In a study conducted by Göregenli (1997) to determine the elements of place attachment and place identity, she asked open-ended questions to young people and asked them to write an essay about their "favorite place." By analyzing the texts obtained through content analysis, 20 factors determining young people's attachment to place were identified. These factors are listed as characteristics of place, activities, togetherness, expressing ideas, relaxation, pleasure-pleasure, dialectical attributions towards place, personalization, remembering the past, attributions towards self, secrecy, privacy, escape from social pressures, belonging, control, self-identification, freedom of expression, anonymity, security, rootedness-permanence, habit-familiarity-knowing, intellectual needs, acceptance-gaining respect.

Lewicka (2010), creating a version of the place attachment scale used in her studies, utilized a list consisting of 12 positive and 12 negative items in a survey. Participants made choices from the place attachment scale in terms of the apartment building, flat/detached building, neighborhood, and city they live in. The score achieved is the difference between the number of positive and negative items selected. The resulting number is between -12 (extremely negative feelings about place) and +12 (extremely positive feelings). The place attachment scale used by Lewicka (2010) in Table 2 was used in the field studies.

RESEARCH METHODOLOGY AND CASE STUDY

In a review of the literature, studies in the fields of environmental psychology, sociology, and architecture were examined. In the case studies, demographic information of the participants, places of memory in their neighborhoods, their experiences of these, and their attachment to their neighborhoods were investigated. A version of the place attachment scale used in Maria Lewicka's studies was utilized as a place attachment scale. Survey participants were also asked about their place of birth, length of residence in their neighborhoods and also in Istanbul, and where they felt they were from. Data obtained from the field studies are compared.

Table 2. Items of the place attachment scale used by Lewicka (2010)

I like this place.	I don't like this place.
I defend it when somebody criticizes it.	I agree with its critics.
I miss it when I am not here.	I leave this place with pleasure.
I have influence over its affairs.	I don't want to be involved in its affairs
I belong here.	I don't belong here.
It is a part of myself	I feel uprooted here.
I want to be involved in what is going on here.	I have no influence over its affairs.
I am proud of this place.	I am ashamed of this place.
I feel secure here.	I feel at risk here.
I am rooted here.	I feel foreign here.
I know this place very well.	I don't know much about this place.
I would not like to move out from here.	I would like to move out.

The case study was conducted in Küçükyalı and Postane neighborhoods, which had undergone extensive changes, and as a control group, in the preserved area of Kuzguncuk, unlike these two areas. Demographic information of participants, existing and lost places of memory in their neighborhoods, and their place attachment to their neighborhoods were investigated. A survey was conducted with a total of 150 participants, 50 from each area—Küçükyalı district, Kuzguncuk neighborhood, and Postane neighborhood. Individuals over the age of 18 residing in the areas were reached out to, while those not residing in the areas and minors were not included in the sample. Additionally, face-to-face interviews were conducted with 7 individuals regarding their living areas.

Participants were asked 14 questions, including demographic questions, to gather information about their sense of belonging. To learn about their sense of belonging, information such as their birthplaces, duration of residence in their neighborhoods and in Istanbul, and how they identify themselves geographically were collected. The average place attachment values obtained for the three neighborhoods were compared to each other and to the changes they had undergone. The relationship between participants' sense of belonging and their attachment values was examined. Following methods from existing literature, Hidalgo & Hernandez (2001) and Lewicka (2010), whether there was a significant relationship between attachment values and participants' gender, age, duration of residence, employment status, and educational status was investigated. To achieve this, the obtained values from the survey were first examined for normal distribution using SPSS software. Since the data did not show a normal distribution, Spearman Brown analysis was conducted using the SPSS program.

Existing places of memory in the three areas were grouped according to their functions. Changes in the areas through lost places of memory were analyzed. Istanbul has 39 districts, twenty-five on the European side and 14 on the Anatolian side. The field studies were conducted in Maltepe, Üsküdar, and Tuzla districts on the Anatolian side. The selected areas are the coastal areas of these districts. Figure 1 shows the districts of Istanbul and case study areas.

Küçükyalı in Maltepe District

Maltepe is located on the Marmara Sea coast of Istanbul. The part of the coastal road within the borders of Maltepe District was filled in 1980 and 2013. Küçükyalı neighborhood is one of the areas most affected by the landfill on the Marmara Sea.

The images in Figure 2 show the changes that occurred on the Küçükyalı coast over a period of 47 years. The relationship of Küçükyalı residents with the sea has changed due to the landfills and the coastal road built on them. In the case studies, the researchers asked questions to the participants to learn about both existing and lost places of memory.

As seen in Table 3, in 144 responses received from fifty people, 44 different places were named. 20.8% of the responses were grouped as responses related to the sea and coast. Sixteen percent of the respondents answered

Figure 1. Map of Istanbul districts.

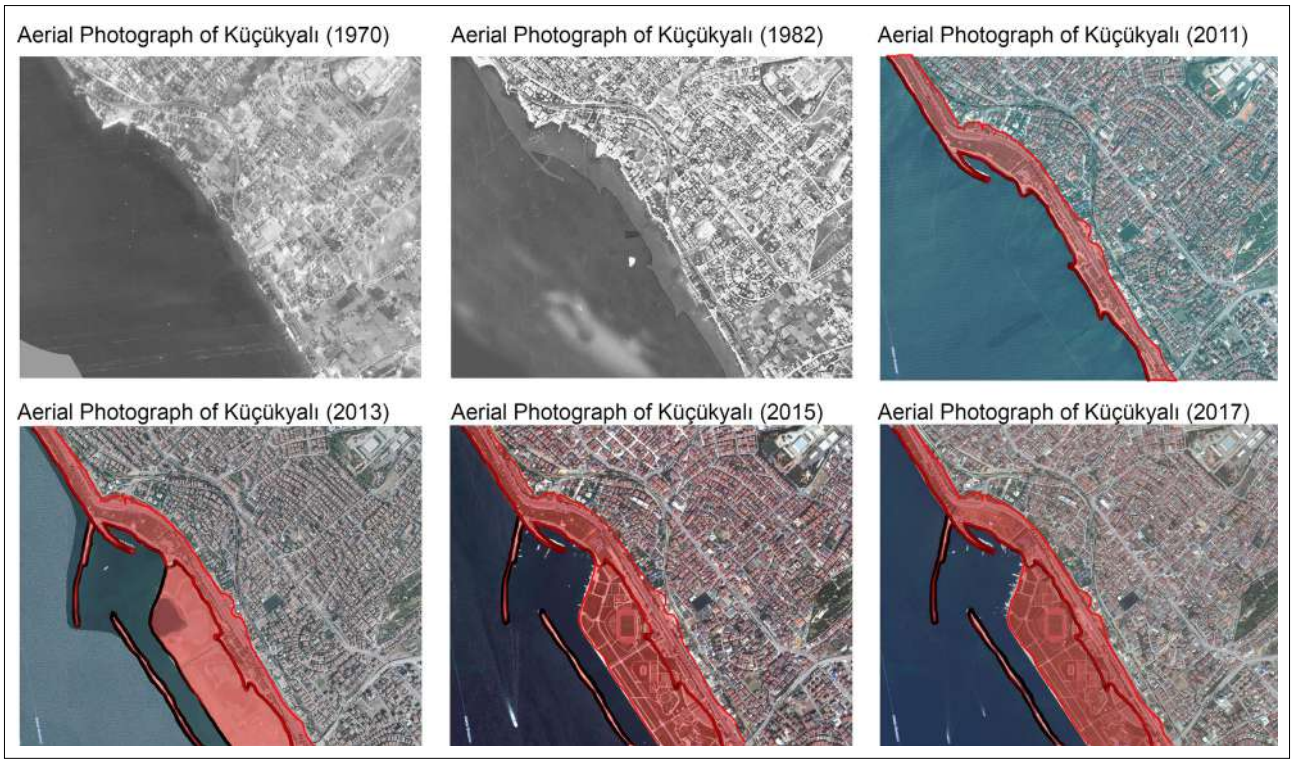

Figure 2. The change in Küçükyalı coastal in 47 years. (Coastal fill areas were marked in red).

this question as "Archaeopark" or "The Cave." Küçükyalı Archaeopark is located in the Çınar neighborhood of Küçükyalı, in an area hidden among the dense building texture. The archaeological site, which includes the Satyros Monastery, built in the Byzantine period between 866-877 AD, is exhibited in its natural environment. No detailed study had been carried out in the area until the 2000s. The local people were not informed about this cultural heritage. The site remained idle. It was named "The Cave" by the residents of the neighborhood and continued to exist as an area where children played. In the early 2000s, detailed archaeological excavations and research were carried out. Küçükyalı Archeopark was mentioned by residents over the age of 40 as a place where they used to play when they were children. The excavation house and visitor center established in the area aim to inform and involve the local community in the process. Figures 3 and 4 show the current state of the excavation site. The local people, who have lived in Küçükyalı for years and have experienced the site, have been trying to follow the process of the site, which they have called "The Cave" since their childhood.

Figure 3. The current state of the excavation site of Satyros Monastery (2020).

Figure 4. The excavation site of Satyros Monastery and the minaret of the mosque on the adjacent parcel and the excavation house/visitor center on the opposite side (2020).

Table 3. Percentages of existing places of memory in Küçükyalı

Existing places of memory	Percentage %
Coast	17.4%
Archaeopark/The Cave	16.0%
50th Anniversary Park	5.6%
Hilltown Mall	4.9%
My School	4.9%
Adnan Kahveci Park	4.2%
Railway station	4.2%
Bazaar	3.5%
Mosque	2.8%
Tunnel	2.8%
Center of Küçükyalı	2.8%
Patisserie / Bakery	2.8%
Çamlık	2.1%
Fish Market	1.4%
Healthcare Center	1.4%
Atatürk Park	1.4%
İdealtepe	1.4%
Kılavuz Çayırı Street	1.4%
Nida park	1.4%
Park	1.4%
Altıntepe	0.7%
Bağdat Street	0.7%
Old Turkish Bath	0.7%
Old railway crossing	0.7%
Old beaches	0.7%
Neighborhood	0.7%
Marmaray	0.7%
Metro	0.7%
Migros	0.7%
Mopaş Market	0.7%
Soccer field	0.7%
White House	0.7%
63 Bus stop	0.7%
Passages	0.7%
Church	0.7%
Street Market	0.7%
Seascape	0.7%
Sani Malaz Park	0.7%
Starbucks	0.7%
Single storey houses with garden	0.7%
Old Police Station	0.7%
Temple of Virgins	0.7%
Çınar Neighbourhood	0.7%
Turk Telekom	0.7%

In response to the question "When you think of Küçükyalı, which 3 buildings or places that are currently in Küçükyalı come to mind?", approximately 5% of the respondents mentioned the schools they attended. In addition, 5% of the participants, who have been living in Küçükyalı for an average of 18 years, wrote the name of the shopping center that was built 4 years ago. The reflection of the change in the neighborhood on places of memory was also observed.

The analysis of Table 4 shows that 30 different answers were given to the question asked. Among the places that have been lost due to the landfill on the beach and the coastal road built on it, Çamlık Beach, Lido Beach, and Yalı Park are mentioned by 23.8% of the participants. Figure 5 shows the coastal landfill road near the old Çamlık Beach area.

Table 4. Percentages of lost places of memory in Küçükyalı

Lost places of memory	Percentage %
Çamlık Beach/ Cafe	10.2%
Lido Beach	8.5%
Old Beaches	6.8%
Yalı Park	3.4%
Beach	1.7%
63 Movie Theater	6.8%
İpek Movie Theater	5.1%
Summer movie theater	3.4%
İhya Movie Theater	1.7%
Highways Housing / Directorate	8.5%
Single storey houses with garden	8.5%
Old Turkish Bath	3.4%
Ulusoy	3.4%
Is Bankası Apartments	1.7%
Old Railway crossing	1.7%
Köşk Apartment	1.7%
Küçükyalı Bazaar	1.7%
Küçükyalı Center Primary School	1.7%
Cafe AgitBey	1.7%
Warehouse of Efes Pilsen	1.7%
Old mosque by the coast	1.7%
Children's park on the beach	1.7%
Grocery	1.7%
Trees	1.7%
Covered bazaar next to the medical center	1.7%
Soccer field	1.7%
The vacant lot where we used to play ball on Akalın Street	1.7%
Old İgdaş	1.7%
Old Kızılay	1.7%
Yeşilçam Cafe	1.7%

Figure 5. Küçükyalı coastal la¬nd fill road Çamlık locality (2020). (With red hidden lines for old coast line).

A total of 17% of the responses mentioned the 63 Movie Theater, İhya Movie Theater, İpek Movie Theater and summer movie theaters that used to exist in Küçükyalı.

Participants also emphasized the change in the construction in the neighborhood. 8.5% of the participants mentioned the single-storey houses with gardens that used to exist in the neighborhood. These garden houses have been transformed into 3-4 storey apartment buildings with the change. In addition, 8.5% of the respondents mentioned the old Directorate of Highways and its lodgings. A multi-storey bazaar-office-residential complex is being built on the site of the former Highways Lodgings.

Kuzguncuk in Üsküdar District

Üsküdar is one of the most important and oldest settlements on the eastern shore of the Bosphorus. Kuzguncuk is a neighborhood of Üsküdar and a historical and natural protected area. When aerial photographs of Kuzguncuk are analyzed, the results of the area being a protected area can be seen. There is no major change that can be detected in the aerial photographs of 1970 and 2020 in Figure 6. Looking at the Pervititch map in Figure 6, it is understood that the area is well preserved.

In the examination of Kuzguncuk, it is observed that the changes are related to the function of the buildings. Functional changes in recent years can be summarized as the transformation of existing buildings into cafes and restaurants.

When we look at the responses to the question in Table 5, 38 different places or locations were named in 148 responses received from fifty people. 23.7% of the responses were grouped as being related to the sea.

14.2% of the responses were for the Church, 13.5% were for the Bostan, 6.8% were for the Pier, 6.1% were for İsmet Baba Restaurant, 5.4% were for Çınaraltı, and 5.4% were for the Mosque. Kuzguncuk Bostan, shown in Figure 7, is an area where the people of Kuzguncuk can plant crops in the areas allocated to them, sit outdoors, and socialize. Public events are also organized here at certain times of the year.

Çınaraltı in Figure 8 is an important area for the locals, with a fountain on one side and Çınaraltı Café and İsmet Baba Restaurant on the other side, where you can breathe the Bosphorus air and watch the Bosphorus view. When the answers to the question listed in Table 6 are examined, 22 different answers are observed.

A total of 25% mentioned the names of small shopkeepers or craftsmen who are no longer operational in the neighborhood. Analysis of the responses shows that the shoe repair shop, tailor, haberdashery, bakery, and grocery store were mentioned. Those shops that closed down were mostly converted into cafes. Figures 9 and 10 show how it has become difficult to walk on Kuzguncuk sidewalks as cafes put tables and chairs on the sidewalks.

Since this neighborhood is a protected area, the physical changes of the buildings are under control. The changes experienced in recent years have been in the form of renovations at the building scale and functional changes.

Postane Neighborhood in Tuzla District

Tuzla District is located on the eastern border of Istanbul, on the Marmara Sea coast. Tuzla District has a 13 km-long coastline, and Postane Neighborhood is located here. The images in Figure 11 show the change in the Postane

Figure 6. Kuzguncuk pervititch map, 1932 & Kuzguncuk aerial photographs from 1970 and 2020.

Table 5. Percentages of existing places of memory in Kuzguncuk

Existing places of memory	Percentage %
Church	14.2%
Bostan (Urban Garden)	13.5%
Pier	6.8%
İsmet Baba Restaurant	6.1%
Çınaraltı	5.4 %
Mosque	5.4 %
Bakery	4.7%
Synagogue	4.7%
Icadiye Street	4.1%
Kuzguncuk Primary school	3.4%
Waterside Mansions	2.7%
Dilim Patisserie	2.7%
Fethi Pasa Grove	2.7%
Coast	2.0%
Nakkastepe	2.0%
Nail Bookshop	2.0%
Old wooden houses	1.4%
Mosque and Church side by side	1.4%
Dere boyu	0.7%
Cafes	2.0 %
Butcher Shop	0.7%
Old PTT (Bureau of Turkish National Post)	0.7%
Sand depot	0.7%
Beşevler	0.7%
Marko Paşa Mansion	0.7%
My home	0.7%
Bosphorus	0.7%
Toys shop	0.7%
The house across from famous chef Refika's shop	0.7%
Greek Church Bell Tower	0.7%
İnebolu Bazaar	0.7%
Simitçi Tahir Street	0.7%
Simotas Apartment	0.7%
Places of worship	0.7%
Soccer field	0.7%
Üryanizade Street	0.7%
Çarşı Street	0.7%
Summer movie theater	0.7%

coastline over a period of fifty-one years. The relationship of the residents of Postane with the sea has changed due to the landfills.

Analysis of data in Table 7 shows that 48 different places or locations were mentioned in 148 responses received from fifty people.

Figure 7. Kuzguncuk Bostan (2022).

Figure 8. Çınaraltı (2022).

Figure 9. Shows the tables and chairs placed on the sidewalks by the buildings that have turned into cafes in Kuzguncuk (2023).

26.4% of the responses are related to the beach and the coast, 9.5% to Ayazma, and 9.5% to Kalekapı.

Figure 10. Shows the tables and chairs placed on the sidewalks by the buildings that have turned into cafes in Kuzguncuk (2023).

Ayazma is an area in the Postane neighborhood that was declared a protected area in 1999. It is an area with centuries-old plane trees where neighborhood residents used to have picnics. When the area faced the threat of housing development, the locals laid claims against it. Kalekapı is also an area where archaeological findings from the late Neolithic period have been unearthed.

As seen in Table 8, in 81 responses received from fifty people, 41 different places or place names were mentioned. When the responses are analyzed, Ayazma, Ayazma Tea Garden, and Ayazma Wedding Hall were encountered. Ayazma was also given as an answer to the question of the existing places of memory. Though the area called Ayazma continues to exist, it has undergone changes over the years. For this reason, Ayazma, Ayazma Tea Garden, and Ayazma Wedding Hall were mentioned by 12.3% of the respondents in total. The Tuzla Rumeli Culture Association, seen in Figure 12, was built in place of the old Ayazma Tea Garden in the neighborhood.

Table 6. Percentages of lost places of memory in Kuzguncuk

Lost places of memory	Percentage %
Small shopkeepers	25%
Summer movie theater	9.5%
Old Turkish bath	7.4%
Post office	4%
Military Recruitment Office Building	3.4%
Bostan (Urban Garden)	2.7%
Old houses	2.7%
Police Station	2%
Sand depot	2%
Old coffehouses	2%
Tield Mansion	1.4%
Fountain	1.4%
Ruined waterside mansion	1.4%
Bim Market	0.7%
Gazhane	0.7%
Nersesyan Yermonyan School	0.7%
Wood storage	0.7%
Bazaar	0.7%
Banks	0.7%
Passage on the seaside road	0.7%
Soccer field	0.7%
Pier	0.7%

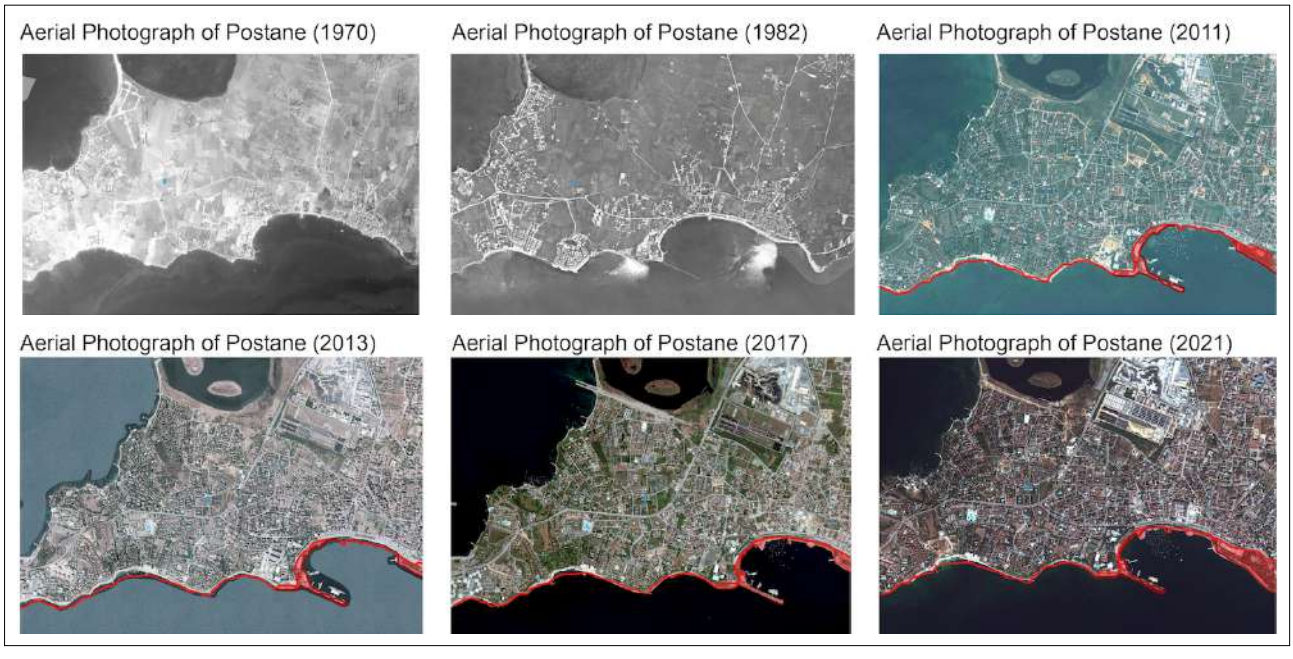

Figure 11. Changes in Postane neighborhood in 51 years.

Table 7. Percentages of existing places of memory in the Postane

Existing places of memory	Percentage %
Mercan	12.2%
Coast	10.8%
Kalekapı	9.5%
Ayazma	9.5%
Fountains	4.7%
Tuzla Port	4.7%
ITU (Istanbul Technical University has a campus there)	4.1%
Rumeli Culture Association	3.4%
Old houses	2.7%
Piri Reis University	2.0%
Haunted mansion/ Garden's of Selami	2.0%
Sultan 1. Ahmet Mosque	2.0%
Arsenal	2.0%
Manastır	2.0%
Sandy Pier	2.0%
Koy içi	1.4%
Tuzla High Scholl	1.4%
Çağrı Bey Primary Scholl	1.4%
Old Turkish Bath	1.4%
Naval Academy	1.4%
Armenian orphanage	1.4%
Farmer's Coffehouse	0.7%
40 Pafta	0.7%
3 Meşeler Area	0.7%
Akbank	0.7%
Atatürk Primary School	0.7%
Çolaklar Fish Restaurant	0.7%
Fish Lake	0.7%
Station	0.7%
Bostan (Urban Garden)	0.7%
By Tahsin Cafe	0.7%
Esentepe	0.7%
Lake	0.7%
Hakan ice cream shop	0.7%
Army Camp	0.7%
Kuyulu Street	0.7%
Marina	0.7%
Organic bazaar	0.7%
Health Center	0.7%
Seaside cafes	0.7%
Sigorta Apartments	0.7%
Tuzla Municipality Social Facility	0.7%
Tuzla bazaar	0.7%
Tuzla Primary Scholl	0.7%
Cafe	0.7%
Tuzla Cemetery	0.7%
Thermal Baths	0.7%
Tuzla Coast	0.7%

Table 8. Percentages of lost places of memory in the Postane

Lost places of memory	Percentage %
Ayazma	6.2%
Ayazma Tea Garden	4.9%
Ayazma Wedding Hall	1.2%
Water Tower/Tank	11.1%
The Burning House/ Selami's garden on the coast	7.4 %
Sand pier	6.2 %
Fountain at Kalekapı	4.9 %
Tuzla Tea Garden	4.9 %
Summer movie theater	3.7%
Kalekapı	2.5%
Farmer's Coffehouse	2.5%
Okra fields	2.5%
Fish Bazaar	2.5%
Adil Restaurant	2.5%
Armenian orphanage	2.5%
Farmlands	2.5%
Fountain	2.5%
Ab-ı Hayat Fountain	1.2 %
Old wooden houses	1.2%
Gardens	1.2%
Vegetable gardens	1.2%
Churches	1.2%
Red wall	1.2%
Cafe of Kubalı	1.2%
Old Tuzla Bazaar	1.2%
Mağfel	1.2%
Manastır Tea Garden	1.2%
Manastır Church	1.2%
Mercan Houses	1.2%
Mezarlık Cape	1.2%
Museum	1.2%
Pide Restaurant	1.2%
Seaside Tea Garden	1.2%
Değirmenaltı	1.2%
Beach	1.2%
Ido Lake	1.2%
Changing restaurants along the coast	1.2%
The venues on the beach	1.2%
Historic Greek Houses	1.2%
Police station	1.2%
Karantina (a building served as a quarantine pace in Ottoman times)	1.2%

In the garden of the Association, ancient plane trees and Byzantine ruins have been preserved and continue to serve the public as a tea garden. The fact that Ayazma is listed as a place of existing memory and as a place of lost memory shows that although the old texture has been lost, memory has been transferred to the present day to some extent.

Figure 12. Tuzla Rumeli Culture Association (2022).

11.1% of the responses were "Water Tower" or "Water Tank." In research conducted on the internet, it was observed that the residents wrote their memories of the water tower/tank where they waited in line for water.

Another frequently mentioned issue, albeit expressed in different ways, is the pink house and its garden on the seaside before the beach filling. It is called by various names such as "The Pink House," "The Burning Pink House," "The Haunted House," "Pastor's House," and "Selami's Garden" by the locals. 7.4% of the respondents said that the abandoned house, the ownership of which was transferred to the municipality, suffered a fire in 2016.

Figure 13 shows the "City and Population Exchange Museum" built by the municipality in place of the burnt building. Figure 14 shows the housing estate built on the site.

Figure 13. Shows the change in the Postane coast due to the landfill area and the newly built housing estate. (2022).

Figure 14. Shows the change in the Postane coast due to the landfill area and the newly built housing estate. (2022).

RESULTS AND DISCUSSION

In this study on places of memory and place attachment in the city of Istanbul, a survey was conducted with the residents of Küçükyalı, Kuzguncuk, and Postane. A total of 150 people, fifty people in each of the three areas, responded to the survey questions.

Table 9 presents the demographic information, duration of residence, where they feel they are from, and place attachment values of the participants in the three field studies. 52% of the survey participants living in Küçükyalı stated that they are from Istanbul, while 6% stated that they are from Küçükyalı. Among the survey participants living in Kuzguncuk, 24% stated that they are from Istanbul, and 54% stated that they are from Kuzguncuk. A different response was encountered in Postane. Of the survey participants living in Postane, 28% stated that they are from Istanbul, and 58% said that they are from Tuzla. Belonging to Tuzla District, where Postane is located, emerged with a big difference in the responses. In terms of place attachment values, Kuzguncuk's place attachment value is 6.24; Postane's place attachment value is 5.47; and Küçükyalı's place attachment value is 4.13. The results obtained in terms of place attachment values, changes in the regions, and lost places of memory are consistent with the research hypothesis. In all three areas, there are similarities related to the functions of places of memory. The functions of the places of memory were grouped regardless of the rate of mention in Table 10. An analysis of the functions of places of memory in the three areas revealed similarities. The most frequently mentioned places of memory included coastal and sea-related areas, parks and gardens, religious buildings, shopping buildings, educational buildings, transportation facilities, cafes and restaurants, cultural buildings, and accommodation facilities.

In Table 11, the rates of the responses to the question "Could

Table 9. Demographic information, duration of residence, where people feel themselves are from and place attachment values of the respondents in the three areas

	Küçükyalı	Kuzguncuk	Postane
Gender %			
Woman	62	38	52
Man	38	62	48
Age			
Average	49	59	46
Standard Deviation	15.962	11.401	10.428
Educational Level (%)			
Primary School	6	10	2
Secondary School	2	12	4
High School	32	36	40
Associate/Bachelor's degree	52	32	38
Postgraduates	8	10	16
Employment Status (%)			
Employee	46	46	64
Unemployed	26	6	20
Retired	28	48	16
Place of birth (%)			
İstanbul	60	18	44
Maltepe/Üsküdar/Tuzla	0	18	24
Küçükyalı/Kuzguncuk/Postane	0	10	2
Duration of residence (year)			
İstanbul	42	50.8	41.5
Küçükyalı/Kuzguncuk/Postane	28.64	43.02	30.44
Where they feel themselves are from (%)			
İstanbul	52	24	28
Maltepe/Üsküdar/Tuzla	0	0	58
Küçükyalı/Kuzguncuk/Postane	6	54	0
Place attachment value	4.13	6.24	5.47

you please mark in the columns how often you visit or use the places of memory?" are presented for the three regions.

When the 421 responses given in Table 11 are analysed, it is revealed that 33.6% of the participants experience places of memory very frequently, 23.9% frequently, 22.8% infrequently, and 8.5% very infrequently. Only 8% of the participants indicated that they do not experience any places of memory. When we look at the places of memory that are not experienced, it is seen that these places are religious buildings in the neighborhood. The research is based on Lefebvre's Spatial Triad process of perceiving, conceived, and experiencing, which enables us to perceive space as a social production, and on the assumption that the places where people live, know their stories, and can catch an intersection with their own life stories are included in the collective memory. The results of the field studies conducted in Küçükyalı, Kuzguncuk, and Postane are in line with this assumption. The gender, age, education level, duration of residence, employment status, and place attachment values of the survey participants in the three areas were primarily examined in the SPSS programme to see whether they were normally distributed. Since the data did not show normal distribution, Spearman Brown analysis was performed.

The correlation analysis for Küçükyalı is shown in Table 12. A significant correlation was found between the values of place attachment and the duration of residence in Küçükyalı.

Table 13 shows that there is a significant relationship between place attachment values and educational level in Kuzguncuk.

The correlation analysis for the Postane is shown in Table 14. In the Postane, there is a significant relationship

Table 10. The functions of the places of memory were grouped

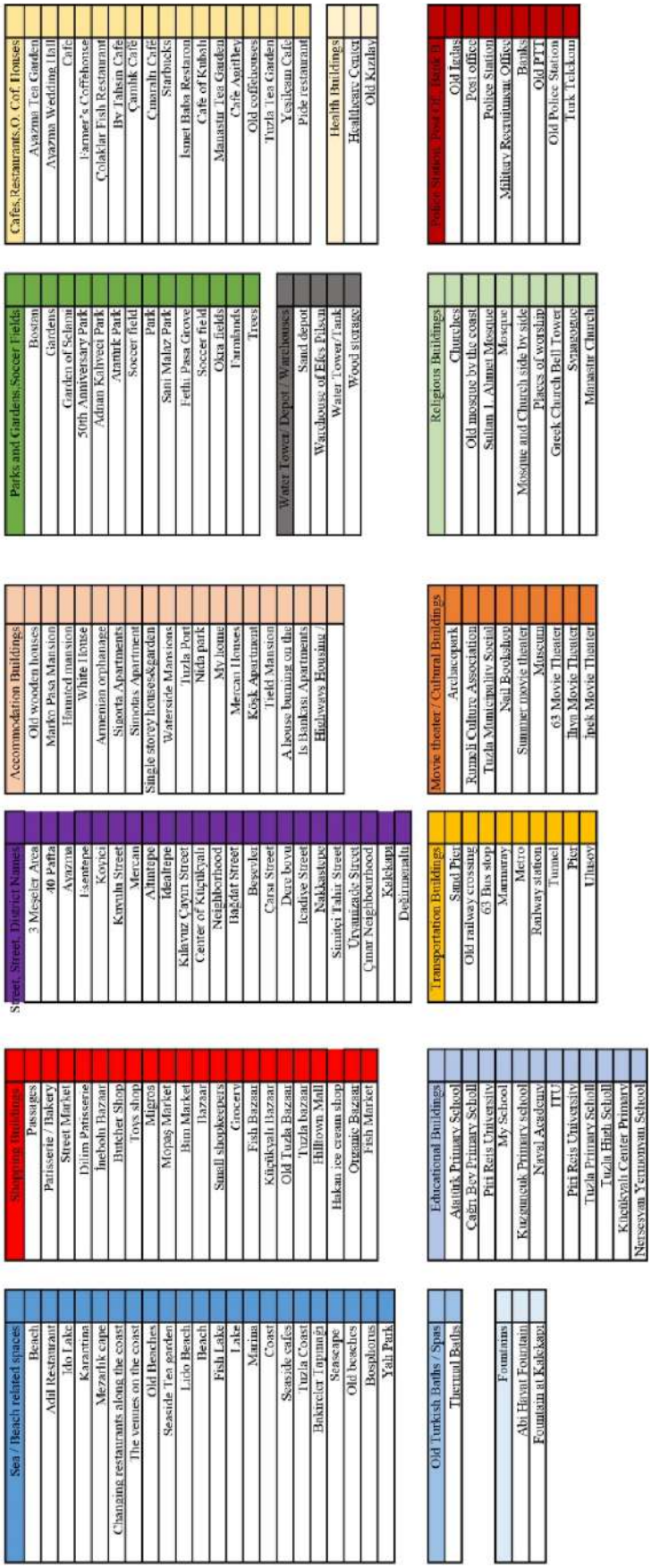

Table 11. Ratios of the responses to the question "Could you please mark in the columns the frequency of your presence in or use of the existing places of memory for the three regions?"

	Frequency	Percent
Valid		
very frequently	146	33.6
frequently	104	23.9
infrequently	99	22.8
very infrequently	37	8.5
none	35	8.0
Total	421	96.8
Missing		
System	14	3.2
Total	435	100.0

Table 12. Correlation analysis for Küçükyalı

	Place attachment	Duration of residence
Place attachment		
Correlation Coefficient	1	.346*
Sig. (2-tailed)	.	0.02
N	45	45
Duration of residence		
Correlation Coefficient	.346*	1
Sig. (2-tailed)	0.02	.
N	45	45

Table 13. Correlation analysis for Kuzguncuk.

	Education level	Place attachment
Education level		
Correlation Coefficient	1	.306*
Sig. (2-tailed)	.	0.033
N	49	49
Place attachment		
Correlation Coefficient	.306*	1
Sig. (2-tailed)	0.033	.
N	49	49

between place attachment values and employment status. In all three areas, there is no significant relationship with place attachment values depending on age or gender. When examining the place attachment values across the three study areas, the relationships between place attachment and participants' gender, age, duration of residence, educational status, and employment status were assessed. In each area, significant relationships were observed between place attachment values and duration of residence, educational status, and employment status.

Table 14. Correlation analysis for Postane.

	Place attachment	Employment status
Place attachment		
Correlation Coefficient	1	-.398**
Sig. (2-tailed)	.	0.005
N	48	48
Employment status		
Correlation Coefficient	-.398**	1
Sig. (2-tailed)	0.005	.
N	48	48

Similar to Lewicka's (2010) study, the positive impact of duration of residence on place attachment was measured. Contrary to the findings of Hidalgo & Hernandez (2001), there was no significant relationship or difference between place attachment values and age or gender in any of the three areas.

CONCLUSION

In this study, it is posited that addressing the issues of places of memory and place attachment together at the neighborhood scale in different regions will contribute to the body of research on memory and place attachment. In regions undergoing profound and extensive changes, the loss of places of memory for inhabitants can lead to a diminished sense of place attachment. In contrast, in protected areas with minimal change, the continuity of places of memory is maintained, resulting in higher place attachment among residents. Numerous variables can influence people's attachment to their neighborhoods, making the identification of these variables a complex issue. The study identified the effects of residence duration, educational status, and employment status on place attachment. However, no significant relationship or difference was found concerning age and gender.

When examining the functions of places of memory, similarities have been identified; however, the most significant commonality of these spaces is that they are places experienced by individuals and connected to their personal life stories.

This study aims to take a step towards preserving places of memory and strengthening residents' place attachment, thereby ensuring the continuity of urban memory. In subsequent studies, the creation of memory maps for neighborhoods could facilitate research on memory transmission at the neighborhood scale. Additionally, to determine individuals' levels of attachment to places of memory, face-to-face interviews with a limited number of participants could be conducted, applying a place attachment scale specifically for places of memory.

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Article

A systematic approach to sound and spatial experience studies: Detection of the key concepts and themes

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ABSTRACT

The research examines studies about the process of spatial experience and highlights aural interactions. In this sense, the goal is to assess and describe the expanding corpus of literature in the field of sound and spatial experience and to provide a framework for further investigation. Key concepts and themes that emerge at the intersection of space, sound, and experience are examined through a comprehensive review. Bibliometric research techniques are applied with a methodological framework in accordance with the process of detecting themes. Web of Science database was used as the raw data source, and scientific mapping and analysis of the obtained data were performed using VOSviewer. PRISMA guidelines were utilized for the study's document selection and reporting processes. Systematic scanning and selection processes resulted in the collection of 416 documents. The procedure of detecting themes led to the identification of 13 major themes and 136 key concepts that emerged. Essentially, it was discovered that the "soundscape" was the most significant concept and theme in the field of study. Furthermore, assessments and inferences were conducted on all other key concepts and themes. The major components of the field, concentrated areas, and potential development areas have been discovered through the analysis of conceptual relationship networks. The findings will provide future researchers an opportunity to comprehend how the research field has developed, as well as a chance to learn more about new potential fields of study and enhance their research.

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INTRODUCTION

How do we experience our environment? This question has long been one of the most important ones in environmental studies. To address this and raise concerns about the mechanisms underlying spatial experience, the senses were organized in a hierarchy, with vision generally recognized as the superior sense (Clouten, 1973; Hutmacher, 2019; Levin, 1993; Posner et al., 1976; Spence, 2020). The "eye-centric paradigm" manifests the superiority ascribed to vision in architectural culture. This method, which peaked with modernist philosophy, aimed to design the space in the logic of machine aesthetics based on a utilitarian system, ignoring the physical and psychological connections of humans with the space (Bille & Sørensen, 2018; Pallasmaa, 2005; Rybczynski, 2001; Williams, 1980).

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However, the users experience the space in an interactive and responsive way with their entire body rather than developing a one-dimensional relationship with it based on the mind's vision. This interaction results from the user's relationship with the environment via all sense mechanisms (Merleau-Ponty, 1968; Pallasmaa, 2005; Puderbaugh, 1967). Especially the aural features of space play a vital role in the experiential identity since they go far beyond serving as a simple, neutral background (Sheridan & Van Lengen, 2003).

Similar questions have always existed in concepts about the experience of space, and the role of sound in the processes of spatial experience has long garnered attention. Pythagoras is credited with using the concepts of harmonic music in his spatial reasoning as early as the fifth century BC (Long, 2006; Pallasmaa, 2017). These concepts are supported at this time period by ancient structures like Greek amphitheaters and whispering galleries (Sheridan & Van Lengen, 2003). In the Middle Ages, the stern and echoing interiors of monasteries and cathedrals expressed notions about approaches to auditory experience (Rasmussen, 1964). The Renaissance brought about more systematic ideas about how geometry affects how sound travels across space, and later on, this system became apparent in concert halls (Forsyth, 1985). With Sabine's acoustic theory, this interaction was conceptually named for the first time in 1895, and it thereafter started to emerge in the literature (Sabine, 1906; Sheridan & Van Lengen, 2003). With the exception of the Philips Pavilion, this strategy did not receive much support within the eye-centric paradigm of the modernist era (Xenakis & Kanach, 2008). Since the advent of acoustic science, the literature has started to reflect a greater variety of methods. The term "soundscape," initially introduced by Southworth in 1967 and then systematized by Schafer, is described as the acoustic environment that humans experience in context (Kang et al., 2016; Schafer, 1994; Southworth, 1967). The International Standardization Organization (ISO) standardized this concept in 2014, and it is still referenced in the literature today (ISO, 2014). Another modern conceptual concept is called "Aural Architecture," which came into being after the 2000s and is defined as architecture that expresses the characteristics of a place that can be experienced by hearing (Blesser & Salter, 2007).

It is observed that there are few research studies in the field that comprehensively and methodically review this literature. Zhang & Kang (2007) conducted a non-systematic literature review focusing on the concept of soundscape in urban open spaces and systematized the factors affecting it. Brown (2011) provided a quick overview of the methodologies as well as an explanation of the fundamental terms and concepts related to soundscape and soundscape planning. Fowler (2013) questioned the concepts related to sound and aurality within architecture and sound design approaches, briefly introduced some prominent approaches in the literature, and evaluated them mutually in the context of installations. Again, Fowler (2015) discussed the interaction of space and sound studies and architectural design processes and compared the leading theories in the literature. The argument made in the paper is that by integrating these methodologies into the architectural design processes, the experience potential of the space will grow. A review by Bild et al. (2016) examined several perspectives on user interaction and the auditory environment in public spaces using a non-systematic literature review methodology. Aletta et al. (2016) analyzed the soundscape descriptors in the literature and offered a conceptual framework for creating predictive models. Ma et al. (2018) reviewed studies that used a systematic approach to evaluate the human perceptual dimensions of sound. They identified perceptual dimensions that are included in the studies and referred to the general judgment of a person. Erfanian et al. (2019) examined the physio-psychological measurement parameters used in soundscape studies with a systematic review. It revealed the trends of the parameters used in the studies. In a systematic review of soundscape prediction model techniques, Lionello et al. (2020) compared various modeling approaches and conducted content analysis on 22 publications. Li & Lau (2020) carried out a systematic literature review to investigate the impacts of audio-visual interaction on soundscape evaluation, design, and noise control. They analyzed and categorized the publications in the field for their study, which resulted in a paper that can be used as a manual for other studies. A systematic literature analysis by Yang & Jeon (2020) analyzed the effects of building envelope elements in the urban acoustic environment and drew conclusions about building envelope design strategies. With a systematic review, Engel et al. (2021) identified the usage of psychoacoustic parameters in soundscape studies from the previous ten years as well as broader trends in the area. Pellegatti et al. (2023) carried out a systematic literature review on the connection between ventilation system-related noises and students' acoustic comfort by concentrating on the indoor soundscape of classrooms. Kang (2023) reviewed and highlighted the most recent advancements and discoveries in the field of soundscape with all of its different facets.

The majority of the research under consideration had a basic methodology and worked under constrained parameters. Few current studies apply bibliometric techniques in a systematic way. However, none of these studies examined the field as a whole, identified the key concepts in the field and the thematic areas they developed, or documented the current condition of the field from this perspective at the time of the study. Therefore, a systematic literature review that considers all approaches emerging at the intersection of space-experience-sound will provide valuable potential for the field. To achieve this, the study uses bibliometric analysis techniques to conduct a systematic and comprehensive review of the literature that is forming at the nexus of sound, space, and experience. The field's emerging con-

cepts and themes they generate are recognized, and their potential for further research is evaluated. Finding conceptual linkages within the field allows us to deduce probable development areas and areas of concentration. The study's evaluation procedures made it possible to pinpoint key concepts and themes within the context of sound and spatial experience, identify current trends, and identify new, pertinent research areas for future studies.

MATERIALS AND METHODS

Research Questions

The study is shaped in line with two main research questions:

- What key concepts emerge in sound and space experience studies and the thematic areas created by these concepts?
- Which themes have studies focused on over time in relation to sound and spatial experience? What is the distribution of these themes in the literature? Which concepts and themes are newer and more open to research?

The primary research question aims to investigate the place of sound and auditory in the user's spatial experience processes, and especially to explore the concepts and themes emerging in this field. The second question aims to evaluate the key concepts and themes that emerge, explore their distribution in the literature and relations between them, and thus derive implications for the future provision of the study field.

Methodological Structure: Detection of Themes

The term bibliometrics was first used by Pritchard (1969) and is defined as the science that aims to quantitatively evaluate academic outcomes developed in a field. It discusses several quantitative techniques for analyzing and evaluating texts and information, particularly those stored in large bibliographic data sets. In recent years, bibliometric research methods have also been widely used in the disciplines of architecture and built environment research (Bild et al., 2016; Engel et al., 2021; Erfanian et al., 2019; Ganbat et al., 2018; H. Li & Lau, 2020; X. Li et al., 2017; Y. Li et al., 2018; Lionello et al., 2020; Xue et al., 2018; Zhao et al., 2018).

A structured approach based on the bibliometric techniques was developed to address the study's research goals. First, in order to identify the concepts and themes that address the processes of sound and spatial experience, a system based on the "process of detecting themes" proposed by Cobo et al. (2011a) was planned. The study proposed a five-step process in order to detect and visualize the conceptual particular themes or general thematic areas in a research field. Thus, it allows us to quantify the importance of themes and thematic areas within a field of study, and their contribution to the field:

1. Collection of raw data: The process of obtaining raw data sets by scanning in databases.
2. Selection of the type of item to analyze: The process of descoping raw data based on filters such as journals, articles, authors, descriptive terms, or words and obtaining an appropriate dataset.
3. Extraction of relevant information from the raw data: At this stage, the co-occurrence frequencies of keywords according to the research field are extracted from the corpus of documents by counting the number of documents in which the two keywords occur together.
4. Calculation of similarities between items based on the extracted information: Based on the data obtained in the third stage, the similarities between the items are calculated based on the co-occurrence frequencies of the keywords (association strength (Coulter et al., 1998; Van Eck & Waltman, 2007).
5. Use of a clustering algorithm to detect the themes. It is based on a process of clustering to locate subgroups of keywords that are strongly linked to each other with several clustering algorithms.

Database

In bibliometric studies, bibliographic sources such as Web of Science (WOS), Scopus, Google Scholar, Microsoft Academic, PubMed, and Dimensions are used (Chen, 2017; Moral-Muñoz et al., 2020). Among these databases, WOS covers different formats such as full-text articles, reviews, editorials, chronologies, abstracts, papers (journal and book-based), and technical articles. In terms of temporal scope, it contains over 90 million records from 1900 to the present. With these aspects, it is widely accepted as a high-quality digital database (Ding & Yang, 2022; Moral-Muñoz et al., 2020). In addition, the WOS Core Collection database is considered the most authoritative data source as it contains the most respected and influential journals (Pouris & Pouris, 2011; Song et al., 2016; Zhao et al., 2018). These factors led to the selection of WOS as the study's bibliometric database.

SMA Software

SMA is used to perform the third (co-occurrence frequencies of keywords), fourth (calculation of similarities), and fifth steps (clustering process) in the method of detecting themes. In order to select the appropriate tool for the study, papers that compare and contrast SMA software were examined (Cobo et al., 2011b; Gutiérrez-Salcedo et al., 2018; Markscheffel & Schröter, 2021; Moral-Munoz et al., 2019; Moral-Muñoz et al., 2020; Pan et al., 2018). Although there isn't a consensus among the studies, each one has explained the benefits and drawbacks of SMA tools and stated that picking the best software based on the analysis techniques to be used and, in some cases, combining more

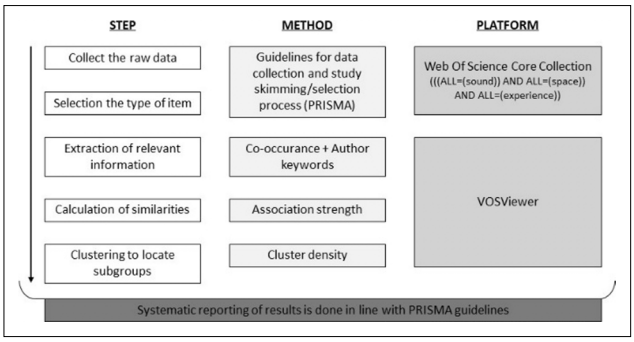

Figure 1. Summary of methodological structure.

than one software will produce advantageous results. The prevalence of use was also analyzed by Pan et al. (2018), who found that VOSviewer software was most commonly used despite finding an upward trend in the use of all the software they looked at. The VOSviewer software is used in the study with its ability to work with common databases (Moral-Muñoz et al., 2020), to create successful visualization outputs (Markscheffel & Schröter, 2021; Moral-Muñoz et al., 2020), and to use the association strength (Van Eck & Waltman, 2007; 2010) similarity criteria in accordance with the method of detecting themes and to be suitable for clustering algorithms.

The results of the methodological analysis are also reported in accordance with PRISMA guidelines (Liberati et al. 2009) (Figure 1).

RESULTS

Search Strategy and Selection Criteria

Keywords for searches were chosen in accordance with the study's objectives and research questions in order to get relevant data from the database. The words "sound," "space," and "experience" were entered into the WOS Core Collection database [(((ALL=(sound)) AND ALL=(space)) AND ALL=(experience))]. At this stage, limitations such as year range or document type were not applied in order to keep the scope wide. As a result of this search, raw data was collected by accessing 2274 records.

First, 2206 records were collected after the results were filtered as English-language materials. The first screening of these documents was made according to their relevance to the research area. Since the keywords used in the search have synonyms in space sciences, health sciences, computer sciences, physics, mathematics, mechanics, etc., documents that are unrelated to the research topic have been eliminated. Then, all records were examined according to their titles, keywords, and abstracts, and incompatible records were eliminated. These stages led to the elimination of 1782 studies that had no relation to the scope. In particular, studies in multidisciplinary fields such as acoustics were examined, and records unsuitable for the study were excluded. Following a full-text evaluation of 424 records, 8 papers and book chapters also included in article versions were dropped from the data set. In the end, 416 studies were acquired for the systematic review process (Figure 2).

Descriptive Analysis

The "process of extraction of relevant information from the raw data" was started with 416 records. First, information on document types and distribution by years was gathered using the WOS system's capabilities in order to define the dataset's current state.

The 416 records' document types revealed that they were made up of 350 articles, 40 proceedings, 14 book chapters, and 12 review articles. The study's coverage of a variety of document types offers an expanded perspective.

When the number of documents changes over time is analyzed, it can be shown that the documents published from 1991 to the present are covered in the scope (Figure 3). It can be said that the number of documents in the study field has increased rapidly, especially since the 2000s. Similarly, it is understood that the number of citations has increased significantly. The statistics indicate that there is increasing interest in the field. Additionally, it can be inferred from Figure 3 that the majority of the documents examined are recent studies.

Thematic Analysis

Data on 416 documents were downloaded from the WOS database in "plain text file" format and with the scope of "full record and cited references." The text file was imported into VOSviewer to conduct next-stage analyses. As stated in the third step of the process of detecting themes, in order to analyze the frequency of co-occurrence of keywords, the file was subjected to Co-occurrence - Author Keywords analysis, and the process was run according to the frequency of co-occurrence of the two words. It was found that there were singular-plural and synonymous words among the occurring words (e.g., sound and sounds; sound-art and sound art; urban park and urban parks; bird sound and bird song, etc.). When these words were matched with a "thesaurus" file and the same procedure was repeated, it was determined that 136 out of a total of 1126 keywords exceeded the threshold. Each of these resulting keywords is considered as a concept for the field of study.

These terms were then normalized using the association strength criteria (Van Eck & Waltman, 2007), as explained in the fourth phase of the process. As a result, keyword relationship networks were created, and a total of 482 connections between 136 keywords emerged. Some keywords may occur in multiple documents, in which case there is a stronger link between them than one. This indicates that the association strength of the two keywords is higher.

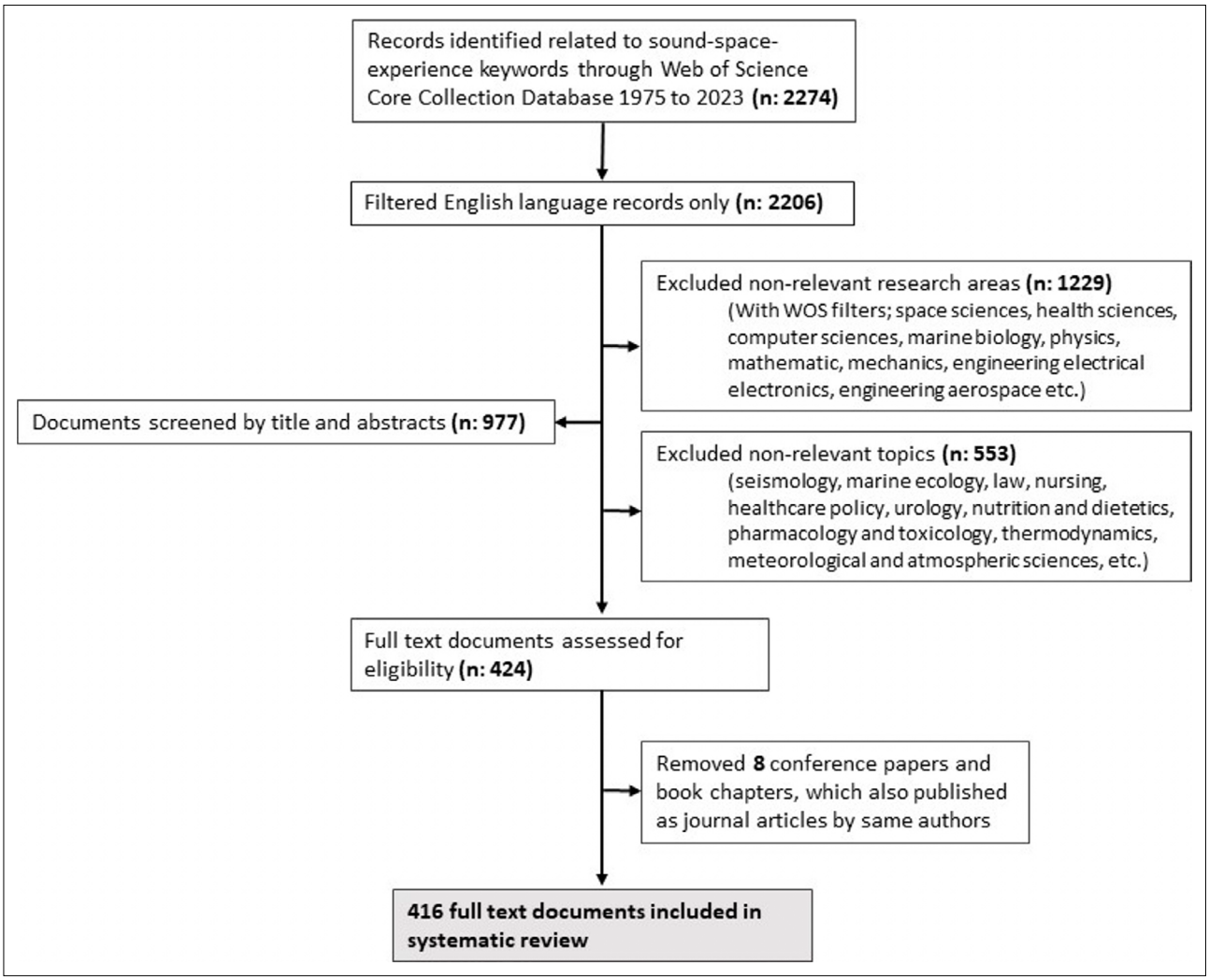

Figure 2. PRISMA Flow diagram for the paper search and skimming/selection process, December 2023.

When evaluated in this way, the total link strength within the network turns out to be 570.

In accordance with the clustering process, which is the last step of the process of detecting themes, the process was run with the clustering algorithm of the VOSviewer (Waltman et al., 2010) and 13 clusters were obtained.

The data obtained as a result of the processes run in the VOSviewer software are presented digitally with an interactive system where graphics and texts are processed together. In order to present this data in text and make mutual assessments, the interactive data has been transferred and presented in a table form by the author. The occurring keywords, clusters, their occurrences (Occ.), total link strength (TLS), and average publication years (APY) are shown in Table 1.

According to Callon et al. (1991), keyword clusters and their interconnections are obtained using co-word analysis. These resulting clusters are considered themes. Each thematic network is tagged using the name of the most important keyword (by occurrence value) in the associated theme. For example, the keyword "blindness," which has the highest occurrence and TLS value in cluster 1, stands out as the most important item in the cluster and gives its name to the cluster. Therefore, the themes that emerged within the database are blindness, virtual reality, sound perception, urban space, perception, soundscape, noise, public space, music, listening, sound art, inequality, and sound. In order to make comparisons between these themes, the total occurrence, TLS, and APY data of each cluster were also calculated.

The Network Visualization Map (NVM) presents the resulting keywords and the connections between them in detail (Figure 4). The elements depicted as circles and labels on the NVM represent keywords. The size of the circle increases with a keyword's frequency of occurrence. Connections between keywords are expressed as links. The line thickness of the link between two keywords increases as the association strength between them becomes stronger. Since the system is operated with the co-occurrence anal-

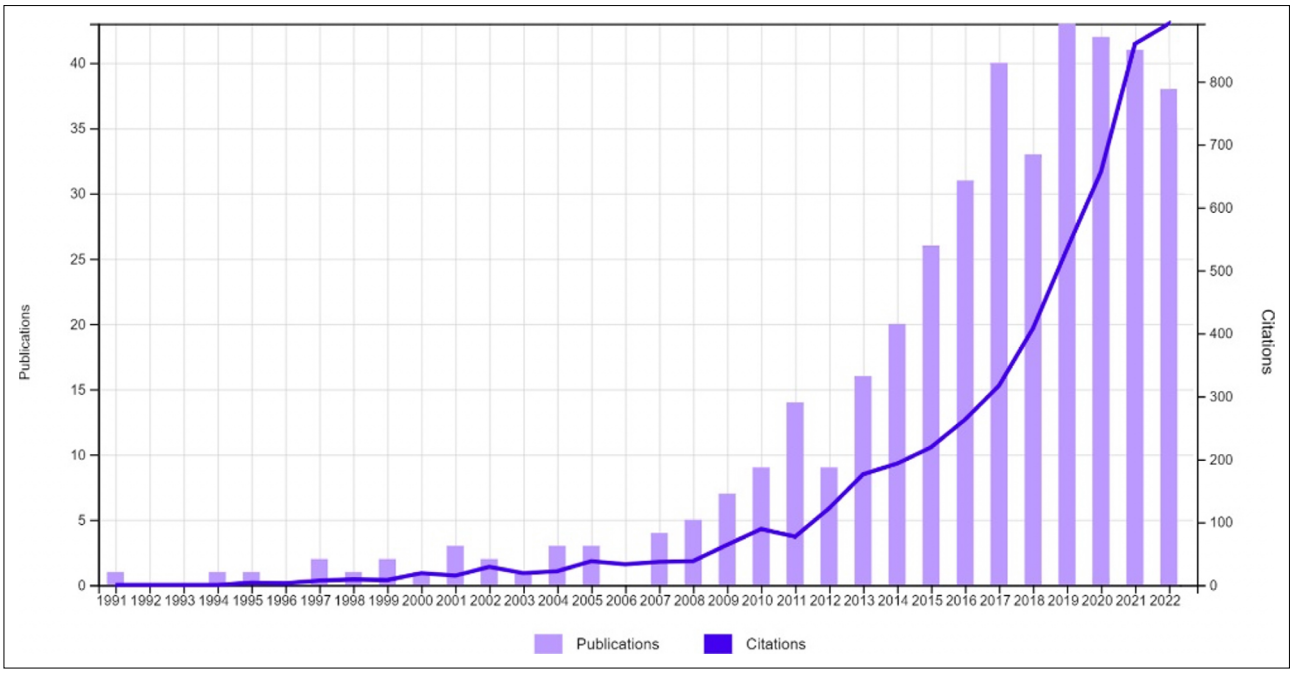

Figure 3. Times cited and publications over time graph.

ysis type, the association strength and therefore the link thickness increases as the number of publications in which the two keywords occur together increases. In the NVM, keywords in the same cluster are represented by circles of the same color (Van Eck & Waltman, 2023). The color legend of the clusters was created by the author and added to the graph (Figure 4).

When the NVM is examined, it can be seen that the keyword "soundscape" is the most dominant element in the research field in terms of both occurrence and TLS. As seen in Table 1, the keyword soundscape occurred 52 times and TLS is 97. Similarly, the most common words after the keyword “soundscape” (Occ: 52, TLS: 97) with occurrence and TLS; “sound” (Occ: 27, TLS: 55), “public space” (Occ: 11, TLS: 29), “urban design” (Occ: 11, TLS: 26), and “noise” (Occ: 10, TLS: 26) continue as follows. The occurrence of the words following these five most common keywords does not change in direct proportion to the TLS. For example, the sixth most common keyword according to occurrence is "urban space" (Occ: 10, TLS: 19); according to the TLS, the sixth strongest keyword is “music” (Occ: 9, TLS: 23). Therefore, it is seen that each keyword emerges within a different network of relationships (Figure 4).

Connection relationships between items can be seen from the NVM graph. For example, the items most frequently linked to the keyword "soundscape" are: “urban park” (Link Strength: 5), “public space” (LS: 5), “sound” (LS: 4), “acoustic environment” (LS: 4), and “noise” (LS: 4). The links between an item and its associated items and a different item and its associated items create attraction and repulsion layouts within the graph. It is seen that keywords and clusters more closely related to each other are intertwined, and keywords with weak connections are located in distant parts. For example, the keyword "inequality" and its surrounding keywords are only associated with a single connection to "soundscape," and are located far outside the chart as they do not associate with other items. On the contrary, the keywords "soundscape" and "public space" are very close to each other due to their strong connections (Figure 4).

The NVM graph can also be used to gather details about clusters and their connections. As exemplified, since the level of connection between the "inequality" (Cluster 12) and "soundscape" (Cluster 6) clusters is weak, the clusters are located at distant points; due to the intense relationship between the "soundscape" (Cluster 6) cluster and the "public space" (Cluster 8) cluster, the clusters are intertwined. Through mutual assessments using NVM and Table 1, comparisons between the number of items and the occurrence of clusters can also be conducted. For example, although it has the highest number of items, the occurrence of the items in the "blindness" (Cluster 1) is lower than the "soundscape" (Cluster 6) and "virtual reality" (Cluster 2) clusters. When the TLS is examined, the "blindness" (Cluster 1) comes after the "soundscape" (Cluster 6), "virtual reality" (Cluster 2), and "perception" (Cluster 5) clusters, despite the highest number of items. Due to this feature, the more peripheral location of the "blindness" (Cluster 1) is understood in the graph (Figure 4).

The Cluster Density Visualization Map (CDVM), which displays the cluster density and inter-cluster interactions, is shown in Figure 5.

Table 1. Detailed list of items and clusters

Cluster 1			
keyword	**Occ**	**TLS**	**APY**
auditory cortex	2	4	2015,00
auditory localization	2	3	2017,00
auditory perception	5	9	2015,80
auditory system	2	5	2000,50
binaural	3	8	2015,00
blindness	7	14	2015,29
body representation	2	2	2018,50
deafness	2	2	2017,00
hearing	2	4	2011,50
perceptual dimensions	2	3	2018,00
perceptual learning	2	5	2015,00
peripersonal space	2	4	2015,00
plasticity	4	10	2008,00
psychoacoustics	2	3	2019,50
sound localization	3	8	2007,67
space perception	2	4	2008,00
spatial cognition	2	5	2016,00
spatial hearing	5	12	2016,00
tool-use	2	4	2015,00
visually impaired	5	9	2017,00
20 item			
Blindness	**58**	**118**	**2014,04**

Cluster 2			
keyword	**Occ**	**TLS**	**APY**
acoustic comfort	5	8	2021,40
acoustic environment	5	14	2019,00
archaeoacoustics	2	3	2016,50
architectural acoustics	3	4	2012,33
auralization	4	6	2019,00
church acoustics	2	3	2016,50
cultural heritage	2	3	2018,50
emotion	7	12	2018,43
gesture	3	5	2016,00
heritage acoustics	2	1	2021,00
multisensory	4	5	2016,50
parametric design	2	1	2012,00
resonance	2	2	2021,00
room acoustics	3	4	2019,67
spatial audio	2	3	2017,00
speech intelligibility	3	6	2020,67
subjective evaluation	3	3	2020,33
virtual acoustics	2	5	2016,50
virtual reality	9	19	2019,11
19 item			
Virtual reality	**65**	**107**	**2017,97**

Cluster 3			
keyword	**Occ**	**TLS**	**APY**
acoustic design	2	5	2012,00
auditory semantics	2	2	2011,50
ethnography	3	5	2022,00
experience	4	11	2017,25
grounded theory	2	2	2021,00
health	3	11	2019,67
improvisation	2	4	2019,00
indoor soundscape	4	8	2019,50
long-term care	2	6	2019,00
multimodal integration	2	1	2019,50
phenomenology	2	4	2019,50
silence	5	4	2017,20
sound perception	5	12	2018,00
sound quality	4	7	2013,75
well-being	3	7	2017,00
15 item			
sound perception	**45**	**89**	**2017,72**

Cluster 4			
keyword	**Occ**	**TLS**	**APY**
attention	4	8	2017,50
attunement	2	6	2019,50
audio-visual interaction	2	4	2019,50
everyday life	2	6	2014,50
heritage	2	4	2020,50
landscape	4	10	2017,50
landscape architecture	2	6	2018,00
memory	6	9	2016,67
place	4	6	2017,75
sensory experience	4	9	2019,75
sonic experience	3	9	2019,67
tranquillity	2	5	2017,50
urban space	10	19	2018,10
13 item			
urban space	**47**	**101**	**2018,19**

Cluster 5			
keyword	**Occ**	**TLS**	**APY**
affect	6	17	2015,83
color	2	4	2014,00
ecology	2	5	2016,50
embodiment	4	10	2015,00
perception	9	20	2019,11
performance	4	11	2015,50
politics	2	5	2017,00
semiotics	2	4	2017,00
sound-space	2	6	2022,00
space	7	18	2017,00
synesthesia	4	10	2017,75
touch	2	3	2019,00
voice	3	9	2015,00
13 item			
perception	**49**	**122**	**2016,98**

Cluster 6			
keyword	**Occ**	**TLS**	**APY**
acoustic experience	2	1	2021,50
bird sounds	2	6	2021,50
eeg	2	3	2021,50
green space	3	2	2018,33
nature	2	2	2018,00
noise annoyance	3	4	2019,00
soundscape	52	97	2018,19
soundscape assessment	4	6	2018,75
soundwalk	4	10	2017,50
traffic noise	5	13	2021,60
urban park	10	16	2018,80
urban soundscape	5	7	2019,60
12 item			
Soundscape	**94**	**167**	**2019,52**

Cluster 7			
keyword	**Occ**	**TLS**	**APY**
built environment	2	7	2022,00
covid-19	4	13	2020,75
cycling	2	7	2022,00
mobility	3	7	2013,00
noise	10	26	2017,30
noise perception	2	8	2019,50
post-occupancy evaluation	2	2	2022,50
residential satisfaction	2	2	2023,00
survey	2	8	2013,00
9 item			
Noise	**29**	**80**	**2019,23**

Cluster 8			
keyword	**Occ**	**TLS**	**APY**
ambisonics	2	5	2020,00
atmosphere	2	4	2019,00
pocket park	3	12	2020,00
public space	11	29	2019,09
quality of the urban public experience	2	9	2020,00
restoration	2	6	2020,50
soundscape design	5	21	2017,60
urban design	11	26	2018,18
urban sound planning	3	12	2017,33
9 item			
public space	**41**	**124**	**2019,08**

Continued on next page →

Table 1 (cont). Detailed list of items and clusters

Cluster 9			
keyword	**Occ**	**TLS**	**APY**
accessibility	2	2	2020,00
architecture	8	18	2015,25
art	2	4	2015,50
city	3	8	2019,33
culture	2	5	2019,00
music	9	23	2018,78
sonic environment	4	7	2020,50
sound preference	2	5	2013,50
technology	3	7	2018,00
9 item			
music	**35**	**79**	**2017,76**

Cluster 10			
keyword	**Occ**	**TLS**	**APY**
aesthetics	4	5	2018,25
anthropology	2	6	2017,00
aural architecture	3	12	2018,00
jerusalem	2	4	2013,50
listening	7	11	2015,57
sound studies	5	16	2015,00
6 item			
listening	**23**	**54**	**2016,22**

Cluster 11			
keyword	**Occ**	**TLS**	**APY**
acoustics	2	7	2015,50
design	2	9	2018,00
field recording	3	2	2016,33
museums	2	5	2021,50
sound art	6	12	2015,00
5 item			
sound art	**15**	**35**	**2017,27**

Cluster 12			
keyword	**Occ**	**TLS**	**APY**
inequality	2	2	2019,50
noise pollution	2	1	2019,50
sensory ethnography	2	2	2020,50
3 item			
inequality	**6**	**5**	**2019,83**

Cluster 13			
keyword	**Occ**	**TLS**	**APY**
bells	2	1	2014,50
sense of place	3	3	2019,67
sound	27	55	2017,63
3 item			
sound	**32**	**59**	**2017,27**

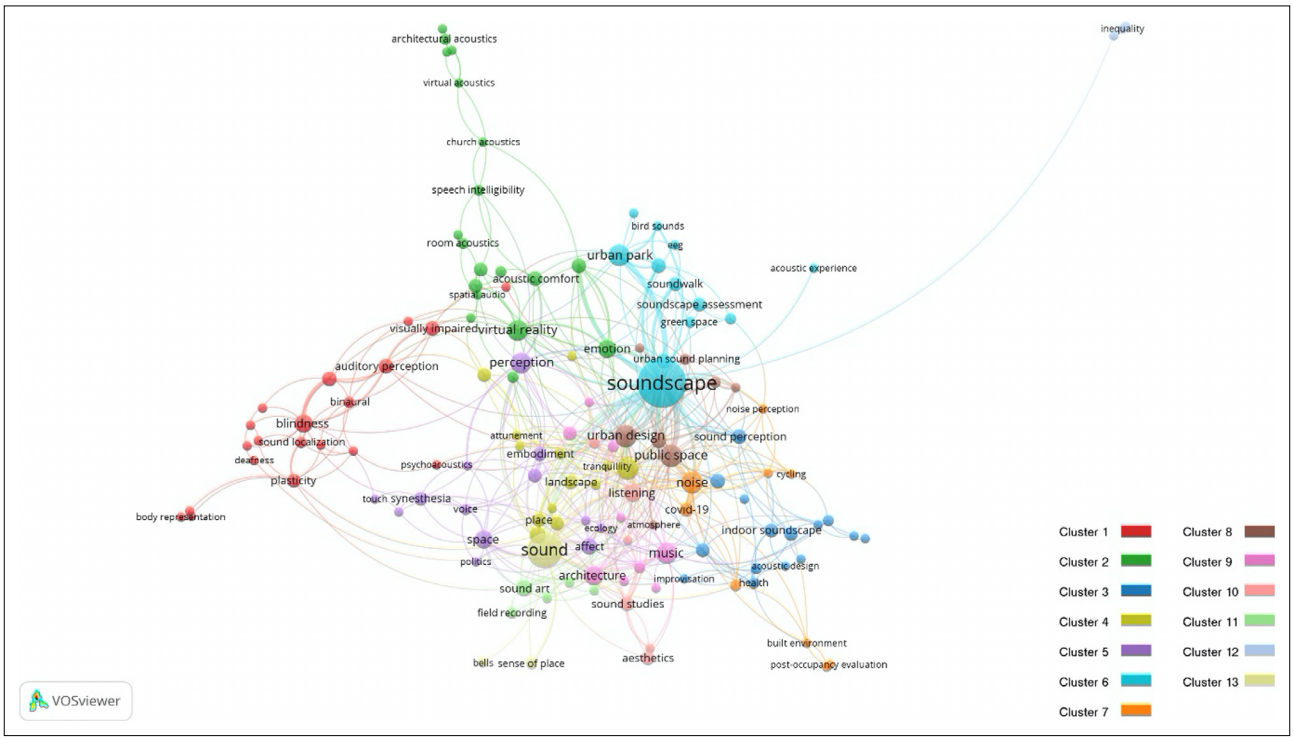

Figure 4. Network visualization map (NVM).

The "soundscape" component and the dominance of Cluster 6 can be seen clearly in the CDVM, similar to the NVM (Figure 4). As mentioned in the inferences from NVM, the location of the "blindness" (Cluster 1) at the periphery can be seen. The "virtual reality" (Cluster 2) has a weak relationship with other clusters, as can also be shown. It is evident that the "inequality" (Cluster 12) is situated entirely independently. The "urban space" (Cluster 4), "noise" (Cluster 7), "public space" (Cluster 8), "music" (Cluster 9), and "listening" (Cluster 10) clusters are in a very thick association, particularly in the center of the graph, and these clusters are mixed with one another in most of the network. On the basis of this, it can be claimed that the fields of study found inside these clusters are also interconnected.

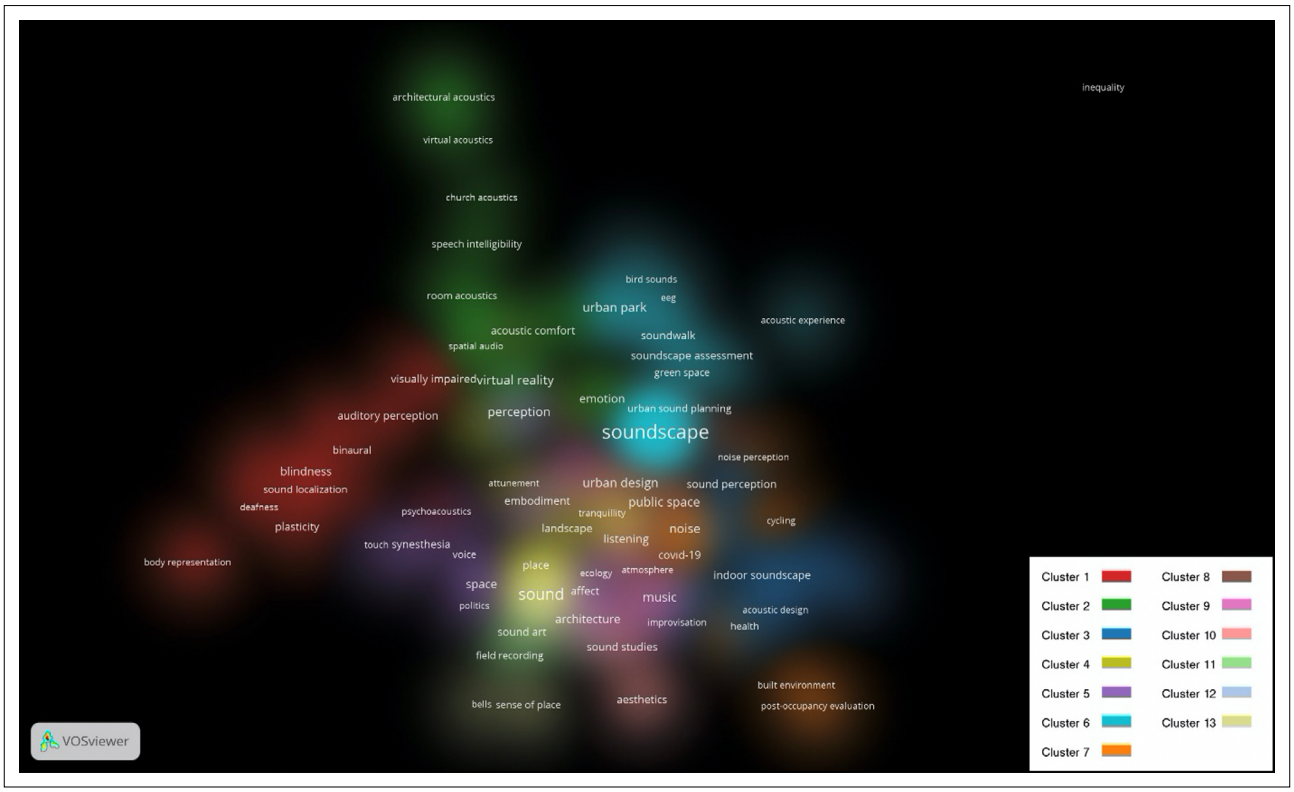

Figure 5. Cluster density visualization map (CDVM).

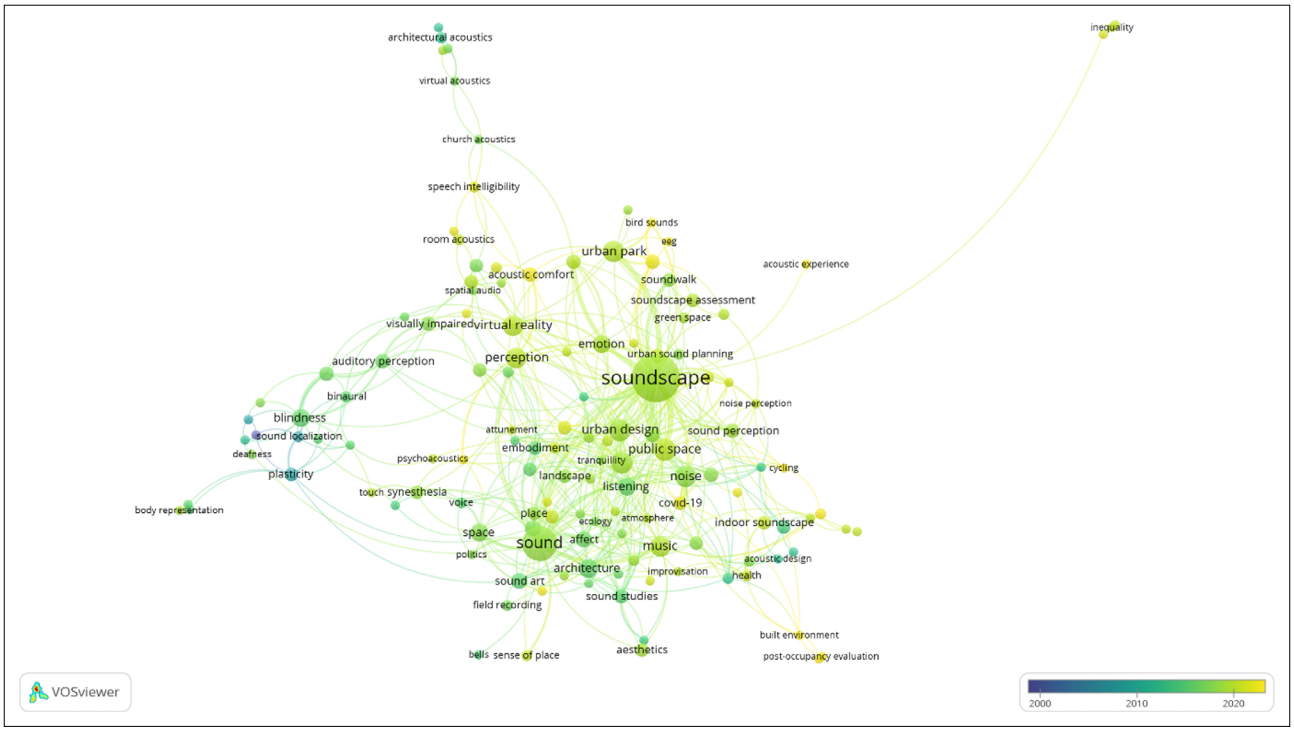

Figure 6. Overlay visualization map (OVM).

The last presented graph is the Overlay Visualization Map (OVM) (Figure 6). OVM is a version of the NVM colored according to the average publication years (APY) of items. Similar to NVM, this map also includes keywords represented by circles with occurrence value-based sizing and links with association strength-based sizing. In contrast, there is

no coloring for the clusters on this map. Each keyword is colored on the map according to the APY of the publications where it appears in the database. The legend displays this color distribution (Van Eck & Waltman, 2023) (Figure 6).

Inferences regarding the concepts' recentness can be drawn with the help of OVM. A keyword, for instance, is considered less current in the field if it has a low occurrence value and an older APY. A keyword that has a high occurrence value and a recent APY, however, is considered to be quite contemporary. Additionally, a keyword with a low occurrence value and a recent APY is likely an idea that is still being researched in the field and could be a potential field for expansion.

According to OVM, the keywords retrieved through systematic analysis have, on average, been in the database since 2000 and some of the elements are still effective today. The APY value for publications containing the keyword "soundscape" is 2018.19, for instance. This result demonstrates that the keyword "soundscape" is often used in the database and has recently grown in importance as a field of study. Another example of the inferences is the "auditory system"'s occurrence value is 2, the TLS value is 5, and the APY is 2000.50. These results indicate that this keyword was only used in the database's initial years and wasn't used subsequently. As a result, the keyword has a low level of currentness. Conversely, the keyword “traffic noise” has an occurrence value of 5, a TLS value of 13, and an APY value of 2021.60. These findings indicate that "traffic noise" is a more recent concept than "auditory system" and represents a potential field for database progress. Within OVM, similar to the keyword “traffic noise”; “cycling” (Occ: 2, TLS: 7, APY: 2022), “EEG” (Occ: 2, TLS: 3, APY: 2021.50), and “museums” (Occ: 2, TLS: 5, APY: 2021.50) keywords can be considered as current and potential areas of progress (Figure 6).

The OVM graph does not directly provide information about clusters. To make inferences about clusters, the arithmetic mean of APY values of all keywords in a cluster was calculated by the author. Accordingly, it was seen that the cluster with the oldest APY was "blindness" (Cluster 1; APY: 2014.04). This is followed by “listening” (Cluster 10, APY: 2016.22) and “perception” (Cluster 5, APY: 2016.98). The cluster with the most recent APY in the field is "inequality" (Cluster 12, APY: 2019.83). Following this cluster, “soundscape” (Cluster 6, APY: 2019.52) and “noise” (Cluster 7, APY: 2019.23) appear respectively (Figure 6, Table 1).

DISCUSSION

Evaluation of Themes

In the third section, binary inferences were drawn about both the items and the clusters based on the evaluation of Figures 4, 5, 6, and Table 1. In order to gain comprehensive results, it would be helpful to discuss all of these data at once, especially in regard to the themes.

First, it can be shown from Figures 4, 5 and Table 1 that "soundscape" (Cluster 6; Occ: 94, TLS: 167) has the highest values for total occurrence and TLS out of all the themes. With the help of this information, it is simple to conclude that “soundscape” is covered in the majority of database research and has the strongest connections to all other fields. The "soundscape" has emerged as the most popular and up-to-date theme within the research field, when these data are evaluated along with the APY. In particular, with the recent APY (2019.52), occurrence (Occ: 94), and TLS (167) values, it is clear that this theme has become increasingly important. With all of these characteristics, it is possible to say that the "soundscape" theme will continue to have an effect as a prospective theme within the field and will be a potential area for further research with new concepts it will be associated with.

The "blindness" theme is identified as a significant theme in terms of its occurrence and TLS within the field (Cluster 1; Occ: 58, TLS: 118). The theme has a diverse range of studies, as was seen when the APY values were evaluated (e.g. "auditory system," APY: 2000.50; "psychoacoustics," APY: 2019.50), but it is less included in the database than in previous years (total APY: 2014.04). Consequently, it can be claimed that its popularity has dropped.

The evaluation of the "virtual reality" theme reveals that it is significant in terms of occurrence and TLS (Cluster 2; Occ: 65, TLS: 107), and that it is still relevant to the items it contains in terms of the APY value (APY: 2017.97). It is one of the field's key themes, especially given that it involves features connected to architectural acoustics.

Examining the "perception" theme reveals that it has a TLS value that is significantly higher than the value of occurrence (Occ: 49, TLS: 122). This can be explained by the items' prevalence, and it is also seen in the theme's centrality in the NVM and CDVM graphics (Figures 4, 5). It is clear that the theme has a wide distribution when considered with the APY value (APY: 2016.98). Examining the "public space" and "urban space" themes reveals how closely related their occurrence and TLS values are to the "perception" theme and how centric their graphic placements are as well. On the other hand, it might be claimed that the themes are more current because their APY values ("public space": 2019.08; "urban space": 2018.19).

The "sound perception" theme is ranked in the middle in terms of total occurrence and TLS when it is examined (Cluster 3; Occ: 45, TLS: 89). In terms of its graphic position and connections, it can be noticed that it has a closer connection to the "soundscape" theme than it does to the others (Figure 5). When compared according to APY

(2017.72), it can be said that it has an average value.

When the "music" and "noise" themes are compared, it can be seen that they have similar TLS values, occurrence rates, and graphic positions (Figure 5). It is clear from APY values that the "noise" theme is one of the field's most recent themes, whereas the "music" theme has a declining value (Table 1).

Although "sound," "listening," and "sound art" are perceived as lower-ranking themes in terms of occurrences and TLS values, this is understandable given the low number of items. These themes also have similar features in terms of APY values.

The "inequality" theme's characteristics, which make it seem to be the weakest theme with occurrence value, TLS value, and graphic position in the database, can be explained by the fact that it has the newest APY value (APY: 2019.83). These characteristics suggest that this theme might be an exciting potential for progress in the field. The relationships, degree of use, and relevance of the concepts and themes that emerged within the study field were made clear through the analyses. The result of the research included an analysis of these, looking at their linkages, present status, and occurrence in the literature. Findings concerning the studied area's current state and predictions about future changes were drawn by this analysis.

A future study will see that the most important concept and theme in the field is “soundscape.” In line with the results of the study, it will be seen how the concepts and themes to be investigated are included in the literature, which concepts are more closely associated with previous studies—and which are less associated or not. Future researchers will be able to narrow the focus of their research using the knowledge they gain about lesser-known concepts and themes in the field. For instance, researchers who study "traffic noise" will discover that this concept occurs five times in the research field and is linked to nine other concepts 13 times (“acoustic comfort”: 1, “acoustic environment”: 1, “bird sounds”: 2, “noise annoyance”: 1, “soundscape”: 3, “soundscape assessment”: 1, “urban park”: 2, “perception”: 1, “public space”: 1). They will find that the concept has an APY value of 2021.60 and is still current in the field. They will be able to evaluate how the concept is located in the "soundscape" theme and how it relates to other components. For example, it can be inferred that a study to be carried out by including the keyword "EEG," which is within the same theme but is not directly related, may be a potential topic. For each of the 136 concepts and 13 themes found in the study, similar conclusions can be drawn. Regarding these aspects, it is believed that the data from the study made a special contribution to the advancement of the field.

EVALUATION AND CONCLUSION

Using bibliometric analysis methodologies, a comprehensive and systematic assessment of the literature was carried out for the study, with an emphasis on the auditory experience processes of the space. The purpose of this review was to define the key concepts that emerged in the literature on sound and space experience studies as well as the themes that arose from their combination.

First, descriptive information about the documents gathered after the systematic scanning process is presented. As a result, it has been noted that there is a general upward trend in the field of study. VOSviewer software was used to perform co-occurrence and co-keyword analyses on the documents. As a result, 136 final keywords have emerged as widely used basic concepts in the field of study. All data related to these concepts have been digitized and presented with detailed tables and graphs.

Then, the concepts were categorized according to their occurrence, and the connections between them were determined according to their association strength. With the clustering algorithm, these concepts were divided into clusters, and thematic areas in the study field were determined. Thirteen themes were identified in this regard: blindness, virtual reality, sound perception, urban space, perception, soundscape, noise, public space, music, listening, sound art, inequality, and sound.

To determine which thematic areas were concentrated in the studies and which areas were new and open to research, mutual evaluations were conducted with all the data acquired throughout this procedure. According to these evaluations:

- It turned out that "soundscape" was the most effective concept that emerged in the field of study. The concept of soundscape appears to be dominant, both in terms of frequency of occurrence and the total link strength with others. However, soundscape also has a current date among all concepts in terms of the average publication year. Therefore, it can be clearly said that its impact will continue in future studies within the field.
- After the "soundscape" concept, it was revealed that the concepts of "sound," "public space," "urban design," and "noise" were the other most common concepts in the study area, respectively.
- In studies, the concept of "soundscape" is most frequently associated with the concepts of "urban park" and "public space." From this perspective, it is apparent that these concepts are frequently studied as research subjects together.
- It appears that "inequality" and "sensory ethnography" are the concepts with the weakest connection to the field of study. It may be argued that the term "senso-

ry ethnography" is relatively new to the field of study, particularly considering how recently the average publishing year has occurred. It follows that this might be a possible subject for future research in the field.

- Examining the thirteen themes that emerged from the study, it is discovered that the "soundscape" theme is the most prevalent. The average publication year value of the items included in the soundscape theme is also quite up-to-date compared to other themes. Consequently, it is evident that the thematic area's dominance and the concepts it contains will persist into the future of this field of study.
- It seems that the concept of "traffic noise" is the most current concept within the soundscape theme. As a result, it is evident that recent research has focused on this idea within the theme and that it will continue to influence subsequent research.
- Other themes that emerged after the soundscape theme are listed according to their prevalence as blindness, virtual reality, perception, public space, urban space, sound perception, music, noise, sound, listening, sound art, and inequality. Evaluations related to these themes are also presented.
- The theme of "inequality" has emerged as the most recent and least prevalent theme in the field of study. Given how current it is and the limited amount of existing research, this theme area may prove to be an intriguing topic for future investigation within the field of study.

The results presented above can be extended for all key concepts and themes, along with the outcomes provided by the research. The study enabled the identification of important concepts and themes in the field regarding the sound and spatial experience framework, revealed trends in the field, and contributed to the discovery of new related research areas. Consequently, a future study using this document will be able to rapidly assess how the concepts or themes coming under its scope are covered in the literature, which concepts or themes are more closely related, and which are less closely correlated. In addition, researchers will have the opportunity to gain knowledge about potential progress areas in the field and deepen their research.

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Article

Predicting the urban sound environment pleasantness with the soundscape approach by fuzzy SMRGT method: A case study in Diyarbakır Suriçi

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ABSTRACT

In the soundscape approach, environmental sounds are not considered noise, but as a source and as a component of the spatial planning and design process. It is necessary to evaluate the soundscape in urban spaces in a multifaceted and holistic manner, together with many factors such as physical, social, cultural, psychological, architectural, and so on. In this study, it is aimed to develop an estimation model that will allow the stages that take a long time to progress faster and more systematically in the multifaceted evaluation of the sound environment pleasantness levels of the users in urban spaces with the soundscape approach. For the model's quantitative data, sound quality metrics (loudness, sharpness, roughness) obtained from binaural sound recordings were used. The fuzzy logic estimation model is constructed by using Simple Membership Functions and the Fuzzy Rules Generation Technique (SMRGT) method, considering the characteristics of users and the survey area. In the model, it was possible to convey user experiences, and a simple approach that could be expressed numerically and understood was obtained with the fiction created with verbal concepts. Flexibility is allowed to diversify quantitative and qualitative metrics. The model has been tested with the case study performed with the users. As a result of the study, a close relationship was determined between the model outputs and the subjective data of the users. The efficiency ratios of other variables (age, gender, reasons for coming to the region, frequency of visit, duration of stay) belonging to users not included in the model were also determined. In this study, it has been revealed that the level of pleasantness of the sound environment in urban spaces should be evaluated not only in terms of quantitative data but also on the characteristics of the spaces and users.

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INTRODUCTION

One of the most important conditions for ensuring the acoustic comfort of the users in indoor or outdoor spaces is that they are free of disturbing and unwanted sounds (noise). In many studies (Alves et al., 2015; Asdrubali, 2014; Andringa et al., 2013; Maffei, 2008), it has been emphasized that the noise reduction intended for noise control, which focuses on environmental noise policies (Commission to The European Parliament and The Council, 2002; WHO,

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1999), is not sufficient to improve the quality of life in urban areas and to ensure acoustic comfort. In research, it has been shown that how noise affects people is not consistent with expectations. Therefore, the soundscape approach has emerged in urban acoustic comfort. The term soundscape was first used by urban planner Southworth in 1969 to indicate the acoustic characteristics of cities (Pijanowski et al., 2011), and Schafer (1977) formalized the term "soundscape" as the "auditory properties of landscapes." In ISO 12913-1 (International Organization for Standardization, 2014), soundscape is defined as "acoustic environment as perceived or experienced and/or understood by a person or people, in context." In the beginning, the first soundscape concept was encountered in music and acoustic ecology studies, and it became widespread in other disciplines. In the auditory landscaping studies that started in the late 1960s, the first articles began to be seen in 1999 (Davies, 2013), and in the last 15 years, there has been a significant increase, and many important projects and works have been carried out worldwide (Kang et al., 2016). Extensive data have been obtained in different cultures, from small areas to large cities, from closed, semi-closed to urban open areas.

This soundscape research represents a paradigm shift from noise control policies towards a new multidisciplinary approach. Environmental sounds are not considered as noise but as a resource and as a component of the spatial planning and design process. In studies beginning with questioning the meaning of the soundscape, the context involves not only physical measurements but also the cooperation of humanities and social sciences to account for the diversity of soundscapes across countries and cultures, with more focus on how people actually experience the acoustic environments. In urban spaces, it is necessary to evaluate the soundscape with many factors such as physical, social, cultural, psychological, architectural, and many other factors. Studies should be conducted taking into account both positive and negative sound sources; thus, a different perspective can be developed by combining the methods obtained from various disciplines on human perception of the soundscape. There have been researches on this subject which were developed by a wide range of academic disciplines, and many different methods were applied to them over time.

In the studies related to the soundscape, many methods are used in the objective evaluation of the sound environment or in determining the user perception. In these methods, it is seen that artificial intelligence techniques have been used in acoustics and especially in soundscape as in many scientific fields in recent years. Yu, Kang, & Harrison (2007) developed prediction models using artificial neural networks (ANN) and ordinal logistic regression (OLR) techniques for soundscape evaluations in urban areas. Yu & Kang (2009) have statistically analyzed the data obtained in urban open spaces with physical, social, behavioral, demographic, and psychological characteristics for soundscape evaluations. Artificial Neural Network (ANN) was used for modeling, and it was stated that models based on individual field studies were functioning better and special models suitable for various regions and functions could be reliable. In the study conducted by Yu & Kang in 2010, different kinds of sounds such as nature, human, mechanical, and industrial sounds were taken into consideration and included in the evaluation as factors affecting sound preferences. The results of the study are intended to provide data for soundscape prediction modeling using the artificial neural network technique. Yu (2009) stated that, based on the ANN model, soundscape maps could be produced, and Torija et al. (2014) tried to create the soundscape classification model with Support Vector Machines (SVM). Maristany et al, (2016) used fuzzy logic to analyze the soundscape quality of urban areas.

Scientific and practical guidance on soundscape needs to be provided rapidly and systematically. For this reason, different methods have been developed and diversified in recent years; especially computer simulation and artificial intelligence techniques have been used in studies. In the literature, soundscape studies with artificial intelligence applications are quite limited. The application techniques of artificial intelligence used in many fields of science and also in the field of soundscape should be increased.

The purpose of this study, which is based on the point mentioned above, is to develop an estimation model that will enable the users to progress in a faster and more systematic way to determine the level of pleasantness of the users in the urban areas by using the soundscape approach. This work aims to:

- increase the diversity of research on soundscape,
- contribute to the assessment of the urban spaces soundscape,
- provide a systematic conduct of long-time processes of soundscape by using the fuzzy logic technique of artificial intelligence.

METHODS

This study, which aims to estimate the sound environment pleasantness levels of users in urban spaces with fuzzy logic, was carried out in the Diyarbakır Suriçi region. The study was carried out in two phases. In the first phase, using the quantitative data and subjective evaluations, the predictive model of the users' sound environment pleasantness level in urban spaces was formed by Simple Membership Functions and the Fuzzy Rules Generation Technique (SMRGT) (Toprak, 2009). In the second phase, the model was applied and its accuracy tested. For the quantitative data to be used

in the model, loudness, sharpness, and roughness were used as the sound quality metrics that are effective in the perception of the sound environment of the users (Çakır Aydın & Yılmaz, 2016).

Quantitative data of the sound quality metrics are needed for the prediction model. In the field study, binaural sound recordings were made with reference to the ISO 12913-2 (International Organization for Standardization, 2018) in order to obtain quantitative data of the sound quality metrics. In order to determine the area where sound recordings should be made in the study, sound walks were held in many places in the city center of Diyarbakır. The Suriçi region of Diyarbakır has been identified as the region to be studied with the impressions obtained from these walks. Due to the availability of this area at an accessible location, living with cultural, social, commercial, and recreational activities, having the original architecture on a large scale, not only traffic or human sounds, but also various sound sources including soundmarks belonging to the region, this field has been chosen as the study area.

Sound sources in the region are identified through interviews with users and sound walks held on weekdays and weekends, and the points and routes where sound recordings will be made are determined (Figure 1).

Binaural sound recordings were performed on weekdays (5 days) and on weekends (Saturdays) so that the sound recordings can give detailed information about the general sound environment of the region. Recordings were made between 07:30-09:00 in the morning, 12:00-13:30 at noon, and 17:00-18:30 in the evening when the users frequently use the area. Binaural sound recordings were made using the Brüel & Kjær 2270-A-D00 and the Brüel & Kjær 4101. The calibration of the microphone set was done with the B & K 4231 before each sound recording. Then, binaural sound recordings were made at the specified routes and points. The calibration of the microphone set was repeated when each sound recording was completed. The duration of the sound recordings varied from 5 minutes to 10 minutes, which can reflect the sound environment of the area.

Model

The flow chart in Figure 2 was followed for the prediction model. The operations of the dependent and independent variables were performed, membership functions were created, fuzzy inference was made with rules, and then the system was established by obtaining the output with the defuzzification.

Input: Includes dependent/independent variables of the model and all data about them. The dependent variable was determined, and independent variables affecting dependent variables were determined. The independent variables are inputs, whereas the dependent variable is the output of the fuzzy system. The independent variables of the study consist of the sound quality metrics of loudness, sharpness, and roughness. The pleasantness level of the users' perception of urban sound environments was indicated as the dependent variable of the study.

Figure 1. The points and the routes where sound recordings were made.

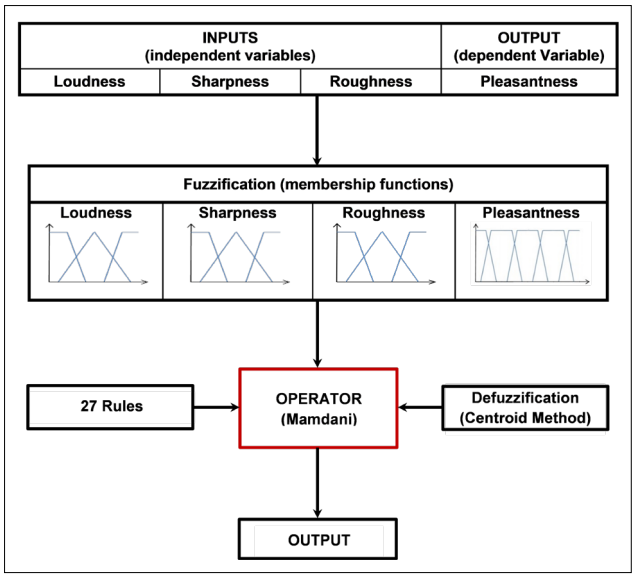

Figure 2. Flow chart for fuzzy SMRGT.

Fuzzification: This step is the phase in which the input information from the fuzzy system and the data from the database are converted into linguistic qualifier values. The linguistic qualifiers to be used for the sound quality metrics in the model were defined as low, medium, and high membership functions. The pleasantness of the users' perception of the urban sound environments was determined as the membership functions of 1, 2, 3, 4, 5 on the Likert scale.

Rules: Depending on the variables in the input parameters, it contains all of the rules that can be typed if-then. In this study, 27 rules were established.

Fuzzy inference: It is an expression obtained by applying fuzzy logic to fuzzy rules (Zadeh, 1996). In this study, the prediction model was constructed using the "Mamdani" fuzzy inference method.

Defuzzification: It is the process of transforming blurred information into a numerical value (Elmas, 2011). In the model, the centroid method was used for defuzzification.

Output: In the last stage of the fuzzy logic system, the dependent variable obtained as a result of the interaction with the information and fuzzy rule bases through the fuzzy inference is determined (Uygunoğlu & Yurtcu, 2006). In this study, the model is prepared by using the Fuzzy Logic tool in MATLAB software. Independent variables, dependent variables, and fuzzy clusters, membership forms, and membership functions were determined, and output data was obtained by creating rules.

For input data, the number and form of membership functions, and the lowest and highest quantitative data of loudness, sharpness, and roughness were determined for the independent variables. The quantitative values of the binaural sound recordings made in the study area have been calculated using PULSE Reflex for the values of loudness, sharpness, and roughness. In the model, for each of the loudness, sharpness, and roughness metrics, fuzzification was performed, and metrics were transformed into low, medium, and high linguistic qualifiers, resulting in three membership functions. In this study, trapezium shapes were chosen for low and high values of membership functions and triangular shapes for medium values. The trapezium was used because when the quantitative values of the metrics go below the lowest value or when the highest value goes up further, there is no change in input. For the intermediate values, triangles were chosen for the medium values of the membership functions since the output could change.

The unit width (*UW*), core value (*Ci*), and key values (*Ki*) of the fuzzy clusters for each sound quality metric created for the prediction model were determined (Toprak, 2009) (Figure 3).

The number of fuzzy clusters of the level of pleasantness that constitutes the output of the estimation model (dependent variable) is composed of 5 clusters. Therefore, the lowest value of the fuzzy clusters is 1 and the highest value is 5. The calculation method used to obtain quantitative data of the independent variables was also used for the fuzzy clusters of the dependent variable. In the forms of the membership functions, the trapezoidal shape is used to reduce fuzziness and to draw the result to an integer (Figure 4).

It is necessary to determine the number of rules of the model to be created with fuzzy logic in order to estimate the users' pleasantness levels in the urban environment.

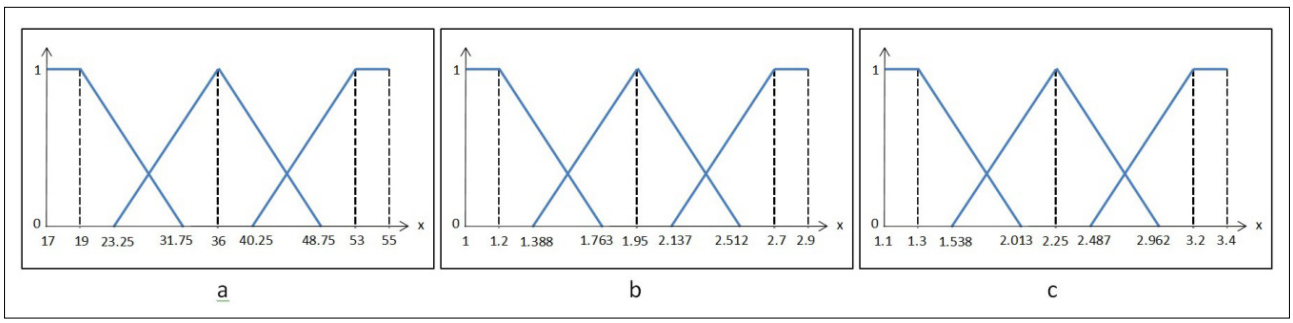

Figure 3. Quantitative values of membership functions a) Loudness, b) Sharpness, c) Roughness

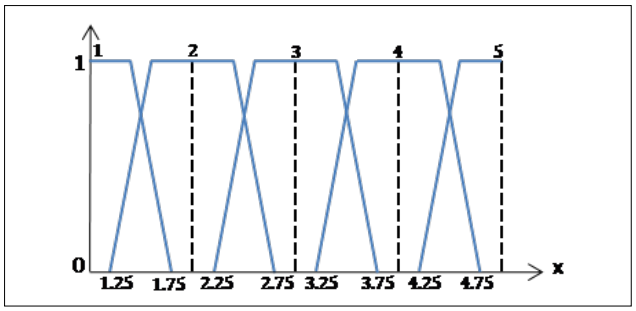

Figure 4. Values calculated for the membership functions of the output.

The number of independent variables and the number of fuzzy clusters per independent variable determine the number of rules. When the fuzzy clusters of low, medium, and high quantitative values of the independent variables formed by the loudness, sharpness, and roughness metrics are considered, 27 different possibilities occur. Therefore, 27 different rules have been established for the model. Many sources can be used in fuzzy logic when creating rules. The rules are formed by data obtained from literature information, experiences, and deterministic methods.

In this study, the independent variables consist of sound quality metrics: loudness, sharpness, and roughness. As the quantitative values of sound quality metrics increase, it is known that users' sound environment pleasantness levels decrease (Zwicker & Fastl, 1999). It is necessary to know the correlation between the three metrics and the level of pleasantness in order to determine the ratios at which these metrics affect the level of pleasantness of the users. At this stage, the results of the previous study were used (Çakır Aydın & Yılmaz, 2016). In the model, it is not enough to create rules according to the correlations between the sound environment pleasantness levels of the users and the sound quality metrics. Although the comparisons made

Table 1. Fuzzy logic rules

Rule 1	If	loudness	low	and	sharpness	low	and	roughness	then	pleasantness	5
Rule 2	If	loudness	low	and	sharpness	low	and	roughness	then	pleasantness	5
Rule 3	If	loudness	low	and	sharpness	low	and	roughness	then	pleasantness	4
Rule 4	If	loudness	low	and	sharpness	medium	and	roughness	then	pleasantness	4
Rule 5	If	loudness	low	and	sharpness	medium	and	roughness	then	pleasantness	4
Rule 6	If	loudness	low	and	sharpness	medium	and	roughness	then	pleasantness	3
Rule 7	If	loudness	low	and	sharpness	high	and	roughness	then	pleasantness	3
Rule 8	If	loudness	low	and	sharpness	high	and	roughness	then	pleasantness	3
Rule 9	If	loudness	low	and	sharpness	high	and	roughness	then	pleasantness	3
Rule 10	If	loudness	medium	and	sharpness	low	and	roughness	then	pleasantness	4
Rule 11	If	loudness	medium	and	sharpness	low	and	roughness	then	pleasantness	4
Rule 12	If	loudness	medium	and	sharpness	low	and	roughness	then	pleasantness	3
Rule 13	If	loudness	medium	and	sharpness	medium	and	roughness	then	pleasantness	3
Rule 14	If	loudness	medium	and	sharpness	medium	and	roughness	then	pleasantness	3
Rule 15	If	loudness	medium	and	sharpness	medium	and	roughness	then	pleasantness	3
Rule 16	If	loudness	medium	and	sharpness	high	and	roughness	then	pleasantness	2
Rule 17	If	loudness	medium	and	sharpness	high	and	roughness	then	pleasantness	2
Rule 18	If	loudness	medium	and	sharpness	high	and	roughness	then	pleasantness	2
Rule 19	If	loudness	high	and	sharpness	low	and	roughness	then	pleasantness	3
Rule 20	If	loudness	high	and	sharpness	low	and	roughness	then	pleasantness	3
Rule 21	If	loudness	high	and	sharpness	low	and	roughness	then	pleasantness	3
Rule 22	If	loudness	high	and	sharpness	medium	and	roughness	then	pleasantness	3
Rule 23	If	loudness	high	and	sharpness	medium	and	roughness	then	pleasantness	2
Rule 24	If	loudness	high	and	sharpness	medium	and	roughness	then	pleasantness	2
Rule 25	If	loudness	high	and	sharpness	high	and	roughness	then	pleasantness	2
Rule 26	If	loudness	high	and	sharpness	high	and	roughness	then	pleasantness	1
Rule 27	If	loudness	high	and	sharpness	high	and	roughness	then	pleasantness	1

in this way have meaning, they do not show the success of the model alone. Together with the correlation coefficient, more criteria should be considered. In this study, in addition to the effect of each metric on the level of pleasantness perceived by the users, the studies in the literature related to the sound environment have also been utilized. The views and experiences of the people who have done similar studies have been utilized. In addition, considering the historical, architectural, and socio-cultural structure of the region, 27 rules were written for the model prepared with fuzzy logic (Table 1). The weight of each input in the model was 1 when creating the rules.

The output data of the model can be obtained after the input created by the dependent and independent variables and the rules that create the interaction between them. In the model, the quantitative values of the loudness, sharpness, and roughness sound quality metrics of a sound recording can be written as input data, and the sound environment pleasantness levels of the users for urban spaces can be estimated. Figure 5 shows the output value of the system in response to the quantitative values of the sound quality metrics loudness, sharpness, and roughness.

The effect of sharpness and loudness metrics on the level of pleasantness is distributed evenly (Figure 6). The level of pleasantness decreases as the quantitative values of both metrics increase; pleasantness level increases with the decrease of quantitative values.

The effect of roughness on the level of pleasantness is lower than that of loudness (Figure 7). There is no significant decrease in pleasantness level, even if roughness is high, in cases where loudness is low.

Sharpness is more effective on the level of pleasantness in the changes that occur in the quantitative data of sharpness and roughness (Figure 8). Even if the quantitative value of roughness is low, the level of pleasantness is low if the quantitative value of sharpness is high. If sharpness is low and roughness is high, the decrease in the level of pleasantness is not significant.

Model Implementation and Test

For the application of the model, quantitative data of the loudness, sharpness, and roughness metrics were obtained from the binaural sound recordings performed in the study area. These data were transferred to the model prepared to estimate the users' sound environment pleasantness levels. Output data were obtained by processing the quantitative values of loudness, sharpness, and roughness metrics in the input data in the model. Thus, the sound environment pleasantness levels of the users in the study area can be estimated. Unlike the study of Maristany et al. (2016), in this paper, the model was tested in order to compare the data with the actual data after the implementation of the model.

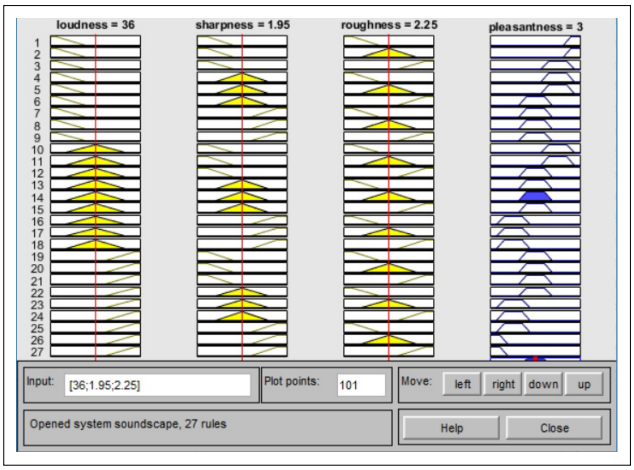

Figure 5. Graphical view of output value generated by rules.

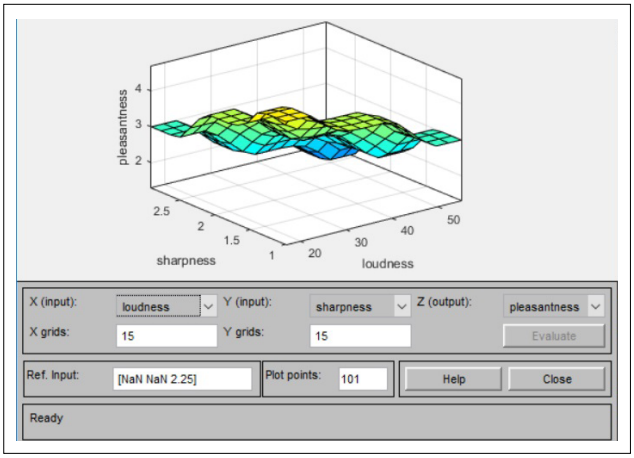

Figure 6. Surface viewer of pleasantness-sharpness-loudness viewer.

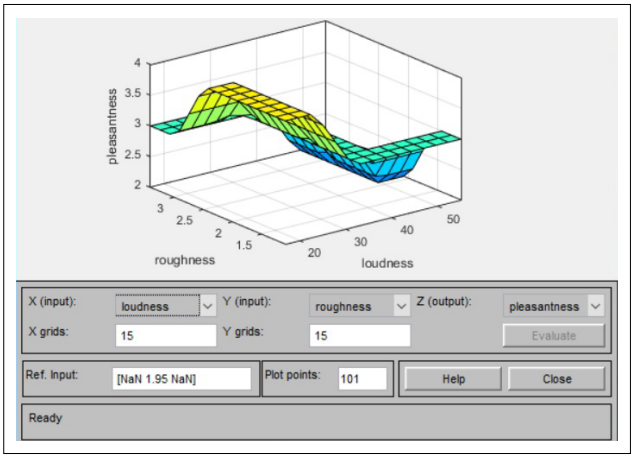

Figure 7. Surface viewer of pleasantness-roughness-loudness.

In the model test, simultaneous surveys were performed while making binaural sound recordings in the study area. The survey was conducted with 390 participants. In many studies in the literature, it was observed that factors such

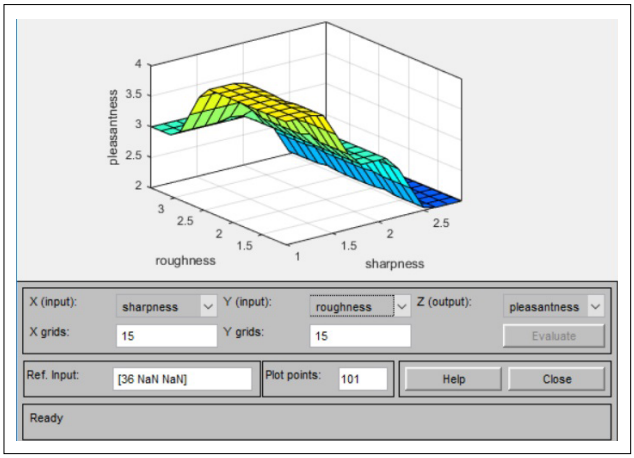

Figure 8. Surface viewer of pleasantness-roughness-sharpness.

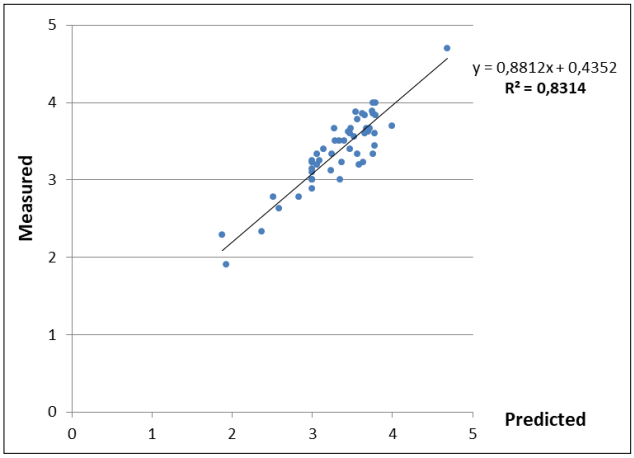

Figure 9. Relationship between the predicted and measured pleasantness level (1-not pleasant at all, 5-very pleasant).

as gender, demographic characteristics, education levels, physiological, sociological, and psychological factors, usage area, and duration of the users were effective in changing their perceptions about the sound environment (Yu & Kang, 2010; Yu & Kang, 2014; Tse et al., 2012; Kang, 2010). Therefore, in the questionnaire applied for the model, participants were asked about their gender, age, education levels, reasons for coming to the field, frequency of arrivals, and time in the area.

Participants were offered options to choose from 1 to 5 for the sound environment pleasantness levels (1: not pleasant at all, 5: very pleasant). Some factors are listed considering the characteristics of the region, as many factors other than sound sources in the perception of the sound environment of urban spaces can affect the choice of pleasant level. In this part of the questionnaire, participants were asked to rank seven factors (sound sources, historical texture, architectural structure, landscape, social structure, commercial structure, touristic value) between 1 and 7, which could affect their pleasant levels.

RESULTS

At the testing stage of the study, Pearson correlation coefficients between the measured (survey study) data and predicted data (SMRGT) were calculated. The regression line was formed between the two data groups and the coefficient of determination was calculated. The Pearson correlation coefficient was 0.91 among the data obtained from the survey conducted in the field with the pleasantness levels of the users about the sound environment predicted by SMRGT. As shown in Figure 9, $R^2 = 0.8314$ was obtained in reliability level. According to Rubin (2013) and Jackson (2014), a correlation of 0.90 and above is statistically significant (Rubin, 2013; Jackson, 2014).

In the model generated by SMRGT, the coefficient of determination (R^2) is 0.8314. This coefficient shows that about 83% of the total changes in the dependent variable are explained by the independent variables. The 1-R^2 value (about 17%) refers to the part described by other independent variables not included in the model generated by SMRGT. In order to determine the parameters affecting approximately 17% of the study, the results of the survey conducted simultaneously with the sound recordings were used in the study area (Table 2).

As a result of the questionnaire applied to the participants, the effect of their gender on the change in pleasantness level is 17%. This study showed that the effect of participants' ages on pleasantness level changes was approximately 24%. It is understood that as the age of the participants increases, the pleasantness levels of the sound environment increase. It was determined that the effect of the level of education on the change in pleasantness level was approximately 34%. It was observed that the reasons for the participants' arrival in the field were about 43% effective in changing the pleasantness level. Employees in the region were negatively affected by the sound environment, and the majority of the participants (31.8%) preferred '1' level of pleasantness. The participants (35.7%) who visited the area to visit and the participants (40%) who relaxed in the area considered the sound environment '4'. When the effect of the arrival frequency of the participants on the change in

Table 2. Effect rates of other independent variables not included in the model

	Chi-Square	p	phi
Gender	11,596	0,021	0,172
Age	22,348	0,004	0,239
Education	44,460	0,000	0,338
Reason for coming	72,704	0,000	0,432
Frequency of arrival	68,352	0,000	0,419
Duration of stay	47,708	0,000	0,350

the pleasantness level was examined, it was determined that there was an effect of about 42%. Thirty-five percent of those who come to the field every day have chosen '1' as the sound environment pleasantness level. Considering the participants who visited the study area several times a year, several times a month, and several times a week, it was observed that the majority of all three groups preferred the sound environment pleasantness level '4'. As a result of the analyses, it was found that the duration of stay of the participants was 35% effective in the change in pleasantness levels. The majority (26.9%) of those who spent 6 hours or more in the field preferred the '1' option as the level of pleasantness.

CONCLUSION AND FUTURE WORK

In this study, a model has been developed in urban areas to predict the sound environment pleasantness levels of users. For this model proposal, artificial intelligence techniques, which are frequently used in prediction models, have been examined in recent years, and a fuzzy logic prediction model has been formed by the SMRGT method. With the testing of the model, it has been demonstrated that the sound environment pleasantness level in urban spaces should be evaluated not only with quantitative data, but also with the historical, architectural, social, and cultural characteristics of the spaces as well as the demographic structure of the users, and the reasons, duration, and frequencies of using spaces. This study shows that the results can be improved by reflecting the spatial and user characteristics together with the quantitative data.

The perception of the countries, regions, societies, and cultures of the soundscape is different from each other. Therefore, the adaptation of studies for a region to other regions may not give accurate results. In this study with fuzzy logic, the characteristics of different societies, regions, and cultures can be reflected in the model. The model to be created can be used for places with different characteristics. In addition, the model has the ability to be developed by recycling.

This study aims to expand the concept of the soundscape and to develop it using new models. To achieve this, a prediction model has been created as an alternative to traditional statistical calculation methods. This model allows for the transmission of both quantitative data and experiential information. Conclusions can be drawn using a straightforward approach that incorporates verbal concepts, which can subsequently be expressed numerically. As a result, this study enhances the flexibility and diversification of both quantitative and qualitative metrics in soundscape research, thereby increasing the diversity of research on soundscape.

It is a time-consuming and laborious process to measure the perception of the soundscape of urban spaces. This model suggestion will allow the long-term stages to evaluate the acoustic comfort of urban spaces in a faster and more systematic way.

In the prediction model studies to determine the sound environment pleasantness levels of the users in the soundscape, the results will be more successful with the development of the models which include the data of the cities and the users with the characteristics of the users with the diversification of the quantitative data. In such studies, analysis of experimental sound data should be developed and interdisciplinary studies should be given importance.

Moreover, this study has provided a valuable contribution to the assessment of the urban sound environment by employing the soundscape approach to evaluate the Diyarbakır Suriçi region. Additionally, sound sources within this area were meticulously recorded and archived, enriching the available data for further analysis and research in the field of urban soundscape.

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Article

Learning from Swindon Railway Town: A Comparative Study with Alsancak Railway Campus

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ABSTRACT

The railway system, considered an industrial heritage today, emerged in England as a means of transportation and spread rapidly worldwide in the second quarter of the nineteenth century. As in other industrial building types, the advancement of technology and the emergence of new systems for railway structures have been a threat; since the twentieth century's latter half, many railways in the industrial and mining areas have been closed, and the disused buildings have faced the risk of rapid extinction. The deliberate destruction of railway structures in the 1960s, symbolized by the demolition of the Euston Arch in England, started the debate on railway heritage, first in England and then in the world. This study focuses on Swindon Railway Town, a highly significant industrial settlement of its era in England, as an exemplar of railway heritage conservation due to preservation efforts since the 1980s, including various restoration and reused railway buildings. It is an early and important example of both railway construction and conservation practice. This article aims to investigate Swindon as a potential conservation model for the Alsancak Railway Campus, considering their shared similarities in era, scale, and style, through a comparative study focusing on cultural significance and conservation status. These two railway areas were selected as case studies because they showcase the architectural diversity of railway buildings, sharing similar architectural features. Both railway campuses were built by the British as the first and early examples of railways in their countries. They were encountering similar problems such as becoming dysfunctional due to developments and changes in railway technology. The research methodology employed in this study comprises archival research and on-site visits to the railway town of Swindon and the Alsancak Railway Campus. Beginning with the history and significance of Swindon railway town, the study systematically examines the buildings that formed a planned railway town. Secondly, an overview of the railway heritage conservation process in Swindon is provided by highlighting the conservation area status, its management plan, and systematically analyzing the conservation status and transformation process of the historical railway structures. It is followed by a comparative analysis between Swindon Railway Town and Alsancak Railway Campus. Overall, this study presents an evaluation and potential for the conservation of railway heritage areas through a comparative analysis.

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INTRODUCTION

In the early 19th century, Richard Trevithick's pioneering demonstration of the steam locomotive unknowingly laid the foundation for the railway network linking cities. Originating from mining roads, the railway was developed for freight transportation as an alternative to existing canals and roads to meet the increasing demands of England's heavy industry (Coulls, 1999; Jones, 2011). There is consensus that the prototype of the "modern railway" emerged with the opening of the Liverpool & Manchester Railway (L&MR) in northwest England in 1830, and the opening of this line is considered to be the beginning of the railway age. Essentially designed as a rival to the transport of goods via canal, this line met a demand for passenger transport that was unforeseen at the time it was built (Coulls, 1999). The Rainhill Trials of 1829, during which the managers of the L&MR invited locomotive inventors to exhibit their works, represent another turning point in railway history (Simpson & Scott, 1979). The locomotive known as "Rocket," which was designed by George Stephenson and later earned him the title of the "father of the railway," played a vital role in the inauguration of the L&MR. This event demonstrated that steam locomotives could efficiently transport both freight and passengers across substantial distances within a relatively short period, leaving a significant impact on the nation (Jones, 2011). The rapid success of the LMR railway sparked a railway mania in England, inspiring investors and entrepreneurs to explore these opportunities and ultimately leading to the development of railways across the nation (Buchanan, 2006).

Following the emergence of the railway, the Great Western Railway was started as one of the major railway projects under construction in the mid-1830s. The city of Swindon is one of the most significant industrial settlements and pioneering railway cities of its era, known for its repair and manufacture of locomotives, wagons, and carriages, tailored to the needs of the GWR, as well as worker houses and social facilities (Cattell & Falconer, 1995). It connected London to Bristol under the direction of Isambard Kingdom Brunel, one of the most significant names of the railway era in England. Contrary to many other railways constructed during the same period at the beginning of the railway era, it was designed as a whole and an ideal railway project with certain design principles (Buchanan, 2006). Similar to the rest of the country, Swindon began to experience a decline in the 1960s due to advancements in technology and transportation regulations. The railway infrastructure became vacant after the works were shut down in the 1980s.

On the other hand, the Alsancak Railway Campus is the terminus of the Izmir & Aydın Railway, which was the first railway line of Turkey and one of the major railway projects of the Ottoman Empire period. It was constructed by a British company under concession. The railway was built between 1856 and 1866 with the primary goal of utilizing the natural resources of the fertile Aegean region and transporting goods and raw materials to England via İzmir port (Ekizoğlu, 2012). The campus consists of storage, service and maintenance workshops, administrative units, and housing along with railway stations. While Alsancak Railway Campus shares similarities with Swindon Railway Town in terms of the size of the railway settlement, being built by British companies, and being early initiatives of their respective countries, it also faced similar challenges due to technological developments and changing transportation policies. Against this background, this study aims to investigate Swindon Railway Town as an exemplary model for the preservation of railway heritage due to preservation efforts over the years since the 1980s, including various restorations, reused railway buildings, and railway museums. It is also an example of holistic conservation, with the area being declared a conservation area in 1975 and 1987. The study not only explores the cultural significance of Swindon Railway Town but also focuses on the preservation processes of railway structures following the closure of railway facilities and that of current conservation status. Following the case of Swindon, the comparison with Alsancak Railway Campus can lead to present an evaluation and diverse potential for the conservation of railway heritage areas.

CONSERVING RAILWAY HERITAGE IN THE UNITED KINGDOM

Biddle (2011a) defines railway structures as developments that matured in the 19th century as railway construction evolved, pioneering new techniques and responding to demands. The structures built on the early railways reflected a lack of foresight about the potential of railways, as railway companies assumed their primary emphasis would be on freight traffic and viewed passenger transportation as a secondary industry (Parissien, 2014). Over time, due to factors such as the increasing importance of passenger transportation and the necessity to separate freight traffic, railway architecture evolved, forming its archetype (Richards & MacKenzie, 1986). Additionally, the requirement for large spaces as waiting rooms for passengers and train depots during the 19th century pushed the limits of material usage and inspired engineers like Isambard Kingdom Brunel to break new ground in the design of railway constructions (Brindle, 2004).

Railway structures, like other types of industrial buildings, have been created for specific purposes, and as technology advances and traffic increases, they may become obsolete for their original purpose and face the risk of demolition (Minnis, 2014). In 1968, the transition from steam

locomotives to electric or diesel locomotives in the United Kingdom resulted in the demolition of many functional units associated with steam traction (ibid, p. 38). Another contributing factor to this demolition was the intervention in the national railway network in the country, largely stemming from the impact of the 1963 Beeching Report[1], which led to the closure of numerous railway lines (ibid, p. 40; Nevell, 2010). The deliberate demolition that followed the closure of these lines became an increasingly common practice from the 1960s onward, and many stations on the closed lines suffered (Minnis, 2014). The 1960s and 1961s campaign to save the Euston Arch at the London & Birmingham Railway terminal, although unsuccessful, was significant in raising awareness of the importance and vulnerabilities of industrial structures in public discourse. This led to the reuse and preservation of railway structures for tourism purposes and gave rise to a new sector where steam locomotives operated on closed lines (Nevell, 2010).

The preservation of railway heritage in the United Kingdom initially focused on locomotives; for instance, Rocket (Figure 1a) was first acquired by the London Science Museum in 1862, and unused railway vehicles began to be preserved and exhibited. The examination of surviving remnants of the railway network in the 19th century laid the foundations for the discipline of Industrial Archaeology, which emerged in the 1950s and 1960s (Falconer, 2007; Nevell, 2010). In 1977, the exhibition "Off The Rails: Saving Railway Heritage," held at the RIBA Heinz Gallery, brought experts together to emphasize the value of railway architecture as heritage, express concerns, and discuss new functions for disused railway structures (Pearce & Binney, 1977). As part of the celebrations for the 150th anniversary of the line opening of the L&MR, research into the "world's oldest surviving passenger train station," the Grade I listed Liverpool Road Station in Manchester (Figure 1b), highlighted the importance of railways in Industrial Archaeology (Nevell, 2010).

On the other hand, until the 1980s, other functional structures of the railway system received little attention, with the focus primarily on railway history, locomotives, and partially on passenger waiting areas, which represented the public face of stations (Biddle, 2011b). Minnis (2014) argued that railway structures were studied more by railway enthusiasts than by architectural historians or industrial archaeologists, leading to a narrow focus on locomotives or a single railway company in railway studies. However, he also acknowledged the contributions of many amateurs, outside their expertise, to railway history (Minnis, 2014). In 1984, the Railway Heritage Trust was established under British Railways, aimed at preserving, restoring, and maintaining the heritage of the railways for the public good. This centralized conservation efforts related to railway heritage (Soane, 1997). The Railway Act 1993 is important in that it includes the concept of 'Railway Heritage' in England for the first time and subsequently established the "Railway Heritage Committee," but the railway heritage is not defined in the law and does not contain a guide on conservation and restoration. It was issued to restructure the UK railway network (Threlfall, 1997). The Railway Heritage Act 1996 is the law that arose from this need and determines the railway structures that will still be protected today and the authorities for their management. The establishment of the Institute of Railway Studies at the University of York in 1995 further accelerated railway studies having an important task (Burman, 1997). To organize applications for the World Heritage List (WHL), ICOMOS established a guideline setting up the criteria for railway heritage applications for WHL in 1999 (Coulls, 1999). This guideline also included case studies from the UK, such as the Liverpool & Manchester Railway and the Great Western Railway, which is the railway of this study. As regards WHL, the Semmering Railway (Austria), the Himalayan Mountain Railway (India), Rhaetian Railway in the Albula/Bernina Landscapes (Italy, Switzerland), and Trans-Iranian Railway (Iran) have been included in the World Heritage List in 1998, 1999, 2008, and

Figure 1. **(a)** Rocket, National Railway Museum, York; **(b)** Liverpool Road Station, Manchester.

2021, respectively. The management plan of the Trans-Iranian Railway highlighted up-to-date trends in railway conservation as documenting, monitoring, and conserving the historic buildings and other elements that are no longer in use. It also underlined documentation of the engineering elements at the same level of detail as carried out for the inventorying of all tangible features (UNESCO, 2021).

SWINDON AS A RAILWAY TOWN

Railway towns evolved from 19th and 20th-century company towns, where communities of workers, employed by the same company or group, lived in houses owned by the company, and these towns were characterized by the company's control over both economic and social aspects. Some railway companies established railway works in existing industrial cities, while others founded new settlements. Unlike these two, as seen from Swindon, small market towns became central hubs for railway lines (Andreae, 1985).

History of Settlement and Development

In the 1830s, Swindon was a small market town (Figure 2a), but with the establishment of railway repair and locomotive manufacturing works, and railway village and community buildings (Figure 2b) by GWR, it rapidly grew into a significant railway town by the end of the 19th century (Andreae, 1985).

Swindon's railway town comprises two interconnected areas, separately for the railway works and the railway village, including a church, a green park, and community buildings for workers for education, leisure, and health services. Both areas were established due to the GWR company's decision to provide housing for its workers and to establish the works.

In 1833, Isambard Kingdom Brunel (Figure 3a), a prominent engineer of his era in railway, was appointed as the chief engineer by GWR to determine the route for a new railway between London and Bristol. This opportunity allowed Brunel to articulate his vision for an ideal railway in detail, which deviated from the standard railway construction practices of the time in two significant ways: first, he prioritized passenger movement in the design, and second, he aimed to achieve high-speed travel to reduce journey times (Buchanan, 2006). In contrast to the prevailing practice of choosing the most economical route, he pushed the boundaries of engineering to achieve the highest standards (ibid, p. 69). As the railway became operational in 1841, Brunel, particularly working on the architectural plans and details of the main stations, created the double-sided platform type that would later be known as the "Brunel type" in station architecture (Figure 3b). Additionally, he was responsible for providing the infrastructure for works that transformed Swindon into a railway town (Buchanan, 2006). The GWR made a strategic decision to establish repair and locomotive manufacturing facilities in Swindon shortly after the opening of the London & Bristol railway line. The choice of Swindon as the central location for GWR's repair and locomotive manufacturing was not random but carefully considered. Swindon's geographical position at the precise midpoint of the London & Bristol line and its access to two existing canals for transporting coal and coke were advantageous factors (Historic England, 2020a).

Construction of the repair works was completed and operational by 1843, just two years after the railway line's opening. Initially intended for locomotive maintenance and repair, the area soon expanded to include locomotive production. A railway village, with rows of houses for the many engineers and workers brought in from outside the town, made it a unique industrial settlement of its time (Brownlee, 2010) and the GWR intervening in the lives of its workers through architecture (Lewis, 2021). Until 1920, Swindon employed more than 14,000 people (Jones, 2011). When British railways were nationalized in 1948, the GWR became one of the four major railways under British Rail. The nationalization led to the reorganization of the works in the 1960s, resulting in some structures becoming disused

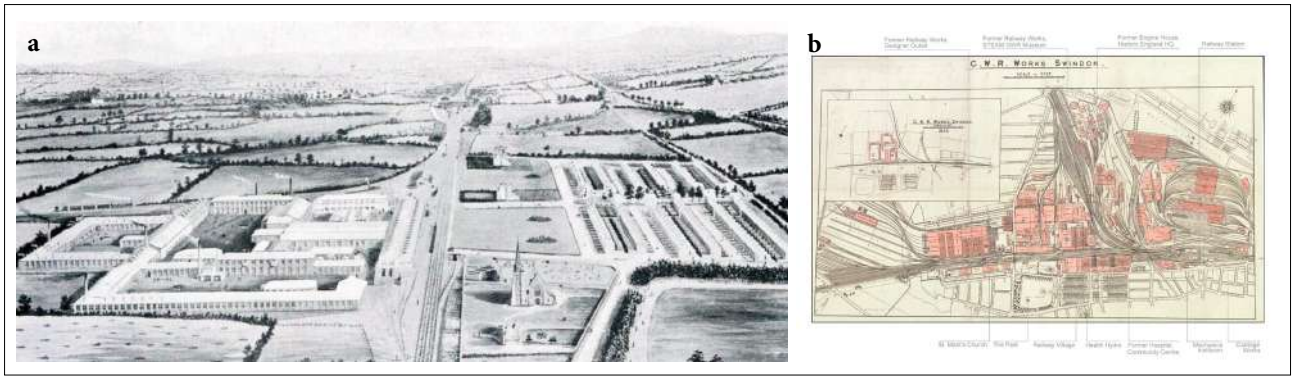

Figure 2. **(a)** Swindon railway works and railway village in 1846, as depicted by Edward Snell, from left to right: railway works and railway village. **(b)** Railway buildings of Swindon (It was prepared by the author on the Swindon Railway Town map obtained from the Great Western Railway Museum, Swindon).

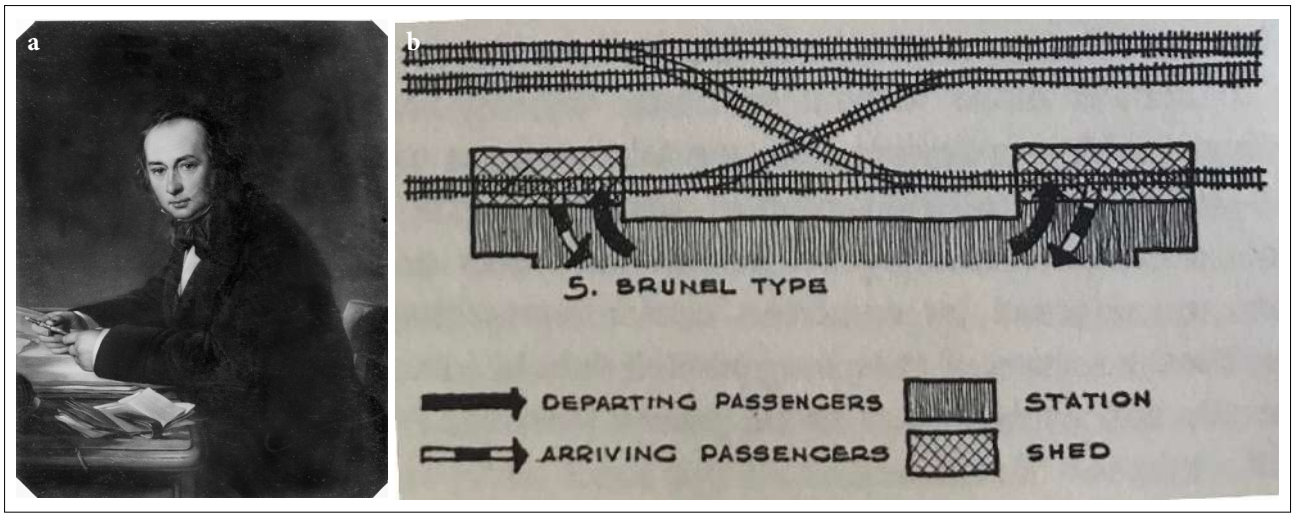

Figure 3. **(a)** I. K. Brunel (National Archives, n.d.); **(b)** Brunel type according to the platform-rail (Meeks, 1957).

and eventually demolished. In 1960, the works, where the last steam locomotive (Evening Star) was produced, closed due to the cessation of steam locomotive production and a decrease in the workforce (Jones, 2011). In 1966, while the railway village was planned to be demolished after Swindon Borough Council purchased most of the railway village from British Rail, through a campaign started with volunteer effort, the cottages were saved, and in the 1970s, the cottages were listed and in 1975 designated as a conservation area. In 1986, the works closed entirely, marking another effort by volunteers to preserve Swindon's identity as a railway town (Jones, 2011). For instance, a charitable trust to keep railway engineering alive in part of the works, repairing and restoring old engines for use on preserved and tourist lines throughout Britain (ibid, p.100). Due to many buildings and features having been demolished following the closure, the railway works area was designated as a conservation area in 1987, at which time the area was derelict.

The Buildings that Compose a Planned Railway Town

The town of Swindon was established as the headquarters of the GWR, one of the world's first and renowned railways of its time. The locomotive and wagon repair and manufacturing works (Table 1) established under the leadership of Brunel, pioneers in railway engineering and architecture, held an international position in the field of railway engineering and were among the largest of their kind in the world. The railway town was also known for its railway village worker housing (Table 2), and social facilities to meet the demands of the workforce, making it one of the significant industrial housing areas of its time. Furthermore, the GWR company established the country's first lending library (Table 3), and

Table 1. Railway Work

Location	**Construction Date**
North of the London & Bristol railway line	1841-1846
Architect/Engineer	**Original Function**
I.K. Brunel Daniel Gooch	Repair and manufacturing works of locomotives and carriage
Architectural Feature	
The works plan (Figure 4) are simple design, large size, and plain appearance and constructed using stones obtained during the excavation of the Box Tunnel on the railway line (Jones, 2011) and have a local character by utilising Swindon stone. They exemplify the characteristic industrial architectural style of the time (Figure 5a-5b).	
Statement of Significance	
For a century and a half, the railway works served as the focal point of the community had a crucial part in the local economy. The GWR company is responsible for the transformation of the once-small hilltop town into the vibrant railway town. The railway works expanded to become the world's one of the largest facility for repairing and manufacturing locomotives, carriages, and wagons gaining a worldwide reputation as pioneers in this field.	

Table 2. Railway Village

Location	**Construction Date**
South of the London & Bristol railway line	1842-1847
Architect/Engineer	**Original Function**
I. K. Brunel	Housing for the engineers and workers and social facilities
Architectural Feature	
Railway village was built including cottage housing, recreational areas, shops, and pubs, within a relatively short time frame. Despite their simple designs, these worker houses were notably superior in terms of quality compared to other industrial housing at the time (Andreae, 1985). The worker houses , approximately 300 in total, designed two stories high and featured front and back gardens (Figure 6). They were constructed using Bath stone, which was extracted during the railway's construction. The facades facing the railway line were embellished with decorative elements, while the other facades were more plain (Figure 7). In the central square, designed as the village's focal point, three-story blocks on either side housed company officials, foremen, and shops.	
Statement of Significance	
The railway village represents an early and rare instance of a model community created by a railway for its employees and their families, showcasing unique Victorian architecture and planning. It provided significantly superior accommodation compared to housing for workers during that era (Jones, 2011). The architectural style of the buildings owe much to Brunel's enduring interest in the area and the consistent use of Swindon and Bath stone. Preserved to this day, the village stands as a vital element of England's railway heritage (Catell, 1997).	

developed a pioneering healthcare system (Table 4). While the works were expanded with carriage works (Table 5), the village endeavored to improve living conditions with facilities such as the Health Hydro (Table 6) building, which is still in use today. St Marks Church (Table 7) and The Park (Table 8) were other facilities that met the demands of workers. Swindon Station (Table 9) connected railway works and the village to the west and east. All of these are defining characteristics of Swindon, a railway town that developed with a sense of community spirit and collective effort. The railway works, though closed, nevertheless hold significance for people in the area, many of whom had family working here. The buildings that compose a planned railway town are analyzed with the category of basic information such as location, construction date, architect/engineer, and original function; architectural features, and statement of significance which reflect data mainly from listed building contents. It is important to note that while the details given in the listed information have increased over time, their significance has been classified as historical architecture or group value.

Table 3. Mechanics' Institute

Location	**Construction Date**
Emlyn Square, the central of the railway village	1854-1855
Architect/Engineer	Original Function
Edward Roberts	Workers' and their families' education to improve all employees' standard of living
Architectural Feature	
The building is two stories tall and prominently features a raised central hall or theatre, showcasing a Gothic Revival architectural style and made of limestone rubble with ashlar quoins and dressings,the institute consisted of a library, reading rooms (Figure 8a), a large theater, a coffee lounge, and recreational spaces (Figure 8b). Over time, an octagonal indoor market was added to the southern end of the building (Historic England, 2017)	
Statement of Significance	
For nearly a century, it played a pivotal role in the social and cultural life of the railway village (Roden, 2010). It was a central gathering place for various community events related to GWR. It includes the country's first lending library. This institute seems to be a rare survivor associated with a railway company.	

Table 4. Medical Fund Hospital

Location	Construction Date
South of the London & Bristol railway line	Built in 1862 as the GWR works'converted to hospital for GWR workers in 1871
Architect/Engineer	**Original Function**
-	Hospital for the use of railway workers and their families
Architectural Feature	
The building was initially designed to integrate with the neighboring railway village structures, with the central block intentionally distinguished, and despite subsequent modifications, its original architectural form remains recognizable (Historic England, 2020c).	
Statement of Significance	
This initiative is of national significance as it served as an inspiration to Nye Bevan, the founder of the National Health Service, when he visited Swindon in the 1940s, pioneering the establishment of medical centers. Established in 1847 by Daniel Gooch, the Medical Fund Society utilized a fund created by deducting portions from workers' wages to contribute to public health and efforts to improve living conditions (Figure 9a-9b). This fund played a significant role in addressing various epidemic diseases and accidents (Roden, 2010).	

Table 5. Carriage Works

Location	Construction Date
South of the railway works between the railway village and the rail line	1874
Architect/Engineer	**Original Function**
Joseph Armstrong	GWR's wagon manufacturing
Architectural Feature	
It stands parallel to main rail line consisting of adjoining buildings. The masonry facade, stretching almost 200 meters, was specifically crafted to complement earlier GWR constructions. It consists of a railway entrance building with a pedestrian subway underneath the railway (Historic England, 2020b).	
Statement of Significance	
At the time of their construction, these works were not only the largest wagon works (Figure 10a) in the country but also exemplified innovative design for this type of railway buildings. In this initial construction phase, brick and iron framing were employed for the interior structure, marking their first use in such a context (Figure 10b). At its busiest, more than 14,000 workers used the entry building and subway tube as the only means of transportation between the works and the railway village (Historic England, 2020b).	

AN OVERVIEW OF THE RAILWAY HERITAGE CONSERVATION PROCESS IN SWINDON

Railway heritage plays a crucial role in shaping Swindon's identity, and this heritage is a vital part of the Great Western Railway, which is among the most significant historical railway establishments still in existence worldwide (Cattell & Falconer, 1995). It stands as one of the best-preserved early railway settlements in the country. While many of the first railway accommodations in rival settlements like Wolverton, Derby, and Crewe were demolished, Swindon Railway Village, which faced a similar fate in the 1960s, managed to survive. From the 1970s onwards, Swindon Borough Council has been a model in preserving railway heritage through successful restoration and redevelopment projects (Cattell, 1997).

The Preservation History of Swindon Railway Town

One of the initial conservation approaches to Swindon's railway heritage was the establishment of a museum focusing mainly on movable artifacts from the Great Western Railway in 1962 (Cattell & Falconer, 1995). In 1986, the closure of Brunel's workshops signified the start of a new era in the railway town, which had been a significant industrial settlement during the period when the works were active. Interest in preserving the works, which had been excluded from the railway heritage until their closure, began when demolition decisions were being considered. To keep railway engineering alive in part of the works, Bill Parker founded the GWR Heritage Trust as a voluntary organization. In the subsequent years, efforts

Table 6. Health Hydro

Location	**Construction Date**
South of the London & Bristol railway line	1891-1912
Architect/Engineer	**Original Function**
J.J. Smith	A wide range of medical and recreational facilities for workers, from swimming pools to Turkish baths and dental surgeries.
Architectural Feature	
The building (Figure 11a) occupy a rectangular block functioning dispensary and swimming baths (Figure 11b). The entire structure is constructed using red brick and adheres to a simplified Queen Anne architectural style (Historic England, 2000).	
Statement of Significance	
Long before the government provided universal healthcare, the Great Western Railway established its own comprehensive healthcare system in Swindon, offering services well ahead of its time (Roden, 2010). The Health Hydro was one of these healthcare facilities made available to workers. As the community raised money to build, a characteristic that makes Swindon unique is its sense of collaboration and belonging (Historic England, 2000).	

Table 7. St. Mark's Church

Location	**Construction Date**
South of the London & Bristol railway line	1843-1845
Architect/Engineer	**Original Function**
Sir George Gilbert Scott William Bonython Moffatt	The Anglican Church built for GWR
Architectural Feature	
The church (Figure 12a-12b) designed by highly significant ecclesiastical architects of the period with the revival of Gothic style. The initial design featured a chancel, six-bay nave, north and south aisles, sacristy, and south porch. The large north tower, adjacent to the north aisle, was a later addition aimed at enhancing the building's appearance from the railway. (Historic England, 2020d).	
Statement of Significance	
It was constructed, particularly for GWR, as a place of worship as part of a comprehensive effort to provide housing, health, and welfare amenities for the workers at the GWR Swindon Works by significant architects of the time (Historic England, 2020d).	

by volunteers across the country led to the preservation of historic railway lines for tourism purposes, with a focus on maintaining old locomotives to be used on these lines (Jones, 2011). While the oldest works were listed by English Heritage, the demolition was halted due to the efforts of retired railway workers and railway enthusiasts who refused to allow the town's railway identity and traditions to be lost in the rubble, considering the destruction a loss of engineering skills and traditions (Taksa, 2008).

Another significant development was the majority of Railway Village properties being purchased by Swindon Borough Council to save them from demolition.[2] This decision, in contrast to the destruction seen in similar industrial settlements of the time, ensured the preservation of much of the character of the Brunel era in the Railway Village (Jones, 2011). In 1970, homes were listed as heritage, and campaigns against their demolition led to the declaration of the village as a conservation area in 1975. Between 1970 and 1980, a comprehensive renovation program for worker housing was implemented with limited changes (Jones, 2011). The actions taken included repairing roofs, cleaning stone facades, removing additions from backyard gardens, burying external wiring, putting long grass strips in place of individual gardens, and enhancing the surrounding public areas and landscaping. One of the houses in the Railway Village was purchased with public funds and restored as a museum to represent the Brunel era (Jones, 2011). The restoration efforts in the Railway Village were considered exemplary conservation practices, earning numerous awards (Cattell, 1997).

With the recognition of the importance of Swindon's railway heritage, both the local community and experts

Table 8. The Park

Location	**Construction Date**
South of the London & Bristol railway line	Purchased by the GWR in 1844, became a formal park in 1871
Architect/Engineer	**Original Function**
-	Recreational area and a gathering place for significant celebrations throughout history
Architectural Feature	
To the west of the village, the GWR company purchased land for a cricket ground, which was eventually turned into a formal park. The park, which had its landscaping redesigned in the 1870s, has successfully remained a green space within the settlement to this day (Figure 13b).	
Statement of Significance	
From the 1860s onward, the park served as the area for the annual GWR children's festival (Figure 13a) and holds significant importance in railway history and urban memory. The park has continually held a pivotal position in the community, serving as a venue for events and providing essential open space as the town.	

Table 9. Swindon Station

Location	**Construction Date**
Middle of the railway works and railway village	1842
Architect/Engineer	**Original Function**
I. K. Brunel	Transportation from London to Bristol
Architectural Feature	
Brunel designed the station (Figure 14a) featuring two island platforms, each equipped with a matching two-story structure and connected by an iron footbridge, complete with attached timber canopies. When the southern island platform was destroyed and the current station tower with an entrance building was built in its place, the layout was significantly changed (Historic England, 2012).	
Statement of Significance	
Despite quite considerable alterations, the surviving building remains (Figure 14b) an integral component of the GWR and holds significance as it connects nearby railway-related buildings to the west and east (Historic England, 2012).	

began to express concerns about its tangible and intangible cultural heritage. In 1997, a reuse project was implemented, covering a significant part of the surviving works, and they were transformed into the modern shopping complex known as McArthur Glen Designer Outlet Village. The GWR Outlet Village, visited by 4.5 million people in its inaugural year of business, (Taksa, 2008) triggered financial support from other organizations, leading to the restoration of the oldest repair works listed as Grade II, which were transformed into the award-winning STEAM – Great Western Railway Museum (Figure 15). The museum interpreted the production processes that took place in the works, showcased the lives of railway workers through video interviews, and displayed the skills and methods of the workers (Taksa, 2008). Beyond the collection, with the approach of depicting a wide range of railway operations, including the experience of working in the carriage and locomotive works, it is notable in railway museology (ERIH, n.d.).

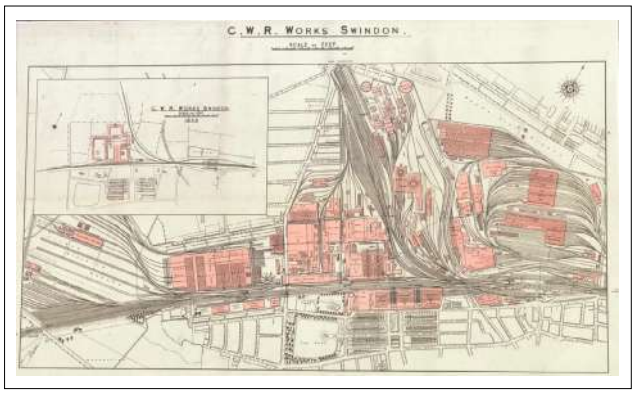

Figure 4. Development of Swindon repair, locomotive, and wagon production works from 1846 to the 1940s.

Figure 5. **(a)** Engine house of railway works; **(b)** Oldest locomotive repair works.

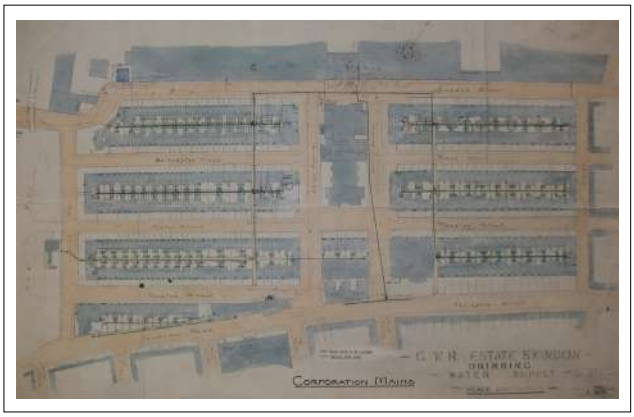

Figure 6. Plan of Swindon Railway Village designed by Brunel and constructed between 1842-1847 (STEAM, 2007).

Swindon Railway Conservation Area

In the United Kingdom, the Planning (Listed Buildings and Conservation Areas) Act of 1990 provides the legal framework for the protection of listed buildings and conservation areas in England and Wales. Historic England is the government's statutory adviser responsible for the conservation and management of historic monuments and buildings, advising on the designation of listed buildings and conservation areas, guiding conservation practices, and undertaking research and advocacy to promote heritage preservation in England.

The Planning Act defines a conservation area as a place of "special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance." This includes all of the characteristics of the buildings and monuments, including the topography, the materials used, the streets, the street furniture, the open areas, and the landscaping. Each of these elements influences an area's appearance and character, giving it a unique local identity and sense of place (Historic England, 2019b). In conservation areas, there are extra planning controls and considerations, and development within conservation areas is subject to stricter controls by local planning authorities. In the case of Swindon, it is important to highlight the area designated with railway identity, namely "the Swindon Railway Conservation Area".

The Swindon Railway Conservation Area (Figure 16) encompasses the internationally significant GWR works, the railway village, and the Swindon railway station. Initially, two separate conservation areas were designated in 1975 and 1987. The first one is for the former railway works and the second one is for the railway village. Both areas are interconnected in terms of their origins, histories, and evolution as the village would not have existed without the works, and had the village not been constructed, the works would not have been sustainable. The railway line that separates the two main sections of the Conservation

Figure 7. The row houses of Swindon railway village, still in use today in their original function.

Figure 8. **(a)** Mechanics' Institute reading room (Historic England, 2017); **(b)** Mechanics' Institute.

Figure 9. **(a)** GWR Hospital (STEAM, 2023); **(b)** Central Community Centre.

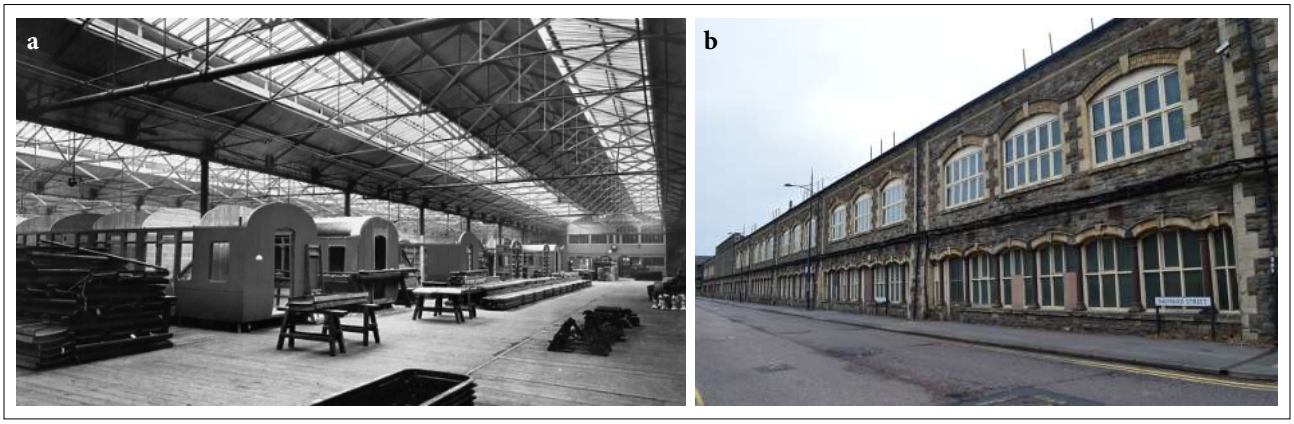

Figure 10. **(a)** Carriage Works (STEAM, n.d.-a); **(b)** Carriage Works.

Area is also crucial in terms of the area's character and its significance in why these areas were built within the town. The railway works are considered a significant historical monument from the early days of the British railway era, and they are recognized for their national and international importance. Swindon's railway village stands out as one of the most notable industrial housing developments of its time and is distinguished as one of the best-preserved railway settlements in comparison to other surviving railway towns like Crewe, Wolverton, and Derby in England (Cattell & Falconer, 1995).

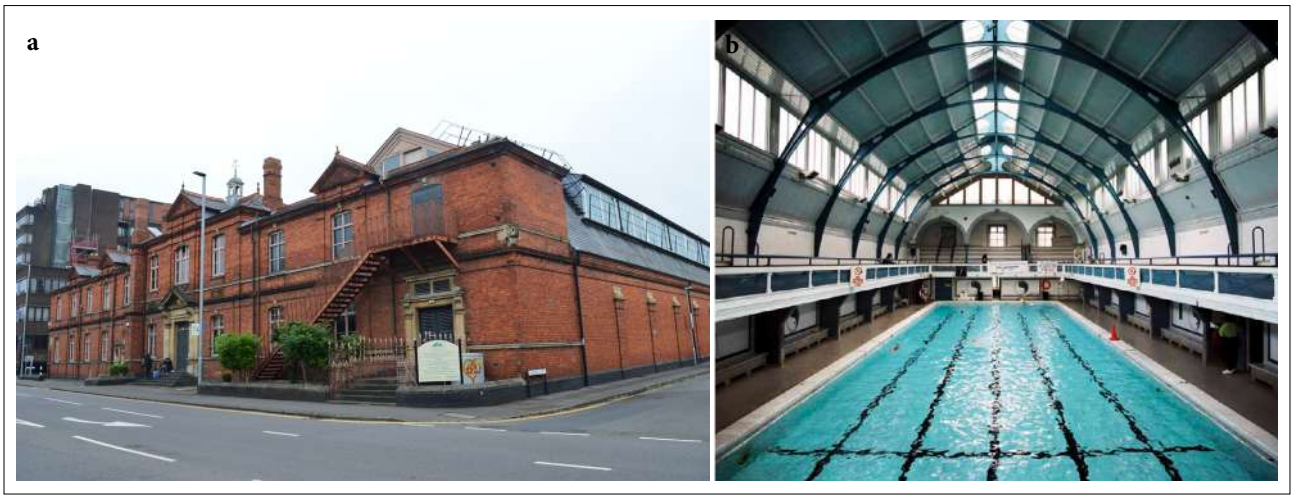

Figure 11. **(a)** Health Hydro; **(b)** Health Hydro (Historic England, 2000).

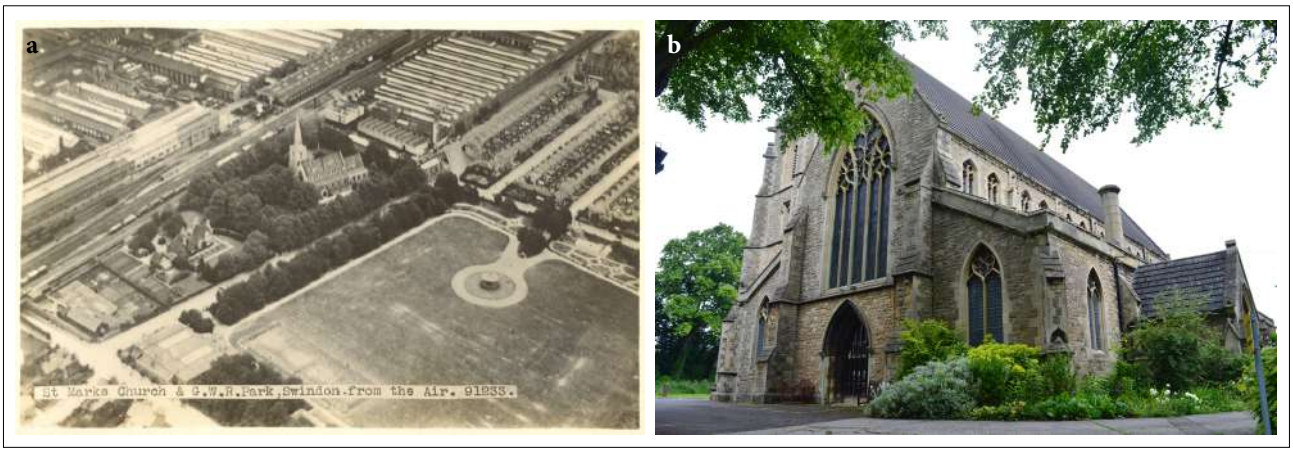

Figure 12. **(a)** St Marks Church; **(b)** St. Mark's Church.

Figure 13. **(a)** GWR Children's Fete in GWR Park (Swindonstory, n.d.); **(b)** The Park.

Swindon Heritage Action Zone

Swindon Heritage Action Zone (HAZ)[3] is a five-year plan prepared in June 2019 to revitalize the conservation area. HAZ is designed to restore and reuse neglected public buildings that were originally constructed to accommodate thousands of workers in the GWR works, revitalize public areas, strengthen relationships between the village and the city center, and highlight the region's distinctive features. HAZ encompasses sixteen distinct projects, ranging from restoration initiatives to branding efforts and public engagement activities (Historic England, 2019a).

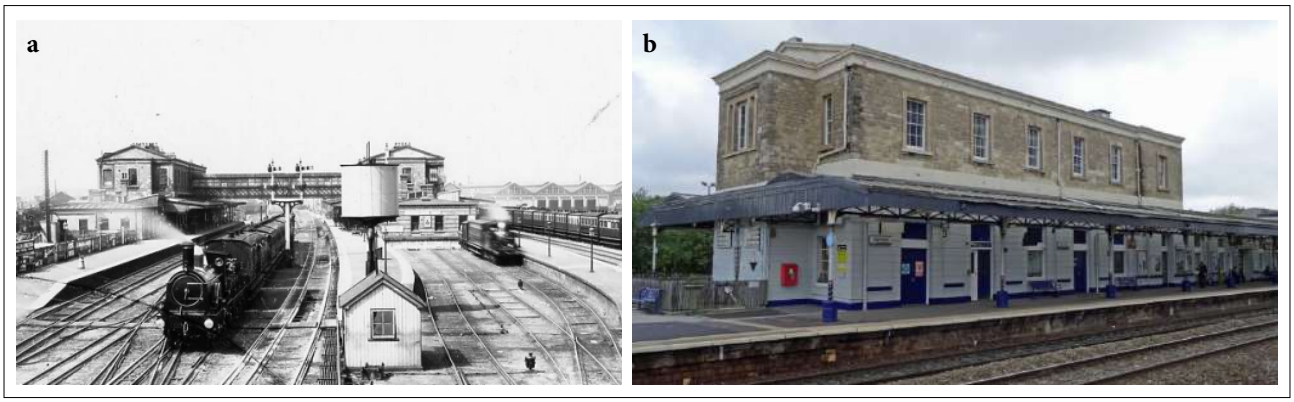

Figure 14. **(a)** Swindon Station was designed with an unconventional layout type by Brunel, differing from his customary plans (STEAM, n.d.-b); **(b)** The part that has survived from Swindon Station to the present day (British Listed Buildings, n.d.).

Figure 15. Great Western Railway STEAM Museum.

Functional Analysis of Historic Railway Structures in Conservation Area

The industrial and administrative buildings that have survived to the present day showcase innovative construction techniques that met the needs of their time. While exemplifying the style of typical industrial buildings of the era (approximately 1840–1920), the usage of Swindon stone gives them a distinctively local appearance. Projects that have adapted and reused these historic structures have received numerous awards since their implementation, making them potential models for the preservation of railway heritage (Pursell, 2021). In this section, as can be seen from Table 10, the current state of preservation of closed railway structures, after 150 years of use, is examined in three categories based on their functions: those still in their original function, those converted into museums, and those adaptively reused with different functions unrelated to railway museums.

COMPARATIVE ANALYSIS BETWEEN SWINDON RAILWAY TOWN AND ALSANCAK RAILWAY CAMPUS

Alsancak Railway Campus

In the mid-19th century, the Izmir & Aydın (Smyrna-Aidin) Railway, the first railway in Anatolia, was granted

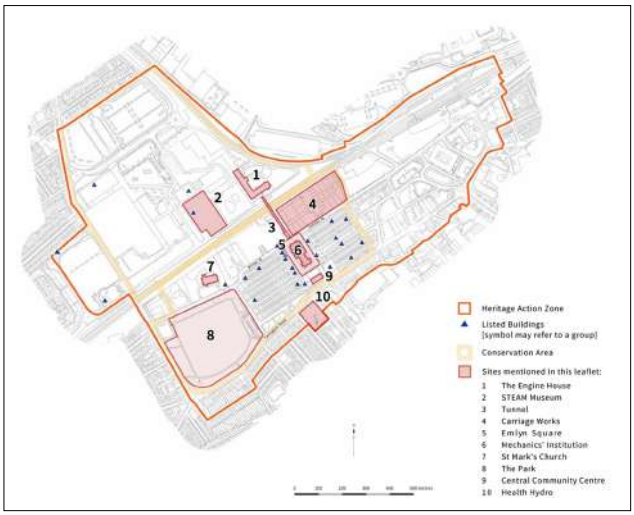

Figure 16. Swindon Historic Action Zone Map (Historic England, 2020a).

to a British-led company, including notable figures like Sir Joseph Paxton and Sir Macdonald Stephenson (Atilla, 2014). It took eight years, starting in 1858, to complete, reaching Aydın in 1866 with the aim of modernizing Ottoman transportation. The British company was chosen for railway construction and management in Ottoman lands due to trust in its railway expertise (Cobb, 2023). It was a notable achievement, connecting once-isolated Anatolian towns to global markets and each other, enabling swift and cost-effective transportation from the inland areas to the port city of Izmir (Inal, 2021).

Alsancak, previously known as Punta, was situated in a rural setting, quite distant from the city center of Izmir, before its selection as the initial point for the Izmir & Aydın Railway (Cobb, 2023). After long discussions, the location of the Alsancak Railway Campus was determined for reasons such as the port planned to be built in Punta, ease of loading and unloading, and the supply of coal required for the railway by sea (Bilsel, 2000). After the station was built, Alsancak, which was originally a suburb of Izmir, transformed into the city center (Demirci & Coşar, 2021).

Alsancak Railway Campus (Figure 18) was built between 1858 and 1861 without a specific plan outline, as seen in early railway examples. The linear layout of Alsancak Railway Station was aligned parallel to the railway tracks and platforms. The railway complex extends to the south and east, including storage facilities, service and maintenance areas, as well as administrative units. Some of the railway buildings, including residential units situated to the northwest of the station building, are presently detached from the campus.

Statement of Significance and Preservation Status of Alsancak Railway Campus

Alsancak Station, one of the most important industrial heritages of Izmir, was the starting point of the first railway line in Anatolia. Alsancak, the initial point of the line, stands out as the largest settlement and also has the most remarkable structures built by the company responsible for the railway's construction (Ekizoğlu, 2012). The railway campus includes different functional group structures not found in other railway areas such as two different passenger stations, wagon repair shops, carpentry shops, warehouses of different sizes, and housing for different groups.

While the railway became a socio-economic milestone for Western Anatolia, Alsancak had a significant impact on both the economy and city planning of that period, as it was the first of its kind and was connected to the Izmir Port. The railway significantly boosted the foreign population in Izmir, with wealthy Levantine families settling in areas close to their countries' living standards. While migrations, population growth, and changing conditions had an impact on daily life, they also brought with them many innovations in agriculture, trade, and communication (Atilla, 2014). The Izmir-Aydın railway construction likely had the most significant impact on Turkey's archaeology, as it led to the discovery of the Temple of Artemis in Ephesus (Köşgeroğlu, 2005). Today, the Alsancak Railway Campus is still active and functions as a central point for IZBAN, a commuter rail system connecting Izmir and its metropolitan area. The railway site holds a central position and possesses significant potential to meet the social and cultural requirements of urban life (Karabağ & Taddonio, 2019).

The declaration of Alsancak as a "historical urban site"[4] in 2017 is significant in terms of the conservation process of the region. The biggest challenge related to the comprehensive preservation of Alsancak, with its historical documents and its role as a space of urban memory, witnessing the development process of Izmir as a port city and the architectural heritage of different periods, is the determination of the conservation area's boundaries (Çırak et al., 2021). Despite the presence of listed structures such as Alsancak Railway Station and railway site, near other boundaries, these areas have not been comprehensively evaluated and have not been included in the historical urban site. The determination of the conservation area boundaries for the Alsancak area requires a more extended and comprehensive discussion. Çırak et al. (2021) suggest that the preservation of Alsancak's historical characteristics should be encouraged through the application of interdisciplinary dialogue-based participatory models within the framework of integrated conservation and planning approaches.

Regarding the functional analysis of the campus, as can be seen from Table 11, some of the railway buildings are still in use with their original function while most of them are adaptively reused.

Table 10. Functional Analysis of Historic Railway Structures in Swindon Railway Town

Category	Building(s)	Listed Status	Original Function	Current Function
In Use with Their Original Function	Railway Village	II	It was designed by Brunel and built between 1842-1847 to house the workers in the locomotive and wagon repair and production works.	In 1966, Swindon Borough Council purchased the railway village from British Rail, and the Grade II-listed houses of the railway village are still within the conservation area boundaries today, continuing their original use.
	Health Hydro	II*	In order to protect the health of the workers in the railway works, a fund established by Gooch was used to build facilities such as a swimming pool and a Turkish bath in 1891.	The Grade II* listed building, located within the conservation area boundaries, continues to be used for its original function by the local community, with improvements initiated in 2021.
Reused as Railway Museums	STEAM	II	This is one of the oldest locomotive repair works. It was established in the 1840s to maintain and repair locomotives used on the London-Bristol line.	Works of 19 and 20 were converted into the STEAM museum, which was established by the Swindon Borough Council in 2000. The museum focuses on the history of GWR and the railway in the town, showcasing the working principles of the works and the skills of the workers (Hoadley, 2001).
	Railway Museum	II	This is one of the houses in the railway village built in Swindon for railway workers to live in. It accommodated railway workers from 1846 until the late 1970s.	This houses was transformed into a "Living Museum", and it was first opened to visitors in 1980. The museum closed in 2000 but was renovated and reopened in 2017 under the management of the Mechanics' Institution Trust.
Adaptive reused with different functions apart from the railway museum	The Engine House	II	It serves as the administrative center of the GWR Works. The drawing office where the first locomotive superintendent Gooch designed some of the steam locomotives.	Since 1992, the building has served as one of the main offices of Historic England (formerly known as English Heritage). Additionally, it houses the archives of the Historic England institution.
	Railway Works	II*	These are works numbered 9, 13, and 15, constructed in 1872 to manufacture locomotives and represent factory buildings of era.	Works numbered 9, 13, and 15, which were originally used for locomotive production, have been reused as the Great Western Designer Outlet Village by McArthurGlen Group since 1997.
	Carriage Works	II	These works, established in 1874 for the purpose of manufacturing wagons for the GWR company, were constructed as the largest in the country at the time.	These works have been partly transformed into working spaces for digital start-up businesses such as "Workshed" and the Royal Agricultural University Cultural Heritage Institute for postgraduate courses (Figure 17).
	Mechanics' Institution	II*	It was established in 1854 at the heart of the railway village to provide education and socialization for workers and their families including a library, reading rooms, a large theater, a coffee lounge, game rooms, and an indoor market.	In collaboration with Swindon Borough Council, Mechanics' Institution Trust, the Theatres Trust, and Historic England, comprehensive research and surveys have been conducted to determine the new function of the building as multifunctional use, including cultural activities (Theatre Trust, n.d.).
	Central Community Center	II	This is the hospital building that was opened in 1871 by the GWR Medical Fund Society, with a mandatory subscription from worker's salary due to the dangers of railway labor.	The hospital remained in service until 1960, then the building was transformed into a community center as still used as the Central Community Center.

Figure 17. Adaptive reuse of historical locomotive and carriage production works with a different function than the railway museum; Great Western Designer Outlet Village, Workshed (Workshed, n.d.) Royal Agricultural University Cultural Heritage Institute (Royal Agricultural University, 2021).

Comparative Studies of Swindon Railway Town with Alsancak Railway Campus

In this section, Swindon Railway Town and Alsancak Railway Campus will be compared in terms of their similarities and differences in architectural features, conservation processes, and current uses. These two areas were selected based on their sharing similarities in architectural features and diversity; their significance as being early examples in their countries, as well as Swindon standing out as an early and effective effort in the preservation of railway heritage.

- **Pioneering Examples of Railway Constructions:** While GWR is one of the earliest attempts at intercity railways in the UK, the Izmir & Aydın Railway is the first example of railway stations in Anatolia. Thus, in both lines, buildings hold special importance from an architectural point of view as these buildings are among the earliest examples of new building types as railways. Additionally, both areas are important in terms of the use of new materials in architecture[5]. In terms of architectural style, as Cobb (2023) highlighted, the façade architecture of Alsancak Station, which features a steeply pitched Gothic style, shows the influence of the revivalist tendencies that were present in England during the same period.
- **Impact on Urbanization:** In both cases, the rural areas before the railway turned into important settlements in their regions after the arrival of the railway. Both regions were chosen because they are convenient and important strategic points for the construction of the railway settlement[6]. The gradual development of railway settlements in Swindon and Alsancak has made a substantial impact on both economic growth and social progress as well as urbanization. As the population increased and new neighborhoods were established with the railway, these railway areas became new attraction points in both cases[7].
- **Planned Railway Campus with All its Elements:** These industrial settlements, both Swindon and Alsancak, were meticulously planned to provide all required settlements for the workforce, from housing to healthcare and recreation. As Cattell & Falconer (1995) stated, Swindon is "an almost complete planned railway settlement of the 1840s and early 1850s, unrivaled in its state of preservation by Crewe, Wolverton, and Derby, England's other surviving railway company settlements". Similarly, as quoted by Kurmuş (2007) from the speech of British Consul General Redcliff, the Izmir-Aydın Railway is seen as "the great work and initiative of British genius and skill", while Alsancak looks like a railway village (IZKA, 2021) with its railway structures from housing to social buildings within the city on a very large area (Sönmezoğlu, 2016). While the town of Swindon stands out with its identity as a railway town, even though it is not currently used for its railway function, Alsancak, although this function continues, is isolated from the city due to the heavy land traffic around it.
- **Preservation Processes, Listed and Conservation Area Status:** In both cases, railway settlements have been impacted by technological advancements, resulting in the adaptation of numerous structures for new purposes. While Swindon railway town has diversified its use to include cultural or artistic purposes, the Alsancak Railway Campus still has active railway-related functions. The Swindon Railway Works, village, and all railway-related buildings are encompassed within the Swindon Railway Conservation Area. As the railway played a crucial role in the industrialization and development of Swindon, the designated railway conservation area is crucial in terms of the area's character and its significance. These areas include special regulations and incentives for the preservation of these structures such as controlling changes that could affect the character of the area even minor alterations may require planning permission[8]. In Alsancak, despite its proximity to the boundaries, the historical urban site does not include the Alsancak Railway Campus, so as Çırak et al. (2021) stated, the conservation area boundaries for the Alsancak area require a more extended and comprehensive discussion. The vast majority of railway structures in both areas are listed. On the other hand, Swindon railway town has

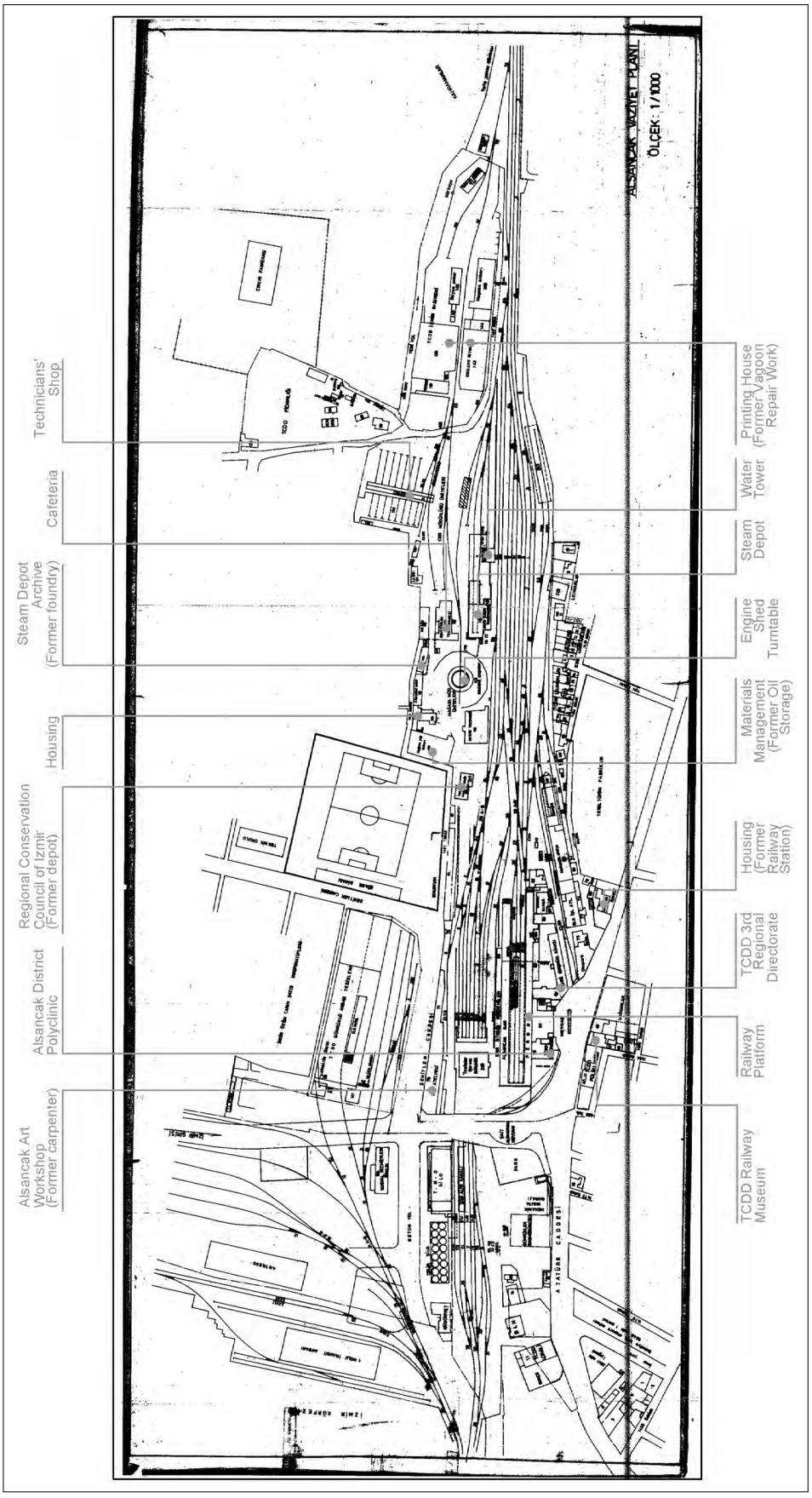

Figure 18. Alsancak Railway Campus with railway buildings (It was prepared by the author on the Alsancak site plan obtained from TCDD 3rd Region Archive.)

Table 11. Functional Analysis of Historic Railway Structures in Alsancak Railway Campus*

Category	Building(s)	Listed Status	Original Function	Current Function	Photograph
In Use with Their Original Function	TCDD 3rd Regional Directorate (former railway termini)	Listed	It was the initial settlement as administrative buildings of major termini of the Izmir & Aydın Railway.	It is home for (TCDD) 3rd Regional Directorate office.	
	Technicians' shop	Listed	It was used as an erecting shop to ensure that locomotives were assembled, maintained, and repaired.	It is the technicians' shop used for maintaining rolling stock.	
	Housing	Listed	It was used as accommodation for railway employees.	It is used as accommodation for railway employees.	
Reused as Railway Museums	TCDD Railway Museum (former commercial warehouse)	Listed & in Conservation Area	It served as a commercial warehouse for British merchants, later becoming the headquarters of British companies and, the residence of the Izmir & Aydın Ottoman Railway Company's manager.	It exhibits a collection Izmir related particularly & Aydın Railway.	
Adaotive reused with different functions apart from railway museum	Housing (former railway station)	Listed	It was the station built in the Alsancak railway settlement for use by Buca suburban line passengers.	It is used as accommodation for railway employees.	
	Printing House (former Vagoon Repair Work)	Listed	The building was used as a wagon maintenance workshop when it was built, It started to be used as a printing house in 1941 until 2000.	Under restoration for an adaptive reuse.	
	Alsancak District Polyclinic (part of former railway termini)	Listed	It was the part of Alsancak Railway Termini.	It is used as a healthcare facility.	

Table 11. Functional Analysis of Historic Railway Structures in Alsancak Railway Campus* (CONT.)

Category	Building(s)	Listed Status	Original Function	Current Function	Photograph
	The Telegraph Building (part of former railway termini)	Listed	It was the part of Alsancak Railway Termini.	It is home for (TCDD) 3rd Regional Directorate office.	
	The Steam Depot Archive (former foundry)	Listed	It was used to cast and mold metal components used in railway equipment.	It is used for storage.	
	TCDD Materials Management (former oil storage)	Listed	Its inital function was oil storage.	It is used as TCDD Materials Management.	
	Alsancak Art Workshop (former carpenter shop)	Listed	It housed an iron workshop and a wood workshop that repaired road sleepers.	It is used as workshop area.	
	Regional Conservation Councils of Izmir (former depot)	Listed	It was used to store and maintain railway campus.	It is used as the head of Office of the Directorate of Regional Conservation Councils of Izmir.	
	Cafeteria	Listed	-	It serves to offer meals and refreshments for railway workers.	
Out of use	Steam Depot	Listed	It sheltered location for the storage of steam locomotives when they are not in use.	It is out of use and neglected and part of building used as a storage.	
	Water tower	Listed	It is functioned to supply steam locomotives with water for steam generation and maintenance.	It is out of use and neglected.	
	The engine shed with a turntable	Unknown	It was served for the maintenance of locomotives and rolling stock.	It was demolished and turned a car parking area of Alsancak railway campus, only turntable is survived.	

detailed conservation action plans such as HAZ[9], while the Alsancak Railway Campus, although survey plans are available for most of the buildings on the campus, needs detailed documentation and a management plan.

- **Museums, Restoration, and Reuse:** STEAM, an awarded railway museum, not only preserves and displays historical artifacts but also educates, engages with the community, promotes tourism, and commemorates the crucial role that Swindon played in the development of British railway history and makes it accessible to the public. The railway heritage in Swindon has been preserved through restoration and reuse projects. Many of the old railway structures have been given new functions, ensuring their continued use[10]. This approach contributes to the physical preservation of these structures and the sustainability of conservation areas. As regards the Alsancak Railway Campus, there is a railway museum and art gallery which exhibit mostly movable heritage related to the Izmir-Aydın Railway. Also, one of the wagons of the "White Train" used by Mustafa Kemal Atatürk, the Founder of the Republic of Turkey, during his domestic trips, is exhibited at Alsancak Railway Campus. However, there is a need for a railway museum in which Alsancak should be exhibited with its railway identity and in all its aspects beyond only movable heritage.
- **Local Collaborations:** The Swindon Borough Council has played a pivotal role in supporting the preservation of railway heritage through local collaborations. These collaborations bring local authorities, community organizations, and other stakeholders together to develop preservation projects[11]. In the case of Alsancak, Turkish Republic State Railways (TCDD) is the responsible organization for railways in Turkey, and Alsancak is one of its seven regional managements. However, there is a vital need for support from local collaborations.

Interest, Awareness, and Education

As seen from the preservation history of railway heritage in Swindon, it is primarily driven by a deep interest and awareness of the locals who are related to the works. Residents of the town are known for their commitment to preserving this heritage due to their strong historical connection. Schools and community groups in the town organize educational programs and awareness initiatives related to railway heritage[12]. These efforts, including interpretation boards, guided tours, and other initiatives to preserve these sites, reinforce the town's unique character. As regards Alsancak, there is a growing interest in the Alsancak Railway Campus, as can be seen from universities' attempts at technical visits, and conferences at the railway campus area in recent years[13]. But still, due to the isolated status of Alsancak from the city, there is a need for initiatives to help increase interest and awareness of railway heritage.

CONCLUSION

Railways, first in England and then in the rest of the world, have transformed economic and social life. They are seen as an unprecedented development in terms of their scale and impact on industrial societies. They have enabled travel over distances that just one generation ago seemed nearly impossible with relative comfort. Railway towns are central to the management systems of historical railway companies. These towns both create and exist because of the historical railways they are associated with, and the railway is an integral part of the identity of these towns.

Swindon continues to thrive within the identity of a railway town, uniting former workers and launching various campaigns for the future of the works and the character of the region, even though the railway works have been closed for approximately forty years. Despite some losses in the area, it remains one of the preserved railway complexes in England. The award-winning STEAM Museum serves as an exemplary model for preserving railway heritage in terms of both museology and adaptive reuse of industrial buildings. Currently, the Heritage Action Zone (HAZ) plan, developed in partnership with Historic England and Swindon Borough Council, is being put into practice to improve the protected areas of the railway works and village, as well as to reuse vacant railway structures. Furthermore, restoration and reuse projects for listed buildings serve as a prime example of a sensitive and viable transformation of a historic railway area. When considering the importance of benefiting from international examples and their experiences in conservation efforts, Swindon exhibits qualities that could serve as an example for the Alsancak Railway Campus. These two railway areas are early and significant examples of railway architecture in their country, while Swindon demonstrates early efforts for similar preservation problems.

Alsancak Railway Campus, a groundbreaking and substantial investment that showcased the most advanced technology of its era, is a pivotal element for both the Izmir-Aydın Railway and the industrialization of Izmir. It should not be overlooked that the Alsancak Railway Campus includes a wide range of conservation concepts, from various building types and intangible heritage to technical equipment beyond the station. A detailed documentation of the campus; identifying and prioritizing the preservation of key historic railway buildings and exploring opportunities for adaptive reuse of vacant buildings are essential for the conservation of the campus. Additionally, considering this area as a whole and the decision of a “historical urban site” is vital for a holistic conservation approach. Involving relevant actors such as the central government, Turkish State Railways, local governments, non-governmental organizations, residents, and railway enthusiasts to collaborate in conservation efforts can also help ensure a

holistic conservation approach. Organizing cultural and educational programs at the campus should also be taken into consideration to raise awareness about its historical and cultural significance.

NOTES

[1]In 1963, The Beeching Report, also known as The Reshaping of British Railways, was released by British Railways chairman Dr Richard Beeching, on the future of British Railways. In the UK at the time, British Rail, a division of the British Transport Commission, was in charge of the nationalised railway sector. Subsequently, Britain implemented several rail financing reductions, a move known as the "Beeching Axe". There are several factors at play, including shifting market trends, botched reinvestment plans, and inadequate management. In conclusion, 42% of the line—approximately 13,000 km from 31,000 km—and roughly 60% of the stations—roughly 3700 out of 6400—were closed between 1950 and 1980 (Gibbons et al., 2018).

[2]Council housing in the UK refers to housing provided by local government authorities, known as councils, at subsidized or affordable rents to individuals and families who are unable to afford accommodation on the private market.

[3]Heritage Action Zones (HAZs), designated by Historic England, aim to identify and revitalize historically significant areas across the UK, fostering preservation and revitalization efforts.

[4]Alsancak was declared a "historical urban site" in 1976, following the first identification and registration studies carried out by the High Council for Historical Real Estate and Monuments. However, in 1984, the status of the region was abolished. 33 years later, it partially regained its protection status as an "Alsancak Historical Urban Site" by Number 1 - Izmir Regional Board for the Conservation of Cultural and Natural Assets, with the decision dated May 9, 2017, and numbered 5948. With the decision of the same board dated June 6, 2017, and numbered 6069, the transition period protection principles and conditions of use were determined, and the borders were corrected with the ildecision numbered 6917 dated December 20, 2017.

[5]For instance, carriage works in Swindon exemplified innovative design for this type of railway building with brick and iron framing (Historic England, 2020b). Similarly, new materials were employed to span large openings due to the need for these openings in the repair workshop on the Alsancak campus.

[6]Swindon was also a convenient choice due to its topography, where the terrain became more inclined. This necessitated the attachment of a more potent engine in Swindon to complete the journey to Bristol, so the decision was made to establish the Great Western Railway's engine shed, repair, and manufacturing works in Swindon. As regards Alsancak, the port connection was an important factor in choosing this region for railway construction (Bilsel, 2000).

[7]In the case of Alsancak, Buca is a suburban area that was born and developed with the Izmir & Aydın Railway, and as Ekizoğlu (2012) stated, there was another station in the Alsancak Railway Campus for the use of the upper-class who lived in Buca.

[8]Conservation Areas are controlled by existing planning controls and with the application of an Article 4. For instance as the management plan of Swindon Railway Conservation Area stated "There is a current Article 4 Direction in place within Swindon's Railway Conservation Area covering the residential streets in the railway village as well as Church Place. The Direction means that work such as painting the exterior of a building, any extension or alteration, erection of garden structures and the creation of vehicle cross-overs all require permission".

[9]HAZ includes sixteen distinct projects, from repair plans to branding to public engagement. The main ones are; future planning of the conservation area, which includes the GWR; applications for unlisted buildings; a recovery plan to help local businesses stand out and thrive; Improvement of Health Hydro and its immediate surroundings; reuse of grade II registered Cricketers (local pub); the restoration of grade II listed carriage works and its reuse as a new business centre and cultural heritage institute; finding a sustainable use for the grade II* listed Mechanics' Institution and securing its future; implementing a management plan for the GWR park. In addition, HAZ branded the conservation area covering the railway works and the railway village by naming it "The Works".

[10]Significant restoration projects are ongoing in both Swindon and Alsancak. The Grade II*-listed Mechanics Institute restoration project, a social building for workers with an important place in industrial heritage as one of the first of its kind in Swindon, continues. The wagon repair workshop in Alsancak, which was used as an Izmir printing house for a long time and had an important place in the city's memory, is now under restoration. In both projects, it is planned to open the buildings for cultural purposes and public use.

[11]These collaborations include; Mechanics Institution Trust, National Lottery Heritage Fund, Swindon & Wiltshire Local Enterprise Partnership, National Trust, Swindon Business Improvement District, Swindon Designer Outlet, English Heritage

[12]Swindon Railway Festival, showcasing the UK's model railway layouts; Swindon Heritage Open Days, to explore historic railway buildings; and We'll Meet Again, a whole-day experience for children at the STEAM are featured examples of railway heritage-related events.

[13]For example, reuse projects were designed by the students

of Yaşar University, Department of Interior Architecture and Environmental Design to revitalise the historical Alsancak Train Station with contemporary functions, to bring a new urban and public space to the city, and to raise awareness about the preservation of the cultural heritage of the Alsancak Train Station building. The projects and models prepared by the students were exhibited at Alsancak Train Station with the participation of TCDD Izmir 3rd Regional Directorate personnel.

In October 2023, within the scope of the opening symposium of Izmir Institute of Technology Department of Architecture - Synergies of Place IZTECH Urban Design Studio Course, the concept of "Railways as Transformative Tourism Assets: Space Synergy of Place, Memories of Time" was discussed and held at the Alsancak Railway campus with the hosting and participation of TCDD.

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Article

Investigation of the determinants of user satisfaction in social mass housings in Edirne during the COVID-19 period

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ABSTRACT

The pandemic, with increased time spent at home, has heightened the importance of user satisfaction as needs have evolved. We aim to evaluate user satisfaction in COVID-19-era state-built mass housing and contribute to mass housing design literature.
The study focused on social housing in Edirne, analyzing architectural observations, surveys, demographic information, house characteristics, and spatial adequacy. Correlation and regression analyses explored satisfaction relationships, factors affecting satisfaction, and their influence.
User satisfaction is influenced by demographic characteristics, with insufficient living spaces due to the pandemic causing structural changes. Structural, environmental, interior, location, and access features significantly impact satisfaction, with structural features having the most significant impact.
Maximizing thermal comfort, ensuring high resistance to disasters, and maintaining good physical condition are the key factors that positively affect user satisfaction. However, poor-quality sound insulation materials and craftsmanship standards decrease satisfaction levels. It has been found that users prefer houses located near the city center. Additionally, users consider the environmental and green spaces of the house more important than its interior features.
Satisfaction with houses is greatly influenced by their structural and environmental features. It has been recognized that green areas and social spaces are essential and should be increased. Furthermore, flexible space planning has been emphasized to ensure the house can adapt to changing living conditions.

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INTRODUCTION

The COVID-19 pandemic, which started in Wuhan, China, rapidly affected the whole world and changed our lives, lifestyles, social relations, and habits, adversely affecting many sectors such as health, education, trade, etc. (Salama, 2020). To avoid the danger of the deadly epidemic, all business areas reorganized their work. As a result of the rapid spread of the virus, educational institutions took an immediate break from face-to-face education and switched to online education. Most business sectors turned to

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working from home. The rapid increase in the number of cases caused curfews. People became familiar with concepts such as "social distance," "mask," "quarantine," and "washing hands frequently during the day." Our homes are no longer just places where we eat, rest, and meet our daily needs; they take on many various functions. For adults who find it inconvenient and dangerous to leave the house, the rooms have turned into offices where online working orders are established, places where meetings and teleconferences are held, gyms where exercise is done, and balconies that have turned into closed spaces have turned into classrooms where children listen to their teachers over computer screens (Gür, 2022). The virus, which carries a higher fatal risk, especially for individuals over the age of 65, has caused them to stay at home for much longer periods, not being able to go out at all (Güngör, 2022). Although the epidemic was partially controlled with the discovery of the vaccine, this extraordinary situation between 2020 and 2022 made everyone unprepared to question life's social, economic, and societal aspects. Just as Paris and London renewed their entire infrastructure during the cholera epidemic in 1954 (Yüksel, 2022), it changed the perspectives of designers, city planners, and interior architects. It showed that all design dynamics should be rearranged despite the pandemic being left behind. Urban planners and landscape architects saw the importance of open and green spaces in planning much better (Andreucci et al., 2019). The concept of "pandemic architecture" came to the fore, and architectural design evolved into spatial arrangements where social relations and business life could coexist.

The housing phenomenon has reminded us again of the vitality of architectural design, as it is one of the issues where the user spends the most time during the pandemic and meets all life needs. In addition to the living function, the installation of additional functions and the increase in the use of the house have changed the need for additional spaces and the expectations from the house (Rogers & Power, 2020). In particular, the owners of the houses built for low- and middle-income families, whose size and usage area are kept to a minimum to enable more families to own housing by producing the maximum number of houses, faced this situation more during the pandemic.

The study aimed to identify the factors determining user satisfaction in social mass housing and residential areas built by the state for Turkey's low- and middle-income families during the pandemic. We selected the sample area of the research as Edirne, a rapidly developing border city in Turkey that hosts social housing projects. Since no previous study had analyzed the statistical data to evaluate user satisfaction in social mass housing built in Edirne during the COVID-19 pandemic, we saw this as a weakness and a decisive factor in choosing Edirne as the study area.

The State Mass Housing Administration builds social mass housing that offers affordable housing options for families who wish to own a house. These houses are cheaper compared to the free housing market. Despite the recent earthquake, which caused damage to many buildings in the affected provinces, the social housing estates remained undamaged thanks to reliable construction solutions such as "raft foundation," "tunnel formwork carrier system," and high-strength concrete. Due to their reliability, the demand for these houses has increased among families (NTV News, 2023). We conducted an intense application process for 11,844 houses, the foundations of which have been laid, and they are scheduled for delivery in 2025. We completed the draw for the houses on March 11, 2023. Our research conducted in Edirne aimed to set an example for similar studies to be carried out in other regions of Turkey. This research is unique in determining the criteria contributing to user satisfaction with their housing during the pandemic period. The study also identifies spatial qualities that should be present in mass housing designs to be produced in the future. We used a survey investigation as the research method for this study. We will analyze the survey results statistically to obtain answers to the questions posed in the research. The main question of the research is whether users were generally satisfied with their residence and its features, including structural, environmental, location, and access features, throughout the pandemic. The study also aims to determine the demographic characteristics that affect housing satisfaction and the factors contributing to user satisfaction with their housing during the pandemic. Additionally, the study aims to identify the design approaches that should be followed in future social housing for low- and middle-income families.

Although the COVID-19 pandemic is behind us, we have learned valuable lessons from the research conducted during this time. Specifically, we have identified critical design criteria that can increase the satisfaction of users living in social mass housing built for low- and middle-income families, particularly in the event of possible pandemic situations in the future. These findings can pave the way for new and improved designs that prioritize the safety and well-being of residents.

LITERATURE REVIEW

User satisfaction is a complex and subjective matter that varies depending on the person, place, and time. Researchers have conducted studies to understand the relationship between the quality of life and user satisfaction, evaluate the success of housing projects built by both the private and public sectors, and determine users' perceptions of the inadequacies of the residential environment. In the literature, many researchers have investigated the economic, social, physical, and personal dimensions of user satisfaction in different areas. Generally, demographic characteristics,

physical characteristics of the house, characteristics of the housing environment, and the relationship between the location of the house and satisfaction are chosen as the main topics in user satisfaction studies. Some researchers have examined the relationship between time spent in housing and satisfaction (Kasarda & Janowitz, 1974; Hunter, 1978; Hourihan, 1984; Satsangi & Kearns, 1992; Mohit et al., 2010; Caldieron, 2011); some have pointed out how factors such as age, family size, whether the woman of the house works or not, and the size of the area per person in the house affect satisfaction. It is important to note that housing satisfaction is a subjective concept that depends on individuals' perceptions and expectations, so research cannot come to a definitive conclusion. This study explored user satisfaction; nonetheless, significant studies in both domestic and foreign literature have contributed to user satisfaction.

Studies frequently include socio-demographic characteristics directly related to satisfaction in the literature (Marans & Rodgers, 1975). Mohit et al. (2010) found that having more family members and a working woman in the household negatively affects satisfaction with housing. Adams (1992) identified marital and educational status as additional factors determining housing satisfaction. In a recent study, Özdeniz (2022) examined the impact of quality of life on housing preferences in Mersin, a city in the Mediterranean region of Turkey, and found that quality of life factors directly influence housing preferences. In a study by You et al. (2022), the relationship between the physical and mental health of individuals living in affordable housing in Hangzhou, China, and their housing satisfaction was investigated. They found that the mental and physical health of the users is affected by their own socio-economic and demographic characteristics. As a result, their satisfaction with their housing was high. Esen & Çivici (2022) also explored the satisfaction levels of public housing users with their living conditions and surroundings in Balıkesir, Turkey. They considered the satisfaction levels based on household size and ownership status. They found that forcing families of different sizes and income levels to live in the same type of housing reduces user satisfaction. They suggested that flexible space solutions are the correct planning principle in housing designs.

The literature also includes studies showing how the house's physical characteristics affect user satisfaction. Lane & Kinsey (1980) stated in their study that housing characteristics are more important than demographic characteristics. Ariffin et al. (2010) suggested that various housing features, such as the number of bedrooms, the size and location of the kitchen, and the quality of housing units, strongly correlate with user satisfaction. Similarly, Mohit & Raja (2014) stated that the number and size of bedrooms, the placement of the kitchen in housing planning, its relationship with other spaces, and the number of bathrooms and toilets are also factors that affect satisfaction. Physical features of the house, such as comfort, building quality, housing plan, and house size, provide higher satisfaction (Türkoğlu, 1997). Tran & Vu (2017) investigated the relationship between house features and user satisfaction with life. They emphasized the importance of improving the facilities of houses where the elderly live, as satisfaction with the house has a strong positive effect on a person's satisfaction with life. In his study conducted in 2009, Gür aimed to measure the satisfaction levels of users who lived in houses built by the Mass Housing Administration in Bursa. The study showed that the users were unhappy with their houses due to specific spatial and structural problems. Gür also provided suggestions for future improvements in the design of these houses. Lee & Jeong conducted a study in 2020 to investigate the effect of residential environment features on user satisfaction in Seoul, Korea. They examined the relationship between housing-environment satisfaction and social environment factors such as accessibility, comfort, security, and location attachment. The study found that place attachment, especially accessibility, positively affected housing satisfaction. The production of high-quality housing was also found to be important in ensuring the architectural sustainability of the house. In Adriaanse (2007)'s comprehensive research on residential environment satisfaction in the Netherlands in 2007, he used multivariate analysis techniques to analyze data collected from a housing demand survey he conducted with users. The study found that the user's relationship with their social environment was satisfaction's most critical component. Çanakçıoğlu (2021) discussed the significance that residents attach to social-environmental relationships in their homes and pointed out that they do not favor urban transformation as they are content with their neighborly relationships. Another study in Bursa, Turkey, examined the relationship between happiness and user satisfaction. It was concluded that residents' satisfaction with their housing and neighborhood relations impacted their perception of happiness (Gür et al., 2020). Berköz & Kellekçi (2007) researched determining the satisfaction of Bahçeşehir mass housing residents with their housing and environment and identifying the necessary conditions for their satisfaction. They concluded that the housing environment is equally important as the housing quality for the residents and that physical, social, and economic factors affect both. Kellekçi & Berköz (2006) conducted another study to determine the factors affecting satisfaction with housing and environmental quality in the Istanbul Metropolitan area public housing. They found that the location of the house, residents' opinions about the environment and recreational areas, structural and environmental security, neighborly relations, and the physical appearance of the residential areas are the factors that most significantly increase the quality and, therefore, the residents' satisfaction. You et al. (2022) found that immigrants living in affordable

housing in Hangzhou, China, were dissatisfied with their housing environment and security expectations. They also highlighted the importance of following housing policies to improve housing conditions for the future. Another study by Mohit et al. (2010) investigated user satisfaction in public housing built at low costs in Kuala Lumpur. The study found that users were more satisfied with open spaces, service units, social environment, and neighborhood relations than the house's physical features. Uşma & Akıncı (2021) emphasized the need to investigate all factors affecting satisfaction in housing thoroughly. They evaluated different opinions based on existing studies on user satisfaction in the literature. By comparing satisfaction criteria in certified buildings, they concluded that the house and its environment should be considered together in future housing designs. They also highlighted the importance of the socio-demographic and cultural characteristics of the user, as well as the physical, social, and economic characteristics of the house and its surroundings when analyzing satisfaction.

Asim et al. (2021) highlighted that the COVID-19 pandemic has emphasized the importance of housing in human life. They noted that users' satisfaction with their homes is directly linked to factors such as natural light, proper ventilation, and the inclusion of open areas such as balconies and terraces in the design. They also mentioned that housing satisfaction significantly impacts physical, mental, and emotional well-being. Bettaieb & Alsabban (2020) conducted a study to determine how Cide residents met their users' psychological, social, and cultural needs during and after the pandemic. They found significant differences in users' satisfaction levels and perceptions before and after COVID-19. The study revealed that the flexibility of the design was related to the house's functional, cultural, and structural features. The authors proposed design suggestions to develop the foundations of flexible housing based on social and cultural values. Torres et al. (2021) investigated the perspective of homeowners in Mexico during the pandemic period. They revealed that most homeowners were satisfied with the size of their homes and spaces but felt that the open spaces were inadequate. The authors suggested that, in light of the current conditions, there is a need to rethink architectural design and incorporate new paradigms that emerged during the pandemic. Torres et al. (2021) researched in Spain to investigate if residential properties satisfied the needs and expectations of users during the pandemic period. The study revealed that architectural design had a significant impact on user satisfaction. The researchers suggested that housing design should be rethought, and existing housing should be renewed, considering the emerging spatial needs. Alavad (2021) investigated how users interact with and adapt to their homes in line with their increasing needs during the pandemic in different countries and found that users have been giving new functions to their existing spaces and adding appropriate equipment to meet their increasing needs (such as turning bedrooms into study rooms with added desks) and argued that flexible space solutions should be included in housing design. According to Li & Tang (2021), the COVID-19 pandemic has highlighted the importance of good home ventilation. Poor ventilation can lead to a higher risk of infection and can negatively impact user satisfaction. Li and Tang's study found that occupants were less satisfied with their living conditions in houses with unmet ventilation needs. In 2022, Gür examined how the pandemic affected the use of space in homes in different regions with varying socio-economic levels in Bursa, Turkey. The study found that changes in hygiene, shopping, and transportation habits also impacted the frequency of people meeting others outside their homes. As a result, users require flexible design solutions that provide multi-purpose spaces. Bayer & Yazıcı (2022) investigated the impact of daylight on working spaces in homes, which became increasingly important during the pandemic when many people were working from home. The research revealed that users who lacked adequate daylight in their workspaces made changes to their homes, highlighting the significance of daylight in terms of the function of the space. The importance of solutions that enable change in residential interior designs and green space arrangements around the residence was discussed by Yüksel (2022) in terms of architectural sustainability. This is based on the increase in the functions of the residents due to the pandemic.

The Concept of User Satisfaction and its Examination in Mass Housing for Low-Income Families

The state of "well-being in general" is the most tangible result that is directly related to the satisfaction of one's life (Diener et al., 2009). The factors that affect happiness and well-being and the components that make up life as a whole are in interaction (Larsen et al., 1985; Diener, 2000; Kahneman, 1999; Veenhoven, 2000; Larsen & Eid, 2008; Diener et al., 2009). Quality of life, satisfaction with life, well-being, and living conditions are essential for satisfaction (Headey & Wearing, 1992; Diener, 2000; Veenhoven, 2000). Satisfaction is a concept related to fulfilling one's goals and meeting one's needs in various areas of life (Ibem & Amole, 2013). The most important of these living spaces are the residences where the person spends most of his life. Housing satisfaction, one of the critical factors in an individual's quality of life, is a relative concept and varies depending on time and person (Huang & Du, 2015). Housing is where the need for shelter is met, people's cultural, social, and economic identity takes shape, and social rules and relations are learned, representing comfort and security (Karahan & Özüerken, 2009). User satisfaction, an important parameter in determining the

residents' reactions to their environment, defines the user's satisfaction regarding the current housing situation (Mohit & Nazyddah, 2011). The dwelling and its immediate surroundings, which occupy an essential place in the user's life and determine the quality of life, are well-planned and can meet needs, increasing satisfaction (Güremen, 2016). Understanding the true meaning of user satisfaction is possible by first measuring the determinants and effects of this concept (Gifford, 2014). These measurements, whose results differ from country to country from the past to the present, are usually carried out through survey research with users in scientific studies (Smrke et al., 2018). Moreover, determining the parameters that increase the satisfaction of homeowners with their homes is seen as the primary goal (Wang & Wang, 2016). Another issue that is as important as housing planning is a well-planned housing environment. Satisfaction with the residential environment, a primary living area where the various needs of people living in the house are met (Lawrence, 1987), has also been the subject of much research, just like housing satisfaction (Oktay, 2001). There are many factors (such as location) that affect the user's satisfaction with the residence (Cao & Wang, 2016; Lin & Li, 2017). Demographic characteristics, socioeconomic status (age, occupation, economic status, marital status, etc.) (James et al., 2019), physical characteristics of the residence (number of rooms, insufficient or unnecessarily large rooms, whether there is a balcony, number of bathrooms, etc.) (Fuller et al., 2000), features of the residential environment (open and green areas, sports areas, recreation and social areas, etc.), location of the house, and features that determine the relationship of the house with the city (access to the city center, access to shopping and health units, etc.) are the variables that determine the satisfaction or dissatisfaction of the user with his home (Gan et al., 2019). The evolution of today's living conditions, driven by the technological age we live in, has changed the needs of homeowners and their perception of their living environment. This shift has increased the importance of satisfaction with one's home, especially in extraordinary situations such as pandemics. With the COVID-19 pandemic, it has been better understood that the flexible planning approach that can be adapted to all kinds of user needs, depending on the changing living conditions, is today's ideal design approach. It is not the individual's adaptation to the dwelling; the adaptability of the dwelling to the individual is an essential factor in increasing the residents' satisfaction. User satisfaction is related to architectural design, urban planning, geography, psychology, etc. Although it has been a subject that has been researched in many disciplines for many years, its importance has increased even more with the COVID-19 pandemic, whose effects have been ongoing since 2019 (Dekker et al., 2011; Aigbavboa & Thwala, 2016; Wang & Wang, 2016). Since the house undertakes many additional functions besides its own, such as sleeping, eating, and resting, the user's expectations from the house have increased accordingly, and the house has been insufficient in many respects to meet the user's needs.

When mass housing applications produced for low-income families worldwide are investigated, different dimensions are seen in housing production for various reasons, such as migration, rapid urbanization, and population growth in every geography. Considering the development of social housing, it is noteworthy that after the Second World War, large-scale mass housing was produced for the working class in the city peripheries in Europe. However, there was no social housing construction in Turkiye at that time (Bican, 2020). Large-scale social mass housing practices, which emerged as a solution to the housing problem with the government's policies in Turkiye, started mainly after the 2000s (Alkiser & Yürekli, 2004). The government focused on constructing social housing to address the housing crisis during a specific period. The objective was to build a significant number of homes in a short amount of time without generating profit. Construction began in 2003, and the goal of 500,000 homes was achieved by 2011. A new objective of 700,000 homes was established with a completion target of 2023, aiming to produce 1.2 million homes (Mass Housing Administration, 2023). The primary emphasis in constructing social mass housing is ensuring the fundamental human right of access to housing. This involves providing financial support to families who cannot afford housing (Bayraktar, 2006). The goal is to ensure that low-income families can access stable and affordable housing with low payments over extended periods. Moreover, the objective is to regulate the housing market using the production model it has determined while minimizing costs and maximizing quality by utilizing state-owned lands. Research has demonstrated that the contentment of families living in social mass housing projects is crucial. These projects encompass housing production and social amenities such as education, health care, commerce, sports, recreation, and religious areas, as stated in Chapter 2. Mass housing production has resulted in the emergence of many properties, but the quality is often subpar due to the increase in housing demands (Gür, 2009). Numerous studies in the literature demonstrate that while social mass housing projects fulfill the expected housing demand by increasing the production of housing units, they often fail to provide user satisfaction due to the lack of emphasis on producing high-quality housing. In Turkey, social housing, urban transformation, and improvement projects have been subject to frequent criticism by both academic and non-academic media (Mass Housing Administration, 2016). Difficulties in obtaining social housing for low-income families, along with the feeling of social exclusion experienced by those who live in such areas and the poor quality of housing planning and

design, have been long discussed by architectural designers. It has been argued that using the same architectural plans for all housing production without considering the design's social, cultural, topographic, and geographical context leads to physical and functional deficiencies. The spatial organization of these plans results in fixed layouts and low-usage areas that do not allow for remodeling (Bican, 2020). Given the current circumstances, it has become crucial to conduct research to assess the level of satisfaction of families residing in social housing, particularly during the pandemic when most people are confined to their homes. This will help identify areas for improvement in the social housing designs that are being developed daily to enhance the residents' overall living experience.

DATA AND METHOD

Study Area

The city of Edirne, chosen as the study area, is a city in the northwest of Turkiye, located in the Marmara region, which includes metropolitan cities such as Istanbul, Bursa, and Tekirdag and covers the entire border of the country with Greece and most of the border with Bulgaria. The city, adjacent to the Aegean Sea in the south, has maintained its importance as a settlement on transit routes throughout history due to its location. Today, Turkiye, which is mainly in the Anatolian peninsula and the Asian continent, is the most extreme point on the European continent, as it is located in the Thrace region, separated by the straits. This means that the country and the Middle East are on the border with the European Union, being on the border between East and West both culturally and politically, and this location has economic, social, and cultural consequences. Despite this, according to TUİK data, although there was a decrease in the population until 2010, a rapid increase was observed in the city's population after this year (Türkiye İstatistik Kurumu, 2023). The reasons for this increase include the rise in the number of university students due to the Higher Education Institution's Strategic Plan in 2007, Turkey's offering of a more comfortable life for citizens from Europe because of the global economic crisis since 2008, immigration and refugee movements resulting from the civil war in Syria and other Muslim-based countries since 2010, and Edirne's location on transit routes between countries (Deniz, 2014).

Housing construction has increased rapidly in Edirne in recent years, in parallel with the increase in population in many cities in Turkiye. Today, owning a house has become a challenge not only for low-income families but also for middle-income families. As housing prices continue to rise, there is a growing demand for social housing that provides more affordable solutions to owning a house. In Edirne, social housing projects were developed in 7 stages in Firinlarsirti and Hadimaga. (Figure 1, Figure 2) Since the number of houses and users in the Hadimaga settlement was insufficient and did not have conditions suitable for the study, it was excluded, and the houses in the Firinlarsirti locality were included. In 2021, the foundations of 221 houses were laid in Hadimaga as the 7th stage, and finally, 120 houses as the 8th stage in 2022.

All residences, except for stages 4 and 7, are situated in Firinlarsirti. The first phase of the residences was built in 2007, consisting of 784 residences in 49 blocks. Each block has 16 flats, and 26 of them are "K type" with a 3+1 plan, while 23 are "F type" with a 2+1 plan scheme. The second phase of the residences was built in 2009, comprising 458 residences in 28 blocks. There are 176 flats in 11 blocks, called "BY type," with a 1+1 plan scheme, and 282 flats in 17 blocks, called "DY type," with a 2+1 plan scheme. The 3rd stage, built in 2010, includes 368 flats with a 2+1 plan scheme in 11 blocks called "CYB" type. The 5th stage consists of 80 residences, "B1 type," built in 5 blocks in 2014, consisting of 2+1 residences. In 2017, 137 residences were built, 97 of which are called "A type," with a 2+1 plan scheme, and 40 are called "D type," with a 3+1 plan scheme. Due to the growing need for public housing for low-income individuals, the number of social houses in Edirne increased from 784 to 2468 in 2021. These residences are

Figure 1. Social mass housing in Edirne.

Figure 2. Working area: Social housing in Firinlarsirti location (Edirnejet news, 2022).

on a 60,000-square-meter settlement in Firinlarsirti, with 24,000 square meters of green areas. Besides the residences, the Firinlarsirti settlement also includes schools, nurseries, health centers, commercial centers, mosques, children's playgrounds, outdoor seating, recreation areas, and sports areas in the design. (Figure 3)

In addition to allocating space for a healthy infrastructure system, the planning includes transportation connections with the city, ramps for disabled access at residential entrances, and necessary points. (Figure 4)

The apartment complex comprises buildings with four floors, a ground floor, and three upper levels. Each floor has four apartments, most 2+1; they have 1+1, 2+1, or 3+1 plan schemes. (Figure 5) The apartments have a usable area ranging from 48 to 106 square meters. Depending on the plan scheme, the apartments have two or three bedrooms, a kitchen, a bathroom, and a balcony. For instance, the 1+1 apartments are designed without a balcony, with an open kitchen-living room, a bedroom, and a bathroom. On the other hand, the 2+1 and 3+1 apartments have separate kitchen-living rooms, bedrooms, and a bathroom. The 3+1 apartments have a balcony that is connected to their kitchens. The design clearly shows that the day and night parts of the apartments have been planned separately, and spatial relations have been established functionally. The planners included a sufficient size and number of windows to provide room lighting and ventilation. In contrast, small numbers and sizes have included open spaces such as balconies. The apartment sizes have been planned to create minimum areas to meet the needs.

Figure 3. Images from the social areas of the residences.

Figure 4. Images from residences.

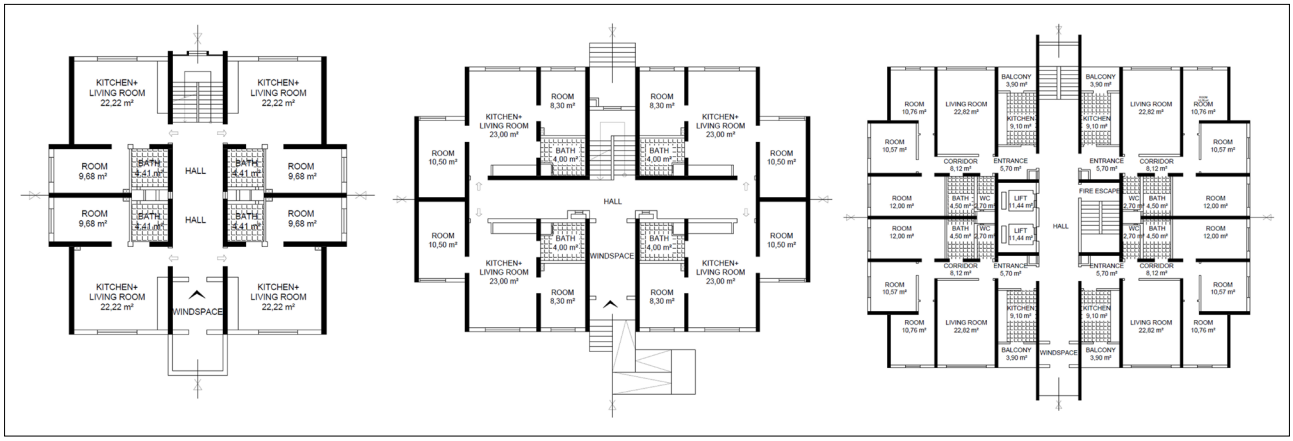

Figure 5. 1+1,2+1 and 3+1 housing plans of Edirne Fırınlarsırtı social housing (TOKİ, 2023).

Data Collection

The data for the study, which aims to measure the satisfaction level of users living in social mass housing built by the state during the pandemic, was obtained through a survey. During this period, curfews and the rapid infectious effect of the virus prevented users and surveyors from meeting face-to-face, and the necessary legal permissions to conduct the survey could not be obtained, so the survey investigation could only be carried out after the pandemic. All survey forms prepared using scientific research methods were conducted in face-to-face interviews with users. A simple random sample selection technique determined the participants among the probability-based sample selection types. All 50 questions were asked to users, of which ten were multiple-choice. The remaining 40 questions were based on a 5-point Likert scale, ranging from "very dissatisfied" to "very satisfied." These questions were carefully selected after reviewing previous literature on user satisfaction in social housing for low- and middle-income groups and satisfaction with housing during the pandemic. The survey was divided into five main sections: demographic characteristics of the user, spatial characteristics of the residences, environmental characteristics of the residence, structural characteristics of the residence, and characteristics of the residence-city relationship. The survey was conducted between April 13, 2023, and May 15, 2023. It targeted 457 people between 12:00 and 18:00, during which housewives usually stayed home most of the day. The necessary permissions were obtained from the Trakya University Institute of Social Sciences Ethics Committee in February 2023, along with the survey questionnaire and application petition. The sample size was calculated using Cohen's sample calculation table (Cohen, 1988). Out of the total number of users, 73 individuals declined to participate in the survey, and the responses of 6 users were considered invalid. The survey was conducted with the remaining 378 participants who spent the entire pandemic period in these residences.

Method

We first thoroughly reviewed national and international literature in our research. We examined user satisfaction studies in mass housing built for middle- and low-income families in various countries worldwide and also researched the changing use of houses during the COVID-19 pandemic. In the next stage, on-site detection, examination, observation, and photographs were carried out in Edirne Firinlarsirti residences, which was determined as the study area. A face-to-face meeting was held with the site management to obtain the necessary information and access the architectural projects of the residences. In the next stage, a survey investigation was conducted, a quantitative data collection technique widely used in housing satisfaction research to measure user satisfaction. The answers were transferred to the SPSS program, and answers to the research questions were sought with correlation and factor analysis. In order to measure the relationship between satisfaction and the variables in each section of the survey, correlation analyses were conducted between the variables. In order to determine their effect on general satisfaction, the variables were classified by factor analysis. Regression analyses were subsequently conducted to determine the effect of the found factors on satisfaction. The stages of the study are shown below. (Figure 6)

RESULTS AND FINDINGS

Demographic Information

In light of the information obtained from the survey, the frequency distribution of the demographic characteristics of the users is shown in Table 1. According to this,

- 225 (59.5%) of the participants are female, and 153 (40.5%) are male participants.
- 116 participants (31%) are 18-24 years old, 46 people (12.2%) are 25-39 years old, 81 people (21.4%) are 40-54 years old, 115 people (30.4%) are 55-69 years old, and 20 people (5.0%) are over age 70.
- 207 participants (54.8%) are married, and 171 (45.2%) are single.
- 89 (23.5%) of the participants are literate, 47 (12.4%) are primary school graduates, 99 (26.2%) are high school

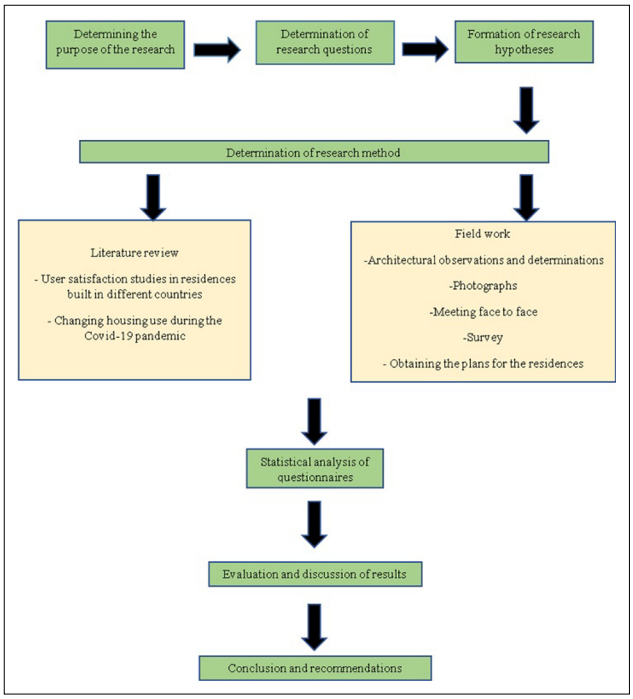

Figure 6. Stages of the study.

Table 1. Demographic information frequency analysis

	N	%
Gender		
Female	225	59,5
Male	153	40,5
Age		
18-24	116	31,0
25-39	46	12,2
40-54	81	21.4
55-69	115	30,4
70>	20	5,00
Condition		
Married	207	54,8
Single	171	45,2
Educational status		
Literate	89	23,5
Completed primary school	47	12,4
High school graduate	99	26,2
Associate degree	53	14,0
Bachelor's degree	82	21,8
Post graduate	8	2,1
Vocation		
Civil cervant	35	9,3
Worker	28	7,4
Health	18	4,8
Housewife	54	14,3
Unemployed	8	2,1
Retired	83	21,9
Freelance	82	21,7
Student	70	18,5
Total monthly income (₺)		
5.000-9.000	46	12,2
9.001-11.000	52	13,7
11.001-20.000	100	26,5
20.001-35.000	110	29,1
35.001>	70	18,5

graduates, 53 (14.0%) have associate degrees, 82 (21.8%) have Bachelor's degrees, and 8 (2.1%) have postgraduate education.

- In the occupational status distribution, 35 participants (9.3%) are civil servants, 28 (7.4%) are workers, 18 (4.8%) are healthcare professionals, 54 (14.3%) are housewives, 8 (2.1%) are unemployed, 83 (21.9%) are retired, 82 (21.7%) are freelance, and 70 (18.5%) are students.
- In monthly income distribution, 46 of the participants (12.2%) earn between 5,000-9,000 ₺, 52 (13.7%) earn 9,001-11,000 ₺, 100 (26.5%) earn 11,001-20,000 ₺, 110 (29.1%) earn 20,001-35,000 ₺, and 70 (18.5%) have a monthly income of 35,001 ₺ and above.

FINDINGS REGARDING HOUSING TYPE AND USERS

The first stage of the residences, which were built in 7 stages in total, is the Fırınlarsırtı residences, which were built in 2007 and consist of 784 houses. In the same region, the construction of a total of 826 additional houses continued in the second and third stages in 2009 and 2010. In 2011, 420 houses were built in the 4th stage in Hadimaga. In 2014 and 2017, 217 houses in the fifth and sixth stages were constructed in Fırınlarsirti, and in 2021, 221 houses in the 7th stage were built in Hadimaga. Finally, in 2022, the foundations of 120 houses were laid as the 8th stage in the Hadimaga location. According to the survey results, information about the characteristics of the houses and the users is shown in Table 2.

Table 2. Residence and housing estate information

	N	%
House satisfaction during the pandemic		
Very satisfied	0	0
Satisfied	225	60
Medium	117	31
Not satisfied	17	4
Not satisfied at all	19	5
Property status		
Homeowner	160	42,3
Tenant	209	55,3
Other	9	2,4
Number of household		
1	64	16,9
2	118	31,2
3	142	37,6
4	47	12,4
5>	7	1,9
Type of residence		
264	69.8	2+1
52	13.7	3+1
62	16.5	1+1

- 160 participants (42.3%) are renters, 209 participants (55.3%) are homeowners, and 9 participants (2.4%) live temporarily in a relative's house.
- 64 (16.9%) of the participants live alone, 118 (31.2%) live with two people, 142 (37.6%) live with three people, 47 (12.4%) live with four people, and 7 (1.9%) live with five or more people in their residences.
- 264 (69.8%) of the residences consist of 2+1, 52 (13.7%) consist of 3+1, and 62 (16.5%) consist of 1+1 plan schemes.

The hypotheses of the study, which aims to measure user satisfaction in social housing where middle and low-income families live during the pandemic, are as follows:

- H1: User satisfaction is related to the user's demographic characteristics.
- H2: The most influential factor in user satisfaction during the pandemic is the adequacy of the house's interior space.
- H3: During the pandemic, the environmental characteristics of the house and its open and green area arrangements affected user satisfaction.
- H4: The house's location relates to satisfaction during the pandemic period.
- H5: During the pandemic, users' access to the needed units did not affect user satisfaction.

STATISTICAL ANALYSIS FINDINGS

Reliability Analysis

The reliability of the scales of the 5-point Likert-rated questions throughout the questionnaire was tested and compared with both Cronbach's alpha and exploratory factor analysis. In the reliability analysis of the questionnaire, in which participant preferences were measured with 35 Likert-scale expressions, the "Cronbach's alpha" finding of 0.892 showed that the scale was highly reliable (Table 3). (Cortina, 1993).

Analyses Determining the Relationship Between Demographic Characteristics and General Satisfaction

The relationship between the user's demographic characteristics and overall satisfaction with the residence was determined by multivariate regression analysis at a 95% confidence interval. As a result of the analysis, the Anova Sig. $p<0.001$ value showed that the established regression model was significant and that at least one of the independent variables consisting of demographic characteristics significantly affected overall satisfaction. In addition, finding the "adjusted R^2" value of 0.280, as shown in the model summary table, has shown that 28% of the overall satisfaction was due to the demographic characteristics of the users (Table 4).

In the next step, correlation analysis was performed to determine the degree, strength, and direction of the relationship between the variables that make up the demographic characteristics and general satisfaction. Correlation analysis is an analysis method that shows the linear relationship between two or more variables in scientific research. The correlation coefficient calculates the relationship between the variables. The correlation coefficient to use depends on the scale level of the variables, whether they are continuous or discontinuous, and whether the data is linear or not. In the analysis, the overall satisfaction average was found to be 3.45. The VIF (variance inflation factor) values, as shown in Table 5, were below 4, indicating that the relationship between the

Table 3. Reliability Analysis (Cronbahs alpha)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,892	,895	35

Table 4. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	ANOVA Sig.
1	,544a	0,296	0,280	0,673	<0,001

Table 5. Relationship between demographic characteristics and general satisfaction, Correlation table

	Mean	Std. Deviation	N	VIF	Sig.	Pearson Correlation
General Satisfaction	3,45	0,794	378			
Age	2,67	1,170	378	2,592	,300	,111
Gender	2,81	1,453	378	1,401	<,001	-,194
Marital Status	2,36	1,495	378	2,072	<,001	,275
Educational status	2,10	1,131	378	1,419	,922	,005
Vocation	3,60	2,586	378	3,370	<,001	,194
Property status	2,69	1,474	378	1,463	,015	-,125
Number of House hold	2,81	1,076	378	1,480	,003	-,150
Monthly income	2,24	1,044	378	1,073	,790	,014

variables was not strong. Therefore, the model did not have a multicollinearity problem (Hair et al., 1995). According to the correlation analysis table, the "sig. value" of demographic characteristics such as gender, marital status, occupation, property, and the number of people in the household statistically significantly affects overall satisfaction, with $p<0.05$. In this instance, the data did not support the H1 hypothesis, positing that all demographic characteristics affect satisfaction. It was observed that age, education level, and income level do not significantly affect satisfaction ($p>0.05$). Upon examining the Pearson correlation values among these characteristics, it was found that marital status and occupation positively correlated with general satisfaction. At the same time, gender, property ownership, and the number of people in the household showed a negative correlation. This analysis suggests that individuals who are married, male, retired, and homeowners tend to be more satisfied with their homes. Furthermore, it was observed that satisfaction levels tend to increase as the number of people in the household decreases.

Analyses Determining the Spatial Adequacy of the House During and Before the Pandemic Period

The adequacy of the spatial features of the house, which constitutes the second part of the survey, was evaluated by frequency analysis. It has been observed that changing lifestyles before and after the pandemic have changed users' ideas about their homes (Table 6).

The acquired data from frequency analysis reveals that 76% of users were satisfied with the spatial adequacy of their residences before the pandemic. However, following the pandemic, this percentage decreased to 57%. Additionally, it was ascertained that out of the 42% of users who found their homes inadequate after the pandemic, 14% undertook spatial changes to cater to their needs. The findings indicate that the changes made to the living spaces were predominantly aimed at increasing the usable area. Specifically, 68% of users reported incorporating their kitchen balcony into the kitchen, while 31% combined their kitchen and living room.

Table 6. Frequency analysis of spatial adequacy and changes in housing before and during the pandemic

	Frequency	Percent(%)
Before the Pandemic		
Sufficient	288	76,20
Insufficient	90	23,80
During the pandemic		
Sufficient	216	57,10
Insufficient	162	42,90
Spatial changes during the pandemic		
Spatial changes made	54	14,30
No spatial changes	324	85,70
Type of the spatial chang		
Combining the balcony with the kitchen	37	68,52
Combining Kitchen and Living Room	17	31,48

In the next step, factor analysis was performed to reduce the number of variables by separating the correlated ones among 35 variables according to their categories and obtaining fewer factors. However, before this stage, whether the data was suitable for factor analysis was measured with the "KMO coefficient" and "Bartlett's Test of Sphericity" (Büyüköztürk, 2007). The KMO coefficient is a number that indicates whether the sample size is suitable for factor analysis. For the sample size to be sufficient, the KMO value must be at least 0.60 and above; Bartlett's test should also be significant ($sig.<0.05$) (Tabachnick & Fidell, 2013). As a result of the analysis, the KMO value was 0.627, and the Bartlett test result was $sig<0.005$, indicating that the data were suitable for factor analysis and that the sample size was sufficient (Table 7).

Analyses Determining the Factors Affecting Satisfaction and Their Degree of Impact

After conducting exploratory factor analysis, we excluded satisfaction scales with a "factor loading" value below 0.5 and those loaded on more than one factor. These scales included bath size, number of bathrooms, separate kitchen, open kitchen, open spaces, pedestrian ways, resting areas, shopping opportunities, scenery, anti-theft security, and ventilation. We concluded that these factors did not affect housing satisfaction during the pandemic. Among the variables that were not included in the analysis, when the kitchen size scale was excluded, the reliability rate decreased, so it was included in the analysis without being excluded from the grouping. Among the 35 variables, 22 scales with a "factor loading" value above 0.5 were considered. Following the factor analysis, we identified variables with an "eigenvalue" exceeding 1, reducing the variables to five primary factors: environmental house features, accessibility to necessities, interior adequacy, location characteristics, and structural attributes. The structural features of the house constituted 28% of the total variance, the environmental features 14%, the interior adequacy 10%, the location of the settlement 7%, and accessibility 7%. All factors together

Table 7. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	,627
Bartlett's Test of Sphericity	
Approx. Chi-Square	4928,483
df	210
Sig.	,001

explained 65% of the total variance, showing that they affected 65% of the variation in overall satisfaction (Table 8).

In the next step, as a result of factor analysis, the average of the scales divided into five main groups (variables computed by mean) was subjected to multiple linear regression analysis. Thus, the effects of these five main factors on overall satisfaction were revealed. (Table 8)

According to the "adjusted R^2" value in the model summary, all factors affect approximately 29% of overall satisfaction. In other words, 29% of overall satisfaction is based on these five main factors. Since the significance value in the ANOVA analysis is $p<0.001$, at least one factor significantly affects overall satisfaction. (Table 9).

A correlation analysis was conducted between the variables and satisfaction in order to determine the effects of the variables determined under the five main factors on user satisfaction (Table 10). Column 1 on the table shows the

Table 8. Factor analysis of variables that have an effect on satisfaction

Items	Variables	Factor Loading	Eigenvalue	Variance(%)	Cumulative Variance(%)
Main factor: Structural features			6,081	27,639	27,639
HA1	Disaster resistance	0,821			
HA2	Physical condition	0,736			
HA3	Thermal insulation	0,653			
HA4	Sound insulation	0,649			
HA5	Material quality	0,649			
Main factor: Environmental features of the house			5,078	13,609	41,248
HA6	Green spaces	0,729			
HA7	Playgrounds	0,694			
HA8	Sports fields	0,575			
HA9	Block distances	0,565			
HA10	Parking adequacy	0,565			
Main factor: Interior adequacy			2,186	9,937	51,185
HA11	Number of rooms	0,788			
HA12	Balcony size	0,778			
HA13	Kitchen size	0,570			
HA14	Living room size	0,538			
HA15	Bedroom size	0,517			
HA 16	Entrance hall size	0,471			
Main factor: Location			1,591	7,233	58,418
HA17	Public transport facilities	0,869			
HA18	Urban location	0,807			
HA19	Distance to the city center	0,710			
Main factor: Accessibility			1.547	7,033	65,452
HA20	Access to health units	0,586			
HA21	Access to shopping units	0,580			
HA22	Access to education units	0,577			

Table 9. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	ANOVA Sig.
1	,543[a]	,295	,285	,671	<0,001

a. Predictors: (Constant), structural features, location, accessibility, external features and interior adequacy

Table 10. Descriptive statistics and correlations between variables

	1	2	3	4	5	VIF
General Satisfaction						
1- Exterior features	1					1,369
2- Accessibility	0,271*	1				1,497
3-Interior adequacy	0,299*	0,339*	1			1,850
4- Location	-0,176*	0,441*	0,325*	1		1,566
5- Structural features	0,182*	0,255*	0,586*	0,168*	1	1,538

*p< 0.01.

values about exterior features: the 2nd column is accessibility, the 3rd column is interior adequacy, the 4th column is location, and the 5th column is structural features. Upon examining the ratios of all factors to each other in the matrix based on the values in Table 10, it is evident that no value exceeds 0.800, and the VIF values are all less than 4. This indicates that the relationship between the variables is not highly robust, thus confirming the absence of multicollinearity in the established model. (Hair et al., 1995).

In the next step, the accuracy of The study's H2, H3, H4, and H5 hypotheses was tested by regression analysis. In the regression analysis, it was found that all five factors have a significant effect on overall satisfaction, with p-values less than 0.05 (see Table 11). The β value examined in this test quantifies the influence of the independent variables on the dependent variable. The fact that the β value of the house's structural features is β=0.317 showed that the variable that most affected satisfaction was the structural features. The residential environment characteristics followed this β value ranking, the interior space adequacy of the house, and the house's location. Access to needs in the settlement was found to have little effect on satisfaction (Table 11).

Table 11. Effect of factors on general satisfaction*

	β	t	Sig.
(Constant)	0,963	4,215	<0,001
Structural features	0,317	4,586	0,000
Environmental features	0,277	4,890	0,000
Interior adequacy	0,251	3,847	0.000
Location	0,176	3,192	0,002
Accessibility	-0,150	-2,066	0,040

*Dependent Variable: General Satisfaction.

DISCUSSION AND EVALUATION

The pandemic has forced us to stay home, making ensuring user satisfaction with our living space more important than ever. A recent study identified five factors that determine satisfaction, all of which positively affect it. The data gathered from the survey revealed that during the pandemic, users were mainly satisfied with their homes' structural features, environmental features, and interior adequacy. However, they were less satisfied with the location and access opportunities. Regression analyses were conducted separately to determine the relationship between satisfaction and the subheadings of each of the five primary factors. While the correlations between the variables were examined to determine the relationship, not all were included in the article due to page limitations. The main findings of the study can be summarized as follows:

- Through this exceptional process, it has been determined that most users are generally content with their homes. The house's spatial and structural aspects, the surrounding environment's features, and the location and accessibility of the settlement where the house is situated have all contributed to ensuring that the user is satisfied with their dwelling.
- It has been observed that users' specific demographic characteristics directly impact their satisfaction levels. Among these characteristics, marital status, profession, gender, ownership status, and the number of people living in the household are the key factors that affect satisfaction. Studies have shown that users who are male, married, retired, homeowners, and have 1-2 people living in their household tend to be happier. However, these findings may differ from study to study, as the demographic parameters affecting satisfaction can vary. For instance, Maina (2021) conducted a study in Nigeria and found user satisfaction was higher among families with 4-6 people, high-income levels, who had lived in their residences for more than ten years, and had more than three bedrooms. In a study conducted by Mohit et al (2010), the researchers explored the factors affecting

user satisfaction in homes built for low-income families in Malaysia. They discovered that satisfaction was influenced by various aspects such as age, household size, number of working individuals, profession, house size, previous residences, and even the house floor. Meanwhile, Inha et al (2009) found that satisfaction levels decreased in Korea with lower income and higher age. Another study in Bangladesh examined housing satisfaction from a socio-demographic perspective and revealed that age, gender, and marital status impacted the level of satisfaction. In particular, married, elderly, and women expressed higher satisfaction levels (Mridha, 2020). Dekker et al. (2010) researched nine European countries and discovered that as age and income levels increased, families tended to become more satisfied with their housing.

- During the pandemic period, the house's structural features had the most positive effect on user satisfaction. Other sub-factors that increased satisfaction included the excellent physical condition of the houses, the provision of qualified thermal insulation, and the good physical appearance of the buildings. The thermal insulation of the rooms, which were frequently ventilated to reduce the spread of infectious viruses, satisfied the users by ensuring thermal comfort. Choosing high-quality materials that provide thermal insulation during the construction phase, reflecting innovations in construction practices by considering the advancements in material technology, and carrying out inspections with a meticulous attitude and sensitivity during the application phase have enabled the production of structurally high-quality houses. Good sound insulation has become very important during this period for individuals who spend most of their daily lives working remotely and sharing separate spaces, as well as for students receiving distance education. However, it was determined in the analysis that users were not satisfied with the sound insulation and craftsmanship of the materials used and the heat insulation. Users evaluated the presence of social facilities in their settlements as a positive factor during closure periods with curfews. So much so that the environmental features of the house affected satisfaction even more than the interior space capabilities. The importance of settlements having places where individuals can go to open spaces, walk-in gardens, spend time in nature, provide entertainment for children in playgrounds, carry out sports activities, and have a high-quality physical environment was better understood in this period. During this period, individuals over 65 are at higher risk of going out on the streets. Therefore, having access to open and green areas within their settlement, where they can maintain social distance, has been crucial. It has allowed them to spend this period more comfortably and improve their quality of life and satisfaction. Users have expressed satisfaction with the social areas of their residences and the adequacy of these areas. Spending time in open spaces helped to mitigate the adverse effects of being away from social life and interaction. Martin et al. (2012) found that the lack of open spaces around housing negatively affects satisfaction. Torres et al. (2021) reported that users were generally unsatisfied with the insulation during this period. However, having open spaces such as terraces and verandas in their residences helped them go through this process more comfortably. Peters & Halleran (2020), Gür (2022), and Yüksel (2022) have pointed out that giving importance to environmental regulations in design can increase user satisfaction. Grum (2016) identified three parameters that determine user satisfaction: the house's physical, environmental, and socio-economic characteristics. Ghazizadeh & Rückert (2013) stated that designers should consider residential environmental design an essential part of the planning process.
- Most houses have 2+1 plan schemes and 1+1 and 3+1 plan types. The houses' interior space adequacy and physical features are important factors that positively affect users' general satisfaction. Before the pandemic, users were generally satisfied with the spatial features of their houses. However, after the pandemic, there has been a decrease in the number of people satisfied with their houses. The size and number of some spaces, such as balconies and kitchens, were inadequate to the users' needs, which reduced satisfaction with the interior space adequacy. As a result, some users have enlarged the usable area by including the balcony belonging to the kitchen or expanded the living room volume by removing the wall between the living room and the kitchen. This situation has highlighted the importance of including flexible spatial solutions in planning during the design phase. The cost of flexible planning is often avoided despite being the most beneficial solution for users in the long run. Özyurt & Altun (2015) found that the number and size of balconies in housing were insufficient, and users needed more balcony space. Studies in the literature mainly conclude that user satisfaction during the pandemic is related to satisfaction with the house's interior. Bettaieb & Alsabban (2020) emphasized that spatial needs have changed due to COVID-19 and that planning should include flexible spatial solutions. The lack of flexibility in design is attributed to cultural, structural, and functional issues. Alawad (2021) stressed the importance of adequate interior space and flexible space solutions in design. The pandemic allowed users to get to know their homes better, and their perspectives on their homes have changed. Peters & Halleran (2020)

emphasized that architects are responsible for creating healthier user living environments in their designs. They highlighted the importance of mental health, suggesting that interior windows be designed to maximize daylight exposure and placed in positions that overlook the sky, green areas, or city streets. Clean air quality, thermal comfort, and acoustic separation were necessary for good living conditions. In addition to balconies, green spaces, common lounges, roof terraces, and courtyards should be included in outdoor spaces for residences, allowing for access to nature while maintaining social distancing. Yüksel (2022) also stressed the importance of flexible design for housing, while Gür (2022) noted that user habits and spatial needs have changed with the pandemic, necessitating additional space in residences. They recommended that future designs prioritize balconies and outdoor green areas. According to Martin et al. (2012), three critical factors affect satisfaction when it comes to housing. These factors are related to outdoor space, interior quality, and satisfaction with structural features. The study found that the type of housing, the number of spaces in the house, the small size, and the general insulation in the interior spaces harm satisfaction. Additionally, the authors suggest that existing housing stock should be updated to prepare for possible emergencies and improved to enhance the user's quality of life.

- Although the location of the settlement appears to have less impact on satisfaction than other factors, users' satisfaction was increased because the residences are near the city center. However, limited and inadequate access to the center and other parts of the city through public transportation reduced the effect of satisfaction. Users were least satisfied with their access to healthcare units, shopping centers, and education units. Access to hospitals via public transportation is risky for users, mostly aged between 55 and 69, who have health issues and no private vehicle due to the contagious effect of the virus. In this period, when there are curfews throughout the country of Turkey, accessing markets during certain hours on weekdays and full-time on weekends to meet families' food needs has been difficult for users due to the remoteness of the settlement. In general, it has been concluded that users are dissatisfied because the settlement is far from health, education, and shopping facilities. Therefore, it is essential to plan social housing designs according to the principles of correct location selection. Böge (2019) and Yin et al. (2019) discovered that satisfaction decreased as the distance of residences from shopping centers increased. Similarly, Aksel & İmamoğlu (2020) found that satisfaction decreased as the distance from the city center increased. Ruiz et al. (2019) stated that user satisfaction with the settlement's location is linked to their perception of well-being.

Several studies have examined local and foreign publications investigating user satisfaction in social housing built for low-income families, regardless of the pandemic's impact on user satisfaction. Gür (2009) conducted a study on social housing implemented in Turkey, which found that quality housing is available in these housing units. Nevertheless, some findings indicate that production targets are not considered, and typical projects are produced. Böge (2019) conducted a study investigating user satisfaction in social housing and emphasized the need to design social housing environments in new areas that align with the user's usage habits and preferences. The study concluded that security measures in residences and inadequate garbage collection services negatively affect satisfaction. Kutor et al. (2022) revealed that housing users who have lived in the settlement for a long time, have good social relations, and receive support from local governments are more satisfied with their housing. Özyurt & Altun (2015) found that satisfaction mainly stems from the choice of location where the houses are located, and being in areas outside the city with green areas and playgrounds for children positively affects satisfaction. The studies show that dissatisfaction with housing during the pandemic is related to the limited usage area and number of spaces. The need for more extensive and more comfortable living spaces has become apparent. The housing design should prioritize open spaces, balconies, terraces, and flexible spaces. Insulation is also deemed necessary in general. The studies have also highlighted the significance of social reinforcement areas and environmental regulations. Overall, these findings are similar to those of many other publications reviewed, and any differences detected are thought to be due to the socio-cultural and economic reasons of the user.

CONCLUSION AND RECOMMENDATIONS

This research focused on determining the satisfaction of users living in social mass housing produced for low- and middle-income families during the COVID-19 pandemic. For this purpose, the parameters affecting user satisfaction and the relationships between them were determined by regression analysis, which is the most widely used in scientific studies and gives the most accurate results. In the study, five factors were found to affect user satisfaction positively. Among these, the three highest factors were determined to be the structural features of the house, environmental features, and interior space adequacy. It has been observed that the location of the settlement and access to needs are the factors that have the least positive effect on satisfaction, and even the access to needs factor has a decreasing effect on satisfaction.

In general, it was observed that 91% of the users were satisfied with their homes during the pandemic, and some demographic characteristics affected satisfaction. These features include the user's marital status, profession, and gender. According to the research results, married, retired, and male users are more satisfied with their homes than other user profiles. It can be said that single users were not satisfied with this period because social interaction was minimized, and people could only communicate with individuals within the house. Before the pandemic, family members who could not stay at home or be together for long periods due to busy school and work lives had the opportunity to spend time together and get to know each other better during this time. However, the fact that all family members are always at home during the day has increased the workload of the women in the house. While women continue to work remotely, they have had to deal more with eating and drinking, cleaning, childcare, and household chores. Due to changes in the amount of time spent at home and how homes are used during the pandemic, many people have found that their living spaces are insufficient for their needs. Women, who typically have more involvement with the home than men, have experienced decreased satisfaction with their living arrangements. For this reason, it has been determined that the overall satisfaction of male users is higher than that of females. The fact that retired users over the age of 65, who were most targeted by curfews and most negatively affected by the virus, had the opportunity to spend time with each other in the green areas of their settlement during this period increased their satisfaction levels. Satisfaction levels were higher for homeowners who owned residential property, as they lived here permanently, than tenants.

Researchers have been attempting to answer a question regarding the COVID-19 pandemic: "What factors affect housing satisfaction, and how do these factors impact satisfaction apart from demographic characteristics?" The findings indicate that users were primarily satisfied with the structural features of their homes, such as disaster resistance, thermal insulation, and physical appearance. Notably, satisfaction with the house's structural features was considered more important than other factors like interior comfort, adequacy, and physical environmental quality. Among the structural features, it was observed that the factor that increased user satisfaction the most was the disaster resistance of houses, thanks to solutions such as raft foundations, tunnel formwork carrier systems, and high concrete strength applied in buildings. The fact that the Firinlarsirti location was considered the safest area of the city by seismic experts has increased users' confidence and satisfaction in their homes in the Edirne social housing. This study has again shown how vital ground strength is in choosing the location of mass housing. Adequate insulation material thickness and coated-insulated glasses help maintain thermal comfort in houses, increasing user satisfaction. Moreover, the good exterior appearance of buildings is another structural factor that enhances satisfaction. It has been observed that environmental and climatic conditions do not harm houses; even after 16 years of age, they look solid and durable from the outside. However, two structural factors can reduce house user satisfaction: sound insulation and the quality of materials used in construction. During the pandemic, users faced difficulties due to sound interference between floors. The absence of materials such as stone wool and glass wool for sound insulation led to poor sound insulation. Despite aiming for quality in housing production, it has been observed that material and technical requirements are not met sufficiently, leading to user dissatisfaction.

In all mass housing settlements, the design of the surroundings of the houses is as important as the housing design. This study observed that the users of Edirne social housing estates were more satisfied with the housing environment's features than the adequacy of the house's interior space. This can be explained as the longing for nature and understanding the importance of green spaces, as users must stay home during the pandemic. The presence of vast open and green areas in the settlement, the communication established with the neighbors in the apartment gardens, and the hours spent ensured that the neighborly relations remained strong. The playgrounds in the neighborhood allow children who are unable to attend school to engage in distance learning. Additionally, residents have access to sports facilities for activities like basketball and volleyball, and there are plenty of safe parking spaces for their vehicles. These amenities contribute to the overall satisfaction of the residents. Considering the social distance, the common areas that strengthen the interaction between the individuals have increased satisfaction. In addition to the social reinforcements, users stated they were satisfied with the distance between the blocks.

The study observed that satisfaction with the adequacy of the residential interior space was also high, except for balcony size, kitchen size, and number of rooms. During this period, open spaces such as terraces and balconies were life-saving, so the interest and need for these spaces increased, and the size of the existing balconies became insufficient. The importance of including more oversized balconies in the design that can be opened and closed when necessary has been understood. The fact that the entire household stays at home all the time and there is an increase in the time and number of meals prepared at home has led to increased use of the kitchen, which has caused the kitchen size to be insufficient for the users. In addition, since kitchens, like many other spaces, sometimes serve as study rooms and classrooms, the available space is insufficient for the users. Some users have tried to intervene

in this situation by making spatial changes of their own. Apart from these two factors, it was seen that the users were satisfied with all the spatial features of the house.

Another study finding is that the user was satisfied with the house's location, an essential factor in residential settlements. Considering that the city is developing towards the ring road in the north, it is seen that the Firinlarsirti residences are also located in the developing region of the city as a part of this process. Due to its proximity to residential areas, it has been determined that the users are generally satisfied with their residences. However, according to other factors, the reason for the lower effect on satisfaction was that users avoided public transport due to the contagious virus during the pandemic period. In addition, the limited number of public vehicles reaching the region during this period was seen as a situation that reduced satisfaction and restricted access to health and education units. It has been concluded that users are not satisfied with their access to hospitals and shopping units.

This study evaluated user satisfaction in social housing built for low- and middle-income families during the pandemic. The findings showed that preparing for possible future pandemics in the housing and its surroundings is crucial for user satisfaction. The sudden and unprepared situation during the pandemic shed light on the need for new design approaches to address the negative experiences in and around the house. Therefore, conducting more studies in this direction, domestically and internationally, is essential to improve housing design further and ensure better user satisfaction.

Housing should be constructed using high-quality materials that do not compromise safety and comfort. As homes now double as schools and workplaces, it is essential to use insulation materials that effectively control sound and prevent noise pollution. A team of experts should install these materials with care and precision. Landscape design is just as important as interior design for residential spaces. The environment around the homes should be planned according to the occupants' needs, focusing on functional and practical social facilities and avoiding unused spaces. All environmental arrangements should be considered holistically, considering the continuity of life inside the house. The positive effects of green areas on human psychology should also be considered, and landscape areas should be designed in proportion to the size of the settlement, taking into account social distances and following regulations. Landscape architects play a crucial role in this regard. Social areas suitable for various activities, such as walking, eating, spending time together, resting, doing sports, parks, and hobby gardens, should be arranged in these areas. Children's playgrounds should be designed in safe areas away from traffic and visible to families. Pedestrian paths should be included in the settlement to provide easy access. In this day and age, when daylight and visual connection with the outdoors are more crucial than ever, these areas should be considered in settlement planning.

In this extraordinary period where all time is spent at home and spatial needs increase, it has been understood that interior spaces should be able to respond to activities such as work, eating, resting, and sports. The ability of a space to serve more than one function depends on its ability to be a place that can change and transform. Therefore, the COVID-19 pandemic has shown designers the importance and necessity of flexible space solutions. By incorporating flexible space solutions and modular systems into the design, spaces will have multiple functions, the number of spaces will increase, and architectural sustainability will be ensured in a spatial sense. Spaces can meet needs with open and closed systems, enlarged, reduced, and detachable. In addition, since needs will vary depending on family types, analyzing different plans will increase user satisfaction as it will offer a choice to the user. In our age where technology is rapidly advancing, including smart home systems in designs is an important method that enables the transformation of spaces in line with needs. It is a situation that increases satisfaction when the designer and the user come together, consider the user's demands, and make joint decisions by evaluating the user's opinions through mutual discussions.

According to a study, user satisfaction in the field of social mass housing in Edirne was found to be high, with a value above the average during the COVID-19 pandemic.

Two primary stages must be followed to increase user satisfaction in all future social housing plans. The first stage is to enhance and improve the positive results determined in the research conducted for this purpose to benefit the user. The second stage involves designing plans to eliminate all the negatives and deficiencies that reduce satisfaction. In future studies, user satisfaction with social housing in different countries or cities can be investigated and compared to determine similarities or differences between the factors affecting satisfaction. Therefore, with the help of the design strategies developed, housing designs with high user satisfaction can be achieved.

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Article

Resilience of rural cultural landscapes: A case study of hazelnut in the Giresun-Ordu subregion

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ABSTRACT

This article examines the resilience of the rural cultural landscape (RCL) shaped by hazelnut production in the Eastern Black Sea Region of Türkiye. Addressing the cultural landscapes shaped by agricultural production with their economic dimensions constitutes the original aspect of the article. In the study, the resilience of RCLs is discussed in the context of the socio-ecological resilience approach. The main aim is to evaluate the resilience of the RCL of the region by identifying causal relationships between socio-cultural, economic, and institutional dynamics in the Giresun-Ordu Subregion.

In the study, historical profiling, which enables the provision of context-specific detailed information, has been adopted. Within the scope of the article, the effects of the historical change and development of socio-cultural, economic, and institutional dynamics in the Giresun-Ordu sub-region on the RCL of the region are analyzed comparatively in three periods. This comparison has been carried out through agricultural production mode-method-economy, social structure and culture, and physical space features. The changing, unchanging, and evolving characteristics of the rural cultural landscape of the region were identified.

As a result of the method followed and the evaluations made, migration and demographic changes in the region have brought about adaptations in the agricultural production style, method, and economy. These adaptations have transformed the way of life by making migration permanent and continuous. It is possible to say that the rural cultural landscape of the region, which can continue its traditional economic and social structure by adapting to all these changes and transformations, is resilient.

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INTRODUCTION

Heterogeneous agricultural areas, that is, rural cultural landscape (RCL) areas where agricultural product production and management decisions are based on interactions between socio-cultural, economic, and spatial factors, cover two-thirds of the world's land surface. These areas constitute a significant part of cultural landscapes (Farina, 2000; Wrbka et al., 2004; Found & Berbes-Blazquez,

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2012; Wijetunga & Sung, 2015; Cañizares & Pulpón, 2018). RCLs are faced with interrelated economic, demographic, social, cultural, and environmental changes, such as increase/decrease in population, intensification/abandonment of agricultural activities, urbanization pressure, disaster risk, especially globalization, and climate change (Plieninger & Bieling, 2012; ICOMOS, 2017). These changes lead to a decrease in the level of welfare in rural areas, an increase in unemployment, and migration of the population to urban areas. Moreover, the aging of the population and, in parallel, a decrease in agricultural production, loss of traditional practices, rural lifestyles, local knowledge and culture, and loss of natural vegetation and biodiversity are consequent results of this process. However, these areas need to be protected to eliminate these problems—to increase the quality of life of the local people, to provide employment, to prevent migration, to ensure the continuity of tangible and intangible heritage, and to protect the natural-ecological environment (Rescia et al., 2010; Ioan et al., 2014; ICOMOS, 2017; Li et al., 2019). Therefore, RCLs are discussed in the context of a socio-ecological resilience approach that takes into account the connections between social, economic, and natural components. The resilience of these landscapes is possible by preserving and maintaining the integrity of their economic, socio-cultural, and spatial structures and functions against internal and external threats (Giannecchini et al, 2007; Rescia et al., 2010; Rescia et al., 2012; Oteroz-Rozas et al., 2012; Found & Berbes-Blazquez, 2012).

The protection of RCLs shaped by agricultural production should be considered together with the resilience of agricultural production and the agricultural economy. Only in this way is it possible to talk about the protection of RCL areas in the context of their adaptability to changes (Plieninger & Bieling, 2012; Meuwissen et al., 2019). In other words, the changes caused by the interactions between economic, socio-cultural, and spatial structures constitute the nature of the unique dynamic structure of RCLs that lives, continues, and is transmitted. In this context, it is possible to maintain the resilience and preservation of RCLs, which can maintain their traditional economic and social structures by adapting to changes (Bürgi et al., 2012; Rescia et al., 2010). Fundamentally focusing on uncertainty, change, the dynamics of change, how to adapt to change, and how to shape change, resilience is defined as the capacity of a system. This system functions to experience shocks while maintaining essentially the same function, structure, feedback, and therefore identity (Berkes & Seixas, 2005; Adger, 2000; Carpenter et al., 2001; Folke, 2006; Holling, 2001; Plieninger & Bieling, 2012; Utami, 2020; Nicholas-Davies et al., 2021; Viñals et al., 2023). In this regard, it is possible to say that RCLs can be preserved with the continuity of agricultural production and the lifestyle based on this production, and, of course, the population engaged in production.

In this context, hazelnut and tea are two products that define the RCL specific to the Eastern Black Sea Region in Türkiye. Türkiye is one of the most important producers in the world for both of these products. While the produced tea is consumed in the domestic market, the produced hazelnut is exported. Despite the demographic structure of the Eastern Black Sea Region, which has been migrating out of the region and country since the 1950s, its economy is based on agricultural production[1].

In this article, the resilience of the RCL of the region is discussed by examining the changes that the Giresun-Ordu Subregion, which we can define as the RCL shaped by hazelnut production, has undergone since the 1950s. Addressing the cultural landscapes shaped by agricultural production with their economic dimensions constitutes the original aspect of the article. From this point of view, the contribution of the study is that it offers a unique approach to evaluate the resilience of rural cultural landscapes by identifying the causal relationships between socio-cultural, economic, and institutional dynamics. This study reveals how hazelnut production in the Giresun-Ordu Subregion, which is under the pressure of urbanization and losing its rural population, continues with its own conditions and rules. It also contributes by emphasizing the critical importance of socio-cultural structures in terms of the continuity of agricultural production in the region and the resilience of the cultural landscape of the region.

RESEARCH METHODOLOGY AND DATA

This research study area includes Giresun and Ordu provinces, located in the Black Sea Region of Türkiye. (Figure 1) The reason for choosing these provinces is that they are the places where traditional hazelnut production first started in Türkiye, and hazelnut has been the main agricultural product for about 70 years (Kaptan, 1978; Kaynar, 2018). In the following parts of the study, the term Giresun-Ordu Subregion is used for these two provinces.

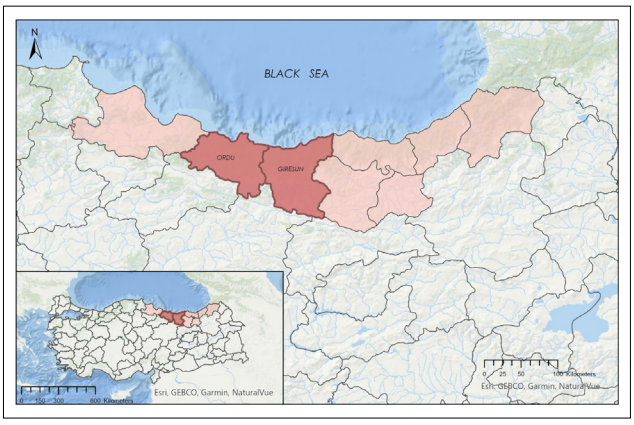

Figure 1. Location of the Giresun-Ordu subregion in the Eastern Black Sea Region.

The resilience of rural cultural landscapes is influenced by complex relationships between socio-cultural, economic, and institutional dynamics. Qualitative research allows examining these dynamics and the interactions between them in detail and provides detailed and comprehensive information specific to a particular geographical or cultural context. For this reason, a qualitative research method was followed in the study, and the examination of printed and non-printed materials for hazelnut production and the study area and observation-based determinations constitute the data collection techniques. The fact that not much is known about the ongoing processes in cultural landscapes reveals the importance of interpreting this landscape within its own historical and cultural context (Antrop, 2004; Antrop, 2005). Therefore, historical profiling was adopted as a method to evaluate the effects of socio-cultural, economic, and institutional dynamics, changes, and developments on the RCL of the region from the 1950s to the present in the Giresun-Ordu Subregion (Carpenter et al., 2005). The historical profiling method allows the effects of the change and development of these dynamics on the rural cultural landscape of the region to be addressed with a comparative evaluation. Historical analysis of RCLs is critical for classifying distinct dynamics and assessing causal relationships between different periods. For this study, considering the effects of the socio-cultural, economic, and institutional dynamics of the study area on the RCL of the region, three periods were determined: 1950-1980, 1981-2000, and 2001-2020.

The examination of the region in this context was carried out in three areas: agricultural style-method-economy, social structure and culture, and physical space.

Agricultural production style-method-economy includes features specific to the structure of agricultural production in the region. Social structure and culture include features related to the demographic structure, lifestyle, and cultural values in the region, and physical space includes features related to hazelnut production areas and land cover in the region.

The study consists of three consecutive stages. In the first stage, the examination items under three areas revealed the characteristics within which the resilience of the RCL will be evaluated. These characteristics were determined through a combination of literature review on the resilience of social and ecological systems, farm systems, and agricultural landscapes, preliminary research into the region, and assessments of the current situation regarding the resilience of cultural landscapes. In the second stage, the changes experienced in the Giresun-Ordu Subregion in three periods, 1950-1980, 1981-2000, and 2001-2020, were examined in the fields of agricultural production style-method-economy, social structure and culture, and physical space. As a result of this analysis, the unchanging, changing, and evolving historical profile of the RCL was obtained by evaluating the cause-effect relationship between each feature or different features and the change in each period. In the last stage, the changes and transformations of the RCL of the region in the historical process were determined and it was discussed whether the resilience of the RCL of the region could cope with change, could adapt to the dynamics of change, and could reorganize if necessary.

Data Sources

Primary and secondary sources were used in this study, which focuses on hazelnut production in the Giresun-Ordu Subregion of the Eastern Black Sea Region. The primary source of the study is the authors' observations of field studies carried out in the Eastern Black Sea Region, especially the city of Ordu, in July-August-September 2021 and 2023. The main contribution of the field study is the compilation of information on the hazelnut production process in the region, social relations, cultural values, and demographic and spatial structure in the rural area.

Considering the secondary sources used in the compilation of this information, historical information about the hazelnut production process, actors, institutions, and socio-cultural structure in the region is compiled from various academic research from different disciplines[2], especially the associate professor thesis titled "Eastern Black Sea Rural Area Settlement Order and Agricultural Production Relations" (Kaptan, 1978). In addition, reports of public institutions such as the General Directorate of Cooperatives (2015), the Competition Authority (Gündüz et al., 2018) and the Development Foundation of Türkiye (2022), were also used as a source of information about the current situation, actors, and institutions in the hazelnut production process. For statistical data on hazelnut production in the region and throughout Türkiye and data on demographic structure such as population, migration, immigration rate, Turkish Statistical Institute (TUIK) data between 1950 and 2020 were used at regular intervals (Turkish Statistical Institute, 2024). Information about the economic, spatial, demographic, and cultural changes in the region after the 2000s was obtained from regional plan reports. Finally, Coordination of Information on the Environment (CORINE) land cover data for the years 1990, 2000, 2006, 2012, and 2018, created by the European Environment Agency, were used to determine land use and changes.

Preliminary Information on Hazelnut Production in the Giresun-Ordu Subregion

83% of the production in the Eastern Black Sea Region, which meets 44% of hazelnut production for export in Türkiye, is defined as the traditional production region, and it is carried out in the Giresun-Ordu Subregion. The economy of both provinces is largely[3] based on the only agricultural product, hazelnut (TUIK, 2024). The approximately 298 thousand tons of hazelnut production of this subregion in

2020 correspond to 37% of Türkiye's total. At the same time, 46% of Türkiye's total hazelnut production areas are within the borders of this region (TUIK, 2024), and 22% of the raw material production in the world chocolate industry is met from here (Gündüz et al., 2018).

32% of the land cover in the Giresun-Ordu Subregion is agricultural areas, and the majority, 27%, consists of agricultural areas where hazelnut is produced. Forested areas and meadow-pasture areas, which constitute the natural vegetation of the region, define 54% of the land cover. Thus, hazelnut production areas and forested areas, two important elements of the cultural landscape of the region, constitute approximately 81% of the land cover (TUIK, 2024; Dikçınar Sel, 2021).

The Eastern Black Sea Region, which includes the Giresun-Ordu Subregion, is the region in Türkiye whose economy continues to be dominated by the agricultural sector and where agricultural employment is the highest (TUIK, 2024). In the region, ongoing agricultural economic conditions prevail due to the effects of uncertainties, constraints, or opportunities in the production of hazelnut (Kaptan, 1978). Under the influence of these conditions, domestic and international migration, which started after the 1950s and continued thereafter, had demographic and spatial reflections in the region and effects on the local economy. The prevalence of hazelnut production in the region initially caused the agricultural areas, especially corn and sub-corn vegetable areas, to shrink, and animal husbandry and transhumance to decrease. Subsequently, the conversion of forested areas into hazelnut production areas led to the decrease and aging of the rural population. The lifestyle based on four-season labor and animal husbandry has been replaced by a lifestyle based on hazelnut production, which is a seasonal occupation.

Hazelnut Cultivation and Production Process in the Giresun-Ordu Subregion

Hazelnut, which can be harvested 50-60 years after it starts to bear fruit, is produced in gardens created with traditional methods in small-scale family businesses in the region (Yılmaz, 2014; Balık, 2023). The hazelnut production process consists of three stages (Figure 2):

1. Pre-harvesting agricultural practices: With these practices carried out between May and July, hazelnut orchards are prepared for the harvest that will start in August.
2. Harvesting, threshing, storage, and transportation: Hazelnut harvesting is done in two ways by hand: from branches or from the ground. Hazelnuts brought to the threshing floor are dried for 3-5 days. Then, the hazelnuts are separated from their shells by a hazelnut sorting machine and, after being dried again in the threshing floor, they are bagged and prepared to be taken to the market. Hazelnuts require a short period of time and intense effort, including harvesting, threshing, storage, and transportation, covering 30 days of the season.
3. Post-harvesting agricultural practices: With these practices carried out between September and April, hazelnut orchards are prepared for the next harvest.

All hazelnut production activities take a maximum of 75 days, assuming a good garden of 3 hectares (Kaptan, 1978).

Except for the hazelnut sorting machine used to separate the hazelnut from its green shell and the machines used to disinfect the hazelnut quarries, all remaining production activities are carried out by manual labor (General Directorate of Cooperatives, 2015; Kaynar, 2018). The most important feature of hazelnut production in the region is that the workforce remains dependent on manual production,

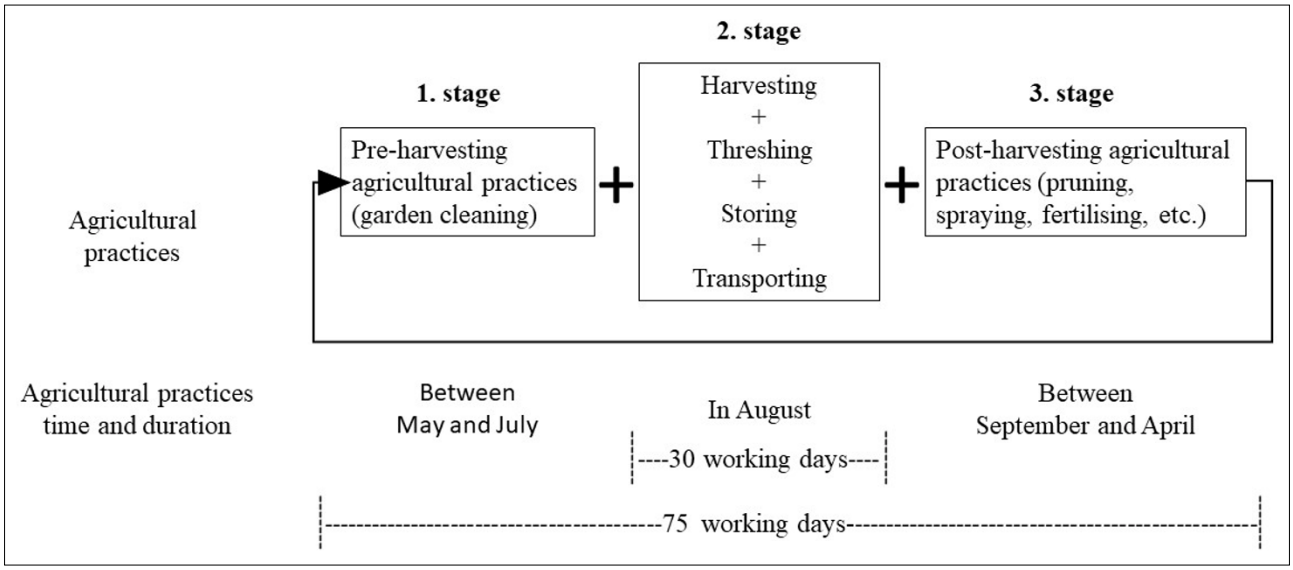

Figure 2. For hazelnut production on a 3-hectare field, agricultural practices, including their timing and duration.

and since mechanization is not possible, there is a seasonal need for workforce (Kutluata, 2015; Kaynar, 2018).

Changes and Developments in the Socio-Cultural, Economic, and Institutional Dynamics of the Giresun-Ordu Subregion and Their Impact on the Rural Cultural Landscape

Hazelnut cultivation has a 2500-year history in the Giresun-Ordu Subregion, benefiting from a favorable climate (Kayalak & Özçelik, 2012; Doğanay, 2013; Gündüz et al., 2018; Development Foundation of Türkiye, 2022). Despite this, significant production began with the Republic's declaration in 1923, following the Izmir Economic Congress's agriculture-focused policies (Boratav, 2016). Türkiye then specialized in exporting raw materials, including hazelnuts. To meet global demand, Türkiye developed legal and institutional frameworks for hazelnut production, trade, and export. Key developments included the establishment of the Giresun Hazelnut Stock Exchange in 1926, the world's first Hazelnut Institute in Giresun in 1936, and the Hazelnut Agricultural Sales Cooperatives Association (Fiskobirlik) in 1938 to enhance hazelnut agriculture (Korkmaz, 2021). By the 1950s, hazelnut production had become a significant socio-economic activity in the region.

As stated before, in this study, the change and development of socio-cultural, economic, and institutional dynamics in the Giresun-Ordu Subregion were examined in three periods: 1950-1980, 1981-2000, and 2001-2020. Geographical features in the region and the hazelnut production that developed accordingly in these three periods have reshaped the relations between agricultural production style - labor use, agricultural production actors - market presentation, demographic structure - migration, people, and land.

The 1950s are important in terms of hazelnut becoming the only agricultural product in the region and the involvement of local actors in the formation of the hazelnut production and buying-selling order (institutionalization of Fiskobirlik and merchants). While Fiskobirlik, which became a state institution in 1964, became an important actor in hazelnut exports, its power was weakened with the intervention of the central government in the 1980s and was replaced by the private sector. The 2000s are important in that Fiskobirlik, a local producer cooperative, was privatized and the production mechanism began to break away from the local, and international investors with foreign capital began to take part as a local actor. While the fact that agricultural production is based on hazelnut as the only product, the population engaged in agricultural production, and the income obtained from agricultural production caused these changes, they were also affected by the changes themselves. Due to the low productivity in hazelnut production in small-scale family businesses, the region has constantly emigrated. However, due to the increasing demand for hazelnut and the existence of the market, hazelnut production has maintained its leading role in both agricultural production in the region and the regional economy. The state has supported hazelnut production either through legal regulations or by intervening in the market or not. These dynamics have shaped agricultural production, demographic structure, lifestyle, living habits, and land cover in each period.

The Form of Agricultural Production and Practice, the Actors of Agricultural Production, the Income Obtained from Agricultural Production

The form of agricultural production and practice, the actors of agricultural production, and the income obtained from agricultural production are highly important issues in this process. Additionally, the fact that the migrating population maintains its relationship with the place where it migrates, and the population's belonging to the place, may cause changes to reduce or exacerbate the effects of the difficulties and/or threats that arise in this shaping process. For this reason, the reflections of the changing dynamics in the region in these three periods were examined under the fields of agricultural production style-method-economy, social structure and culture, and physical space.

Agricultural production style-method-economy includes features specific to the structure of agricultural production in the region. These features are the size of the agricultural enterprise, the number of days worked in the agricultural enterprise, the purpose of production, the mode of production, the way the land changes hands, the type of agricultural enterprise, the form of agricultural practice, the use of labor in agricultural practices, the income obtained from agricultural production, the form of presentation to the market, the role of the state, the harvest method, harvest season, and market formation (Ashkenazy et al., 2018; Berkes & Sexias, 2005; Fang & Liu, 2008; Found & Berbes-Blazquez, 2012; Folke, 2006; Garmestani et al., 2006; Huang et al., 2018; Kaptan, 1978; Meuwissen et al., 2019; Nera et al., 2020; Rescia et al., 2010; Zambon et al., 2017).

Social structure and culture include the characteristics of the demographic structure, lifestyle, and cultural values in the region. These features are the ratio of the rural population in the total population, rural population change, net migration rate, the relationship between entering and leaving migration, seasonal population change/difference, lifestyle, tradition, customs, rituals and agricultural production relationship, and sense of belonging and sense of place (Rescia et al., 2010; Pătru-Stupariu et al., 2019; Bender & Haller, 2017; Keitsch et al., 2016; Król, 2020; Adger, 2000; Stephenson, 2008; Ioan et al., 2014; Cumming et al., 2005; Basile & Cavallo, 2020).

Physical space includes features related to hazelnut production areas and land cover in the region. These

features are the production region, production area, change of ownership of agricultural land, and change in natural vegetation (Giannecchini et al, 2007; Rescia et al., 2010; Rescia et al., 2012; Oteroz-Rozas et al., 2012; Found & Berbes-Blazquez, 2012).

The study areas and the characteristics that define these areas were constructed from data groups that can reveal the basic structure of each area in the context of the resilience of the RCL. These features differ in the periods subject to examination, and this difference helps to monitor the change and transformation of the rural structure.

The examination carried out within the scope of these features is important in terms of being able to more clearly reveal the cause and effect relationships in each period and between periods, and showing how the RCL of the Giresun-Ordu Subregion evolved and which features were effective in this process. Because there is a mutual relationship between spatial and cultural structures in RCLs shaped by agricultural production. Agricultural areas and natural areas provide both a physical and ecological spatial environment for agricultural production. Traditional practices, knowledge, skills, and traditions, and such cultural accumulation can contribute to the conservation and preservation of agricultural production.

The Period Between 1950 and 1980

The 1950s represent the period when hazelnut production began to increase in the Giresun-Ordu Subregion and became the dominant agricultural product until the 1980s. This situation has caused changes in the traditional agricultural structure of the region in the last 30 years. First of all, while hazelnut production areas increased, corn, sub-corn vegetable production, and animal husbandry decreased. Due to the production of hazelnut for marketing, there has been a transition from subsistence agriculture to commercial agriculture in the region, and socio-economic transformation has occurred. During this period, the rural population increased (Table 1). This situation has brought about a change in the lifestyle based on four-season agricultural activities.

Table 1. Change in rural population size and rural population ratio in Giresun-Ordu subregion (TUIK, 2024)

	Rural Population			Rural Population Change	Total Population			Ratio of Rural Population (%)
	Giresun	Ordu	Total		Giresun	Ordu	Total	
1950	264785	340106	604891	-	299555	373028	672583	89.94
1955	293694	368032	661726	56835	334297	407687	741984	89.18
1960	322363	411245	733608	71882	381453	469379	850832	86.22
1965	352946	460278	813224	79616	428015	543863	971878	83.68
1970	360773	490680	851453	38229	451679	608721	1060400	80.30
1975	354749	515553	870302	18849	463587	664290	1127877	77.16
1980	352972	543715	896687	26385	480083	713535	1193618	75.12
1985	341156	543790	884946	-11741	502151	763857	1266008	69.90
1990	279973	493285	773258	-111688	499087	830105	1329192	58.18
2000	240503	471134	711637	-61621	523819	887765	1411584	50.41
2007	177138	320126	497264	-214373	417505	715406	1132911	43.89
2010	173875	314793	488668	-8596	419256	719183	1138439	42.92
2011	170951	305102	476053	-12615	419498	714390	1133888	41.98
2012	170598	318076	488674	12621	419555	741371	1160926	42.09
2013	173196	0	173196	-315478	425007	731452	1156459	14.98
2014	159369	0	159369	-13827	429984	724268	1154252	13.81
2015	151132	0	151132	-8237	426686	728949	1155635	13.08
2016	151853	0	151853	721	444467	750588	1195055	12.71
2017	146756	0	146756	-5097	437393	742341	1179734	12.44
2018	176238	0	176238	29482	453912	771932	1225844	14.38
2019	148608	0	148608	-27630	448400	754198	1202598	12.36
2020	146462	0	146462	-2146	448721	761400	1210121	12.10

During this period, hazelnut production in the subregion was carried out in small family businesses in agricultural areas divided by geographical conditions and inheritance. Although hazelnut producers who cultivate their own land generally carry out their agricultural activities based on family labor, they receive support from seasonal workers during harvest. This harvest is carried out by the picking from the ground method. Hazelnut farming, which is an occupation in which working in an agricultural enterprise for a maximum of 75 days a year is sufficient, has become the main livelihood product of the rural population. However, corn, sub-corn vegetable production, and animal husbandry activities have decreased, but since hazelnut production is an activity that does not cover the whole year, these traditional agricultural activities have continued to exist.

While Fiskobirlik, a local producer cooperative, and merchants were active in the formation of the hazelnut market until 1964, as of this year, the purchase guarantee for hazelnut has been given by the state through Fiskobirlik, and this made the state the leading actor in the formation of the market. The state's supportive role for producers has contributed to hazelnut continuing as the agricultural item that is most produced. The agricultural areas of the region producing hazelnut increased by 42% in this period (TUIK, 2024). This increase occurred when corn production areas, one of the main agricultural products of the region, turned into hazelnut production areas, and the coastal zone/middle zone below 500m altitude became the hazelnut production areas (Figure 3). This situation caused hazelnut to become the only agricultural product that generates income below 500m altitude. During this period, the rural population of the region increased by 48% due to hazelnut production, whose productivity increased with agricultural measures and the accompanying agricultural income (TUIK, 2024) (Table 2).

However, after the 1970s, the production amount in existing hazelnut production areas reached its highest level. This situation means that the productivity of hazelnut production can no longer increase. The shrinking of the size of the agricultural enterprise[4], and the vegetative structure of the hazelnut, which yields more crops in one year and less in the next, have led to a gradual decrease. The effects of this decrease in productivity can be observed from the fact that the rural population growth between 1975 and 1980 fell behind the increase values in 1950 and 1970 (Table 1). Considering the net migration rate values between 1975 and 1980 in Table 3, it is seen that the rural population rate decreased from 90% to 75% due to migration from rural areas to cities or out of the region due to economic reasons (Table 1).

However, the traditional lifestyle based on four-season occupation with corn production and animal husbandry has changed with the changing agricultural business structure

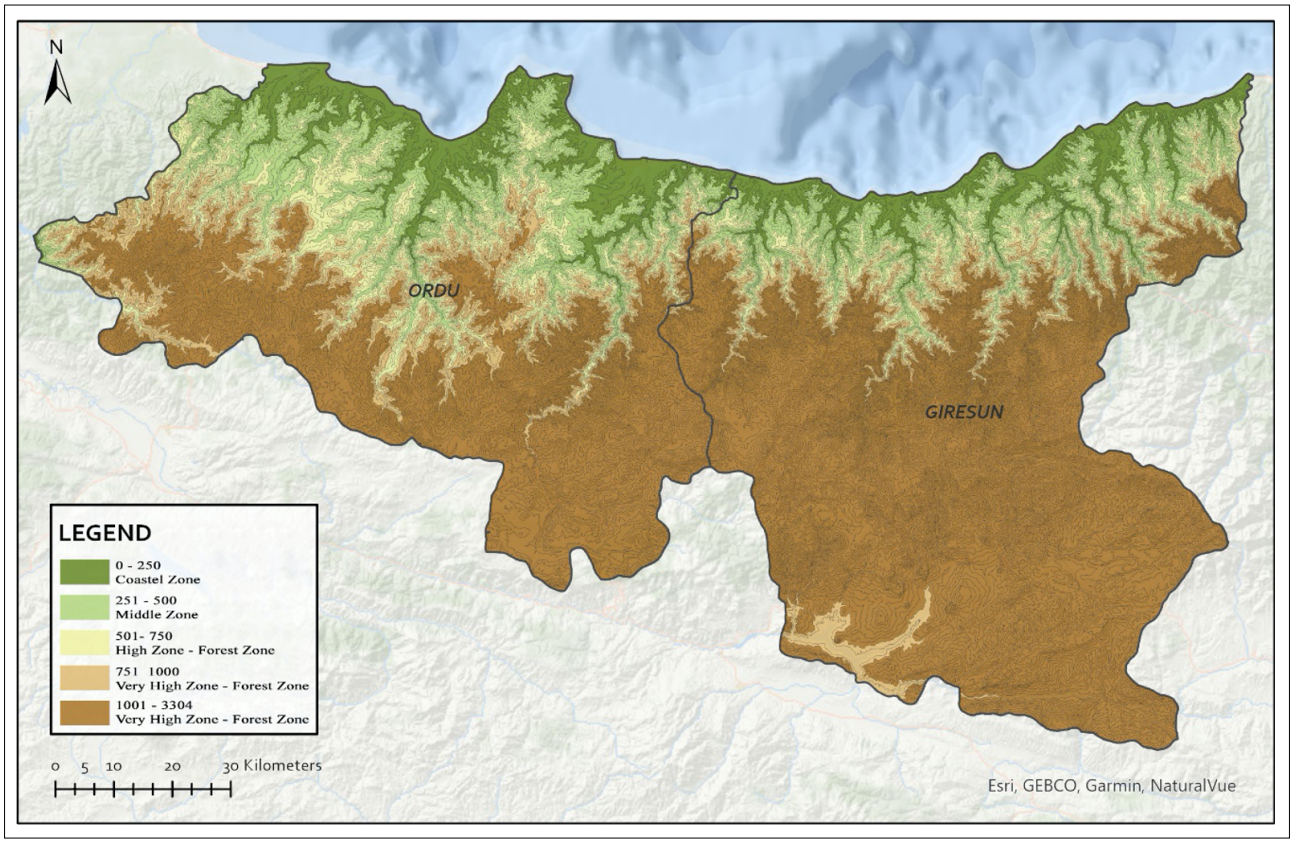

Figure 3. Altitude map of the Giresun-Ordu Subregion - hazelnut production zones.

Table 2. Changes in hazelnut production areas and rural population in the Giresun-Ordu sub-region (TUIK, 2024)

	1950	1960	1980	2000	2020
Hazelnut production areas	-	139.000	197.154	271.823	345.019
Change in hazelnut production areas	-	-	42%	38%	27%
The ratio of hazelnut production areas in land cover	-	11%	15%	21%	27%
Rural Population	604891	733608	896687	711637	146462
Rate of change in rural population size	-	21%	22%	-21%	-79%

Table 3. Change in the net migration rate for the provinces of Giresun and Ordu (TUIK, 2024)

	Giresun		Ordu	
Years	Net migration	Net migration rate	Net migration	Net migration rate
1975-1980	-17.523	-40.6	-20.668	-32.3
1980-1985	-19.955	-43.4	-24230	-34.5
1985-1990	-34.828	-73.9	-42.91	-54.6
1995-2000	-5849	-12.1	-36.958	-44.7
2008	1550	3.68	-3739	-5,18
2009	-2597	-6.14	-961	-1,33
2010	-3040	-7.22	-8345	-11.54
2011	-2288	-5.44	-10509	-14.6
2012	166	-0.4	21645	29.63
2013	3283	7.75	-15540	-21.02
2014	3237	7.56	-11382	-15.59
2015	-4634	-10.8	-2765	-3.79
2016	15092	34.54	15766	21.23
2017	-9146	-20.69	-12194	-16.29
2018	14405	32.25	24661	32.47
2019	-7985	-17.65	-21254	-27.79
2020	286	0.64	5492	7.24

and migrations with hazelnut. It is possible to summarize the lifestyle changed by migration with what we call "guest workers." They mostly spend their time working away from their hometowns, and they only come to their homeland during certain periods of the year and carry out agricultural activities based on hazelnut. This situation reflects the mode of production in the region and the dynamics of rural life in the region.

The Period Between 1981 and 2000

In the 1980s, although the rural population in the Giresun-Ordu Subregion increased quantitatively from 1950 to 1980, the rural population rate decreased from 90% to 75%, which will drop to 50% with the migration in 2000 (Table 1). Despite this remarkable decrease in the rural population, the agricultural areas producing hazelnut increased by 38% between 1980 and 2000 (Table 2). This increase in hazelnut production areas can be explained by the change in land cover in the region. The hazelnut production region, which was only up to 500m altitude in the previous period, expanded to upper altitudes after the 1980s. In fact, the declaration of the entire region as a legal hazelnut production area in 1989 caused corn production areas between 500m and 750m altitude to turn into hazelnut production areas. The examination of the land cover shows that hazelnut production increased up to an altitude of 1000 meters and that some of the forested and pasture areas at this altitude have turned into agricultural areas (Tables 4-5).

As mentioned, although hazelnut production areas increased from 197,154 hectares in 1980 to 271,823 hectares in 2000, it is understood that hazelnut production areas expanded towards lands less suitable for production and, naturally,

Table 4. Distribution of land cover in the Giresun-Ordu subregion based on CORINE data (%)

	1975 (*)	1990	2000	2006	2012	2018
Artificial Surfaces	0.1	0.44	0.69	0.79	0.99	1.05
Agricultural Areas	30.2	39.03	38.57	44.15	45.05	45.03
Forest and Semi Natural Areas	69.7	60.19	60.25	54.55	53.41	53.36
Water Bodies	-	0.34	0.49	0.51	0.55	0.56

(*) (Kaptan, 1978).

Table 5. Agricultural land change in Giresun-Ordu subregion based on CORINE data (%)

	1990	2000	2006	2012	2018
Non-irrigated Mixed Agricultural Areas	54.78	54.94	28.09	25.93	25.90
Agricultural Areas Mixed with Natural Vegetation	39.98	40.02	26.88	23.22	23.27
Non-irrigated Fruit Areas	**0.56**	**0.58**	**39.85**	**45.78**	**45.75**
Irrigated Mixed Agricultural Areas	0.97	0.97	0.76	0.83	0.83
Pastures	**0.54**	**0.37**	**0.53**	**0.46**	**0.45**
Non-irrigated Arable Land	2.06	1.99	2.75	2.62	2.62
Permanently İrrigated Land	1.11	1.12	1.14	1.13	1.13
Irrigated Fruit Areas	0.00	0.00	0.01	0.04	0.04

production did not increase at the same level (Güvemli, 1997). It is possible to see the effect of this situation on the net migration rate of the period (Table 3). Despite the insufficient economic income based on agriculture in the countryside, due to the economic and social opportunities offered by big cities, the region continued to lose population by migrating out of the rural areas, and the ratio of the rural population dropped to 50% (Table 1).

In hazelnut production in small family businesses, labor force loss due to migration has been tried to be compensated by increasing the use of chemical fertilizers and pesticides. However, the migrating population continued to operate its own land either through relatives or sharecroppers (Kaptangil, 2005). In this way, the use of land for agricultural purposes continued without changing land ownership in the region. In addition, while the migrating population could carry out agricultural practices as agricultural workers on their own land during their residence in rural areas, they filled this gap by employing temporary agricultural workers after migrating (Özbekmezci & Sahil, 2004; Atalar, 2015). Thanks to these adaptations, the migrating population was able to continue hazelnut production by coming to the region with their families only during the harvest season. However, since these types of hazelnut producers have to complete the harvest during their stay in their hometowns, they have adapted their harvesting method. While previously harvesting hazelnut was done by picking them from the ground, they shortened the harvest time by starting to pick them from the branches. Hazelnut is now harvested from both the ground and the branch.

These solutions, shaped according to dynamics, enabled agricultural production to continue despite the 21% decrease in the rural population. Due to hazelnut farming, which is a seasonal agricultural activity, the lifestyle in the region has transformed into one where a part of the rural population not only works "abroad" as in the previous period but also lives and comes to their hometown for a month during the harvest season. We call this situation "guest workers-seasonality" due to the fact that the population living abroad maintains their connection with the place they migrated from and the seasonal nature of hazelnut production. Rural life has maintained its vitality seasonally, depending on hazelnut production, with both producers and seasonal workers.

The state's hazelnut purchase guarantee, which lasted from 1964 to 1994, reshaped the market formation with the state's restriction on Fiskobirlik's exports in this year (Şentürk, 2010). The export of hazelnut, which Fiskobirlik now purchases from producers as well as traders, has begun to be dominated by the private sector. During this period, hazelnut production remained the most profitable product in the region. Although there is a decrease in productivity due to various reasons, especially the decrease in the size of agricultural enterprises through inheritance, the income obtained from hazelnut production has been considered a source of assurance for hazelnut producers. Hazelnut

production has become a way for the hazelnut producers, both in rural areas and abroad, to meet the planned or unplanned expenses of themselves and their families in daily life, such as a child's school expenses, marrying a daughter, circumcising a son, and paying debts.

The Period Between 2001 and 2020

In the Giresun-Ordu Subregion, where the rural population has been decreasing since 1950, hazelnut production areas in the region have increased continuously between 2001 and 2020, as in previous periods (Table 2). Between 2000 and 2020, agricultural areas producing hazelnut in the region increased by 27%, from 271,823 hectares to 345,019 hectares. When the land cover data of the subregion is examined, this increase occurred as the hazelnut production region expanded to cover almost all agricultural areas (Figure 4). However, it is seen that hazelnut agricultural areas, which were up to 1000m altitudes in the previous period, have increased to areas above 1000m altitudes, and forested areas at this altitude continue to turn into agricultural areas (Tables 4-5) (Figure 4).

In the previous period, hazelnut producers operated their land through sharecroppers/divider, which caused agricultural practices to be inadequate (Kaptangil, 2005). This practice has led to a further decrease in the efficiency of hazelnut production in family businesses, which are gradually shrinking due to the problems caused by division through inheritance. In addition, the increase in the agricultural areas producing hazelnut has expanded to lands less suitable for production, making agricultural practices difficult as in the previous period. Therefore, rural population in the region continued to decrease due to the ongoing low productivity in hazelnut agriculture over the years (Table 1). In this context, looking at the values given in Table 1, between 2000 and 2020, the ratio of the rural population decreased from 50% to 12% and the rural population decreased by 79%, but this information does not reflect the truth. In reality, although the rural area continues to lose population and its rate continues to decrease, it must be said that there is not as sharp a decrease as stated. As can be seen in this data, the reason why the rural population rate decreased to 0 in 2013 is that the villages in rural status were moved to urban neighbourhood status due to Ordu province gaining metropolitan status. Although the net migration rate decreased during this period, it continued to lose population through emigration.

In this period, alongside the migrating population from the subregion, a new breed of producers emerged: those born and raised abroad, representing the generation of previous migrants. They continue agricultural practices by cultivating inherited land. While agricultural tasks were typically carried out by seasonal and temporary workers,

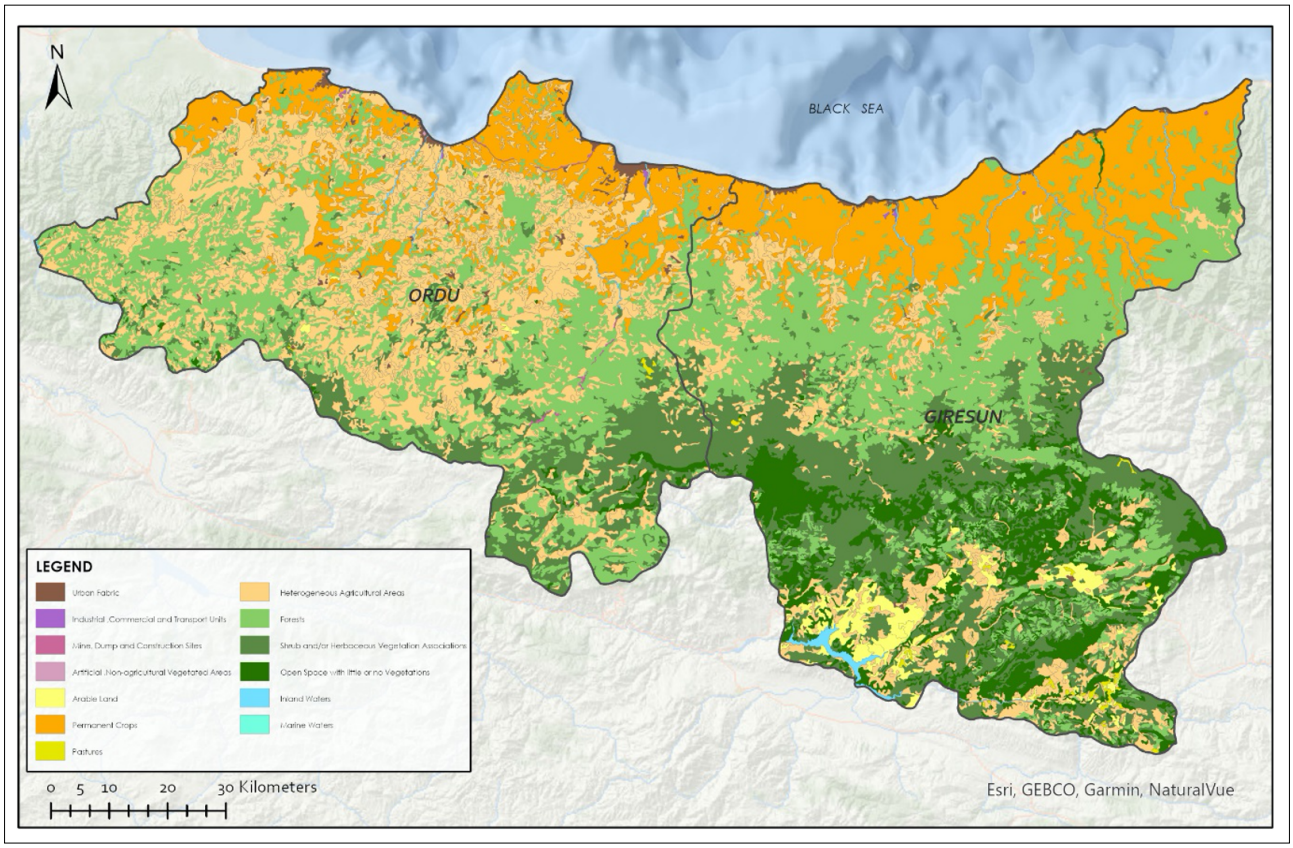

Figure 4. Land cover map of the Giresun- Ordu subregion in 2006, based on CORINE data.

hazelnut harvesting shifted towards the branch-picking method, which gained preference. Additionally, hazelnut producers now spend more time in the production area. Despite being able to maintain sufficient relations, they may only stay for two to four weeks. Nevertheless, their continued connection to the region remains a crucial factor in sustaining hazelnut production.

However, as can be seen from Table 4 and Figure 5, in addition to climate change, the effects of increasing urbanization in the region, forested areas are lost by turning into hazelnut orchards. Also increasing mining activities on the natural structure and climate of the region have increased the frequency and severity of natural disasters, especially floods and landslides. This situation affected both crop productivity and caused the hazelnut harvest in August to be extended until mid-September. Hazelnut producers, who arranged his arrival to his hometown according to the harvest season, continued hazelnut production by adjusting the harvest date according to themselves, as he had to complete the harvest in the limited time he was in his hometown. Although it is important that agricultural practices that affect the yield of hazelnut and harvest are carried out on time, the product continues to be obtained in any case.

During this period, the presence of the private sector in the market strengthened its already dominant position with the entry of foreign capital. So much so that it is known that 68% of hazelnut exports in Türkiye were made by a single foreign capital company in 2019 (Ordu Chamber of Commerce and Industry, 2019). Of course, the state appears to have an encouraging role in this process. Especially after Fiskobirlik was privatized in 2001, the state continued its purchases through the Soil Products Office, but this was subject to changing practices from time to time. For example, between 2009 and 2017, the state had no intervention in the hazelnut market, and the trader became an important actor during this period. Even in this case, economic prosperity continued regardless of the fact that hazelnut is a product dependent on location and its quality, actors and practices.

In the early 2000s, a large part of the rural population of the Giresun-Ordu Subregion migrated domestically and abroad, and it became a geography where a certain part of the population made “guest workers” lifestyle permanent due to the seasonal structure of short-term hazelnut production during the harvest season each year. In other words, while approximately 20% of the region's population lives outside the region as "guest workers”, the region has become a "visited geography" during the harvesting season. It is understood that the region continues to be the dominant region in the country where hazelnut production is made, and in this context, agriculture continues to be the main economic sector of the region despite all these changes.

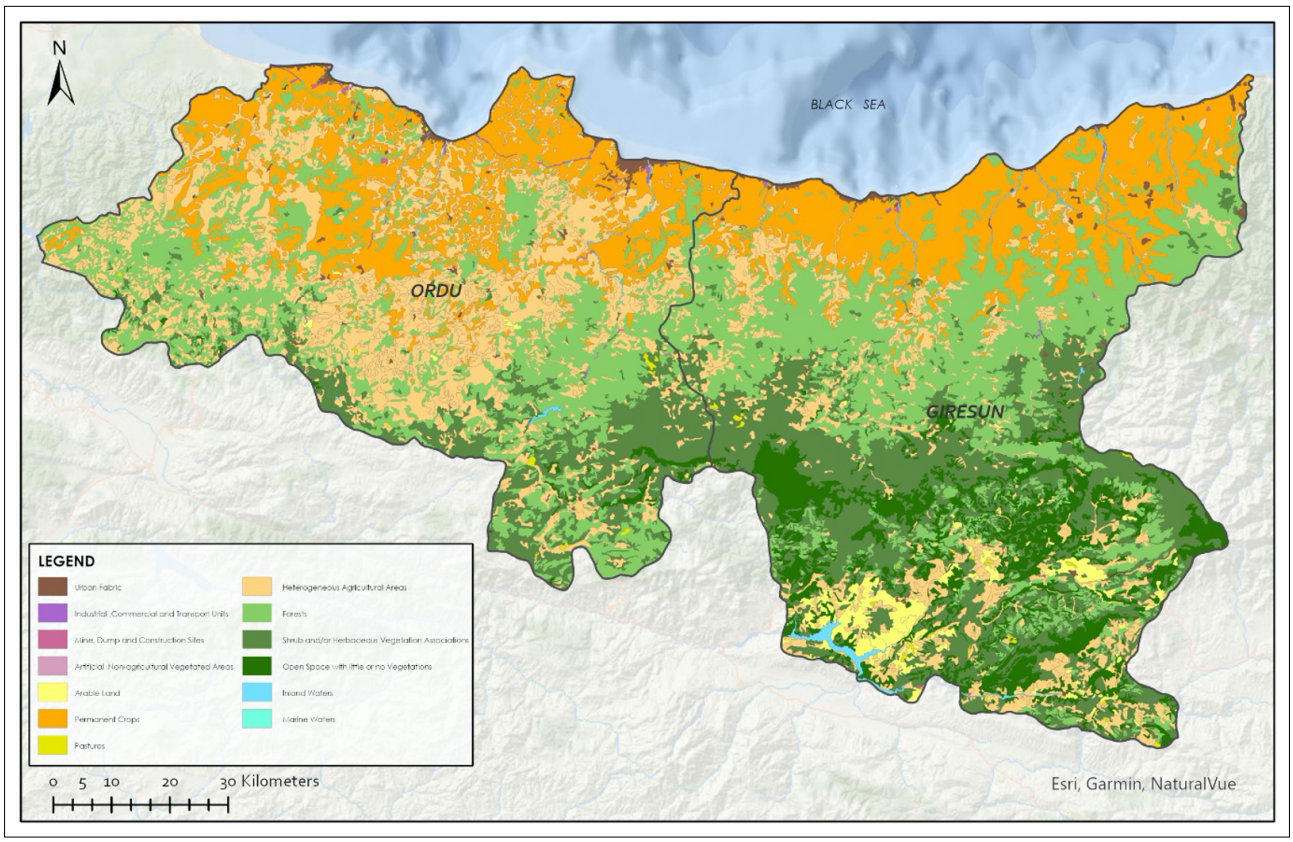

Figure 5. Land cover map of the Giresun- Ordu subregion in 2018, based on CORINE data.

DISCUSSION

In the period between 1950 and 1980, hazelnut became dominant in agricultural production and the economy in the region. The rural population increased due to hazelnut production. The areas of hazelnut production increased, and hazelnut production areas became the main element of land cover below 500m altitude. The most important reason for this increase in hazelnut production is the government's purchase guarantee for the hazelnuts produced. As a result of this subsidy, productivity in the existing hazelnut production areas in the region reached the highest level after the 1970s. The economic situation caused by the cessation of the increase in the amount of hazelnut production led to a decrease in corn production and livestock in areas above 500 meters of altitude. This has led to the migration of the rural population in the region to cities or out of the region. The traditional lifestyle changed, with a certain part of the population having to work abroad and coming to their hometown at certain times of the year. Guest workers have become common due to migration.

Between 1980 and 2000, hazelnut production areas in the region began to spread towards forested and pasture areas. Natural vegetation changed with the expansion of hazelnut planting areas. As a result, unsuitable forested areas were destroyed for hazelnut production, and hazelnut production areas expanded from 500m altitude to 1000m altitude. Hazelnuts began to be produced in an increasingly larger area, in parallel with the continuation of the purchase guarantee given by the state to the hazelnuts produced. The declaration of the region as a legal production zone during this period also legalized this situation.

With hazelnut becoming the dominant agricultural product in the region and almost all agricultural production being hazelnut, significant declines in item productivity occurred. The economic situation caused by this situation led to the migration of the rural population in the region. However, while the rural population migrated out of the region, they did not leave the region completely but retained the ownership of the inherited lands on which they produced hazelnut. This situation enabled hazelnut production to continue through sharecroppers/dividers or temporary agricultural workers. In this way, the ritual of the migrating population coming to the region during harvest time and contributing to the production by participating in the hazelnut harvest continued. This guest worker population, on the one hand, earns a basic living by working outside the region, and on the other hand, continues the traditions by participating in hazelnut production during the "harvest season" and contributes to the family budget with the "bulk money" they obtain from hazelnut production. Hazelnut production has become a seasonal activity due to migration. The region has become a geography where the population living abroad visits once a year, usually in August, that is, during harvest time.

Between 2001 and 2020, the expansion of hazelnut production areas towards forested areas continued, and hazelnut production increased to areas above 1000m altitude. In these years, the influence of neoliberal policies in the country gradually weakened the dominant and decisive role of the producer in hazelnut production. However, production continued at an increasing rate due to the fact that hazelnut was exported, in other words, due to the presence of a foreign market. The rural population continued to decrease due to the expansion of hazelnut production areas into areas that are not suitable for production and the ongoing low productivity over the years. In addition to the population that migrated during this period, the generation of the population that had previously migrated from the region, born and raised abroad, continued to produce hazelnut by cultivating their own land. Agricultural practices carried out through temporary agricultural workers have allowed hazelnut producers to continue production by going back and forth once a year. Migrations out of the region and the seasonal structure of hazelnut production have made guest workers permanent. Life in the region has taken a form where the population living abroad continues to produce hazelnut in a geography that they visit once a year during the harvest season.

CONCLUSION

In conclusion, when the events that took place in three areas, namely agricultural production style-method-economy, social structure-culture, and physical space, in three periods covering a 70-year period, are examined, it is possible to summarize the change and transformation of the RCL of the Giresun-Ordu Subregion in the following items:

- The regional economy continued its agriculture-based structure.
- Hazelnut is the only agricultural product produced for income generation.
- The encouraging role of the state, due to the purchase guarantee in hazelnut, has been decisive.
- With the spread of hazelnut production, corn production was abandoned, and corn production areas turned into forested areas.
- Hazelnut production areas have expanded towards forested areas, and the natural vegetation of the region has changed.
- Hazelnut production is carried out as a seasonal agricultural activity under the influence of the "guest worker" population.
- The migrating population plans their visits to the region according to the harvest season and thus continues hazelnut production in the region.

- The fact that hazelnut production can be carried out seasonally has ensured the continuity of rural life culture in the region.
- Land ownership has not changed hands. The fact that land is acquired through inheritance shows that there is a strong sense of belonging and attachment to the region.
- Due to division through inheritance, the size of agricultural enterprises has gradually decreased.
- Hazelnut production is an important tool in generating economic income.
- The power of Fiskobirlik, a local producer cooperative in hazelnut production, has weakened.
- The merchant continued his existence as a local actor in hazelnut production.

Hazelnut production has played a determinant role in the RCL of the Giresun-Ordu Subregion. Diversity in cultural landscapes is a source of resilience (Carpenter et al., 2001). Accordingly, what is accepted is that agricultural production and agriculture-based structures are not dependent on a single product. In addition, rural areas are abandoned, and agricultural production weakens (Rescia et al., 2010). However, the research results reveal that although the rural areas of the Giresun-Ordu Subregion are migrating, they continue the production style that defines the economic structure, space, and socio-cultural life by adapting to the unique conditions of hazelnut production, which is the only agricultural product. This supports the view that migration to areas where new economic opportunities are offered as a result of inadequate socio-economic conditions in rural areas is not always negative (Plieninger & Bieling, 2012). Of course, this does not mean that the economic, socio-cultural, and environmental effects of dependence on a single product and the change and transformation in land cover in favor of agricultural areas should be ignored. However, the fact that the RCL of the region maintains its basic structures and functions shows that it has the ability to cope with these impacts and make changes to this day. Migration in the subregion has brought about adaptations in the style, method, and economy of agricultural production. These adaptations have transformed the way of life by making migration permanent and continuous. Agricultural production continues through institutions and socio-cultural structures such as the migrating population not selling their land in the region, visiting the region during harvest time and participating in production, and this becoming a ritual repeated every year. In this way, it is possible to say that the RCL of the region, which can continue its traditional economic and social structure by adapting to all these changes and transformations, is resilient.

This change and transformation process in the rural cultural landscape of the Giresun-Ordu Subregion is an important reference point that should be taken into account in determining future agricultural, economic, and demographic trends. Preserving natural resources and adopting a sustainable agricultural policy will contribute to the region achieving an economically and ecologically balanced structure and increasing the welfare of the local community.

NOTES

[1]According to TUIK, agricultural employment in the Eastern Black Sea Region was 62% of total employment in 2004, 54.68% in 2010, and 41.3% in 2020. In 2020, agriculture constituted 17.6% of total employment in Türkiye, indicating that the Eastern Black Sea Region remains more agriculture-focused than the national average.

[2]See: Kutluata (2015), Güvemli (1997), Yılmaz (2014), Kaptangil (2005), Şentürk (2010), Kayalak & Özçelik (2012), Doğanay (2013), Kaynar (2018), Korkmaz (2021).

[3]In 2020, the GDP distribution in Giresun and Ordu shows that agriculture accounts for 13%, industry 27%, and services 60%. Nationwide, agriculture is 6%, industry 34%, and services 60%. The higher share of agriculture in Ordu-Giresun is due to hazelnut production, while the lower industrial share is because the region's industry is agriculture-based (TUIK, 2024; DOKAP, 2022).

[4]The average business size in 1975 was 15.55 in Giresun and 15.02 in Ordu.

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Article

Diverse geographies of urban crisis: A comparative analysis of Egypt, India and Türkiye

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ABSTRACT

The article concentrates on the reasons behind, and consequences of, the post-2008 urban crises experienced in the southern geographies of capitalism. It does so through a comparative analysis of three cases, namely India, Egypt, and Türkiye. The methodological approach in the article attempts to expand the scope of urban politics research to bring divergent cases into conversation. We argue that loosely defined, similar and different causes and/or repeated outcomes of urban crises across diverse cases could form an appropriate base for research in urban politics. The article brings the politics of redistribution in three cases/countries under the spotlight, focusing on four dimensions of the politics of redistribution: (dis)possession; exploitation; commons; and representation. While the last two dimensions dominated the scene in Egypt, in the case of Türkiye, it was about the politics of representation and exploitation. In India, the politics of (dis)possession and commons seem to constitute the center of urban politics. Furthermore, as the comparative analysis of the countries reveals, the role of the state and its historical and spatial configurations have played a strategic role in the formation of the politics of distribution. The comparative analysis also indicates that the variegated neoliberal urban policies have become successful or have failed in containing urban crises. The reasons for the success/failure in urban policies depend on three major factors: (1) the spatio-institutional design of the urban policy-making mechanisms; (2) the historical pattern of urbanization; (3) the role of the nation-state, especially the central government, in the politics of redistribution.

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INTRODUCTION

The Urban Crisis and Its Diverse Geographies Under Spotlight

The post-2008 waves of economic crises have mainly manifested themselves in major urban centers of different countries across the world. Various economic and social problems, such as unemployment, low wages, austerity policies, precarious work, and exclusion, observed dramatically in cities, gained an urban character in time and were called an "urban crisis" by many researchers (Bayırbağ & Penpecioğlu, 2017; Martí-Costa & Tomàs, 2017; Arampatzi, 2017; Barbehön & Münch, 2017; Hinkley, 2017).

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In our previous study (Bayırbağ & Penpecioğlu, 2017), we clearly defined "urban crisis" as the remarkable outcome of government policies. Urban crisis has become a political phenomenon when neoliberal policies ("containment strategies") fail to keep socio-economic inequalities under control; thus, there is a need to look at the relationship between two different dimensions of urban crises: (1) their root causes in the longer past and (2) the containment strategies employed by the governments to manage socio-economic inequalities. The purpose of the article is to briefly explicate these two dimensions of urban crisis within an initial and limited framework of comparative analysis.

The urban crisis has now become a global phenomenon and it has exploded in diverse urban geographies ranging from the global North to the global South. As a country having diverse characteristics from both the global North and South, Türkiye inevitably suffers from urban crisis, particularly as observed in the last decade. Regarding the diverse countries of urban crisis, there are key questions that remain to be answered: Are there any significant differences between the instances of urban crisis in diverse urban geographies across the world? What are the main characteristics of urban crises in the selected countries of the global South? Urban crisis in Türkiye manifests what kind of similarities and differences compared to the countries of the global South? What is the meaning of these similarities and differences in terms of comparative urban politics? In this article, we propose some initial and limited answers to these wide-comprehensive research questions by drawing on a comparative analysis of India, Egypt, and Türkiye.

Why is a comparative analysis of urban crisis regarding the geographies/countries of the global South significant for the purpose of this paper? There are mainly two reasons. Firstly, although the global economic crisis of 2008 hit almost every country across the world, it has been quite visible and deep in some less-developed southern geographies/countries of the world (including some countries of the global South, such as Brazil, Chile, Egypt, Morocco, etc., and some less-developed countries of the EU, like Greece and Spain). Moreover, most of the protests/riots in those countries have been violently repressed by the state. Secondly, the socio-economic transformation experienced in those southern geographies/countries has been fast-paced, and this transformation has come in the form of a new and rapid wave of neoliberal urbanization, which exacerbated dispossession, uneven development, and alienation. Therefore, concentrating on those southern cases of urban crisis could provide further insights into the geographical organization of global neoliberal capitalism.

The article puts forward a comparative research based on three country cases: India, Egypt, and Türkiye. Although the cases of India and Egypt draw on a comprehensive analysis of secondary resources (literature reviews), the case of Türkiye is based on an international academic research project completed in 2020 and funded by the British Academy. Diverse findings from the first and secondary resources were elaborated meticulously and gathered within a comparative analytical framework.

MATERIALS AND METHODS

Thinking Urban Policies with Elsewhere: An Initial Step for A Comparative Methodological Framework of Analysis

The urban could be theorized as a "concrete totality" by Lefebvre (2003; 1996) that could provide an essential base for comparative imagination and conceptual innovation. Following the main theoretical-methodological line of Lefebvre, Robinson (2022; 2016a; 2016b) recently put forward an alternative comparative methodological framework to investigate diverse cases in the field of urban politics. According to Robinson (2016a), many studies in urban politics have confronted challenging methodological problems. Some of these problems in comparative research could be summarized as follows: framing a case as a particular or pre-given entity, an over-focus on similar socio-economic causes of the cases, the ignorance of both the socio-cultural differences and the historical backgrounds in the cases, and limiting research to some similar cities having resembled socio-political contexts based on the global North.

Building an initial methodological step/framework for a comparative analysis in urban politics is a challenging scientific task. Robinson (2016b), Deville et al. (2016), and Jacobs (2012) have all attempted to provide an alternative framework for comparative analysis, which allows analytical reach across difference and diversity, expanding the scope of the research to bring divergent cases into conversation. We argue that loosely defined similar and different causes and/or repeated outcomes of urban crisis across diverse cases could form an appropriate base for research in urban policy. Robinson (2022), in her recent book, conceptualizes this "reformatted comparative methodological approach" as "thinking with elsewhere," meaning that starting to think about urban policy anywhere should be in conversation with the multiple elsewheres of any other urban policies in a different country/geography across the globe.

In other words, in diverse countries/geographies of neoliberal capitalism, there are prolific circulating processes and dramatic interconnections regarding the crisis of neoliberal urban policies. These processes and connections draw us to think across different cases of urban policies, which entail a comparative framework of analysis. Tracing these, the field of urban policies could be thought of as composed of a multiplicity of differentiated (repeated) outcomes of urban crisis, which are closely interconnected

through a range of transnational processes and are part of repeated-but-differentiated formations within wider circulations and circuits of urbanization and globalization (Robinson, 2022). To this end, based on Robinson's (2022; 2016a; 2016b) methodological formulation of "thinking with elsewhere," our article attempts to build an initial step for a comparative methodological approach to investigate diverse cases of urban crisis. In the article, we comparatively analyze three significant cases: Egypt and India from the global South and Türkiye as a geography/country of transition between the North and South.

There are five main reasons behind the selection of the three cases, Egypt, India, and Türkiye. First, in all cases, the nation-state has played a historical and central role in the construction of a capitalist market economy (Keyder, 2022; Bayırbağ, 2013a). Second, ethnic/religious diversity is a common ground for all three cases, and at least in the cases of Egypt and Türkiye, not only the historical paths of their political-economic development but also the cultural fabric of their societies (especially the role and place of religion in social life) are quite similar in many regards (Tuğal, 2012). Third, all these countries are characterized by deep social and geographical inequalities, which have worsened during their increasing integration with the global market economy. Revealing the reasons and consequences of inequalities in the urbanization processes requires an in-depth analysis of the role of informality in the context of neoliberal economic relations and politics (Roy, 2009; Roy, 2005; Alsayyad, 2004). Fourth, despite the above-mentioned similarities, the urban protests and social resistance movements in these countries have taken quite different forms. While the Egyptian case resulted in the downfall of the political establishment, the protests in Türkiye seem to have created an atmosphere of political alertness, without causing a major change in political balances (Bayırbağ & Penpecioğlu, 2017). The case of India, however, seems to portray a quite different picture. In India, one does not come across widespread urban protests targeting the political regime, even though there are stark social and geographical inequalities produced by the neoliberal urbanization processes (Roy, 2011). Thus, the containment strategies employed by the public authorities in India seem to work rather efficiently, keeping the political scene under control. Finally, regarding the depth and diversity of the relevant literature, these three cases have recently drawn the attention of the broader public and academics, fueling quite productive scholarly debates challenging the established interpretations of urban politics under neoliberalism.

Through a critical review of the key secondary sources (articles, chapters) on cities of the global South (Alsayyad & Roy, 2004; Roy, 2005; Roy, 2009; 2011; Schindler, 2013b; Schindler, 2017; Soliman, 2004; Sharp, 2022; Tuğal, 2012) and building on our previous theoretical arguments on urban politics in Türkiye (Bayırbağ, 2013a; Bayırbağ & Penpecioğlu, 2017; Bayırbağ et al., 2022), we have identified four main contested axes of urban politics to make a comparative analysis. These four main axes are: (1) Politics of Possession/Dispossession (resources exploited to produce material wealth, such as land, labor, and capital); (2) Politics of Exploitation (surplus value produced through the exploitation of these resources); (3) Politics of Commons (publicly owned, controlled, and redistributed common wealth); (4) Politics of Representation (sites of decision-making that shape the functioning of the above spheres of redistribution and political struggle).

These four dimensions are not ontologically isolated categories; rather, they constitute the main contours of the comparative analysis of urban crisis. These dimensions could also be seen as a framework of the key issues/concerns examined by the literature concentrating on the dramatic and fast-paced story of neoliberal urbanization in three cases. The article reveals that those different dimensions of urban politics come to the fore in different combinations in diverse countries and thus shape the form of urban crises in these countries/cases. To be more specific, while in the case of Egypt, the politics of commons and representation dominated the scene, in the case of Türkiye, it was about the politics of representation and exploitation. In the case of India, the politics of possession/dispossession and commons seem to constitute the core of the main conflicts and struggles in urban politics.

DISCUSSION I

The Role of The States in Crisis-Prone Neoliberal Urbanization Processes

To reiterate one of our key arguments, urban crises are publicly recognized when the strategies employed by the state fail to contain the structural dynamics that lay the grounds for urban protests and oppositional movements (Bayırbağ & Penpecioğlu, 2017). Hence, the scope of our research framework will remain incomplete if we do not ask questions about the role played by the state. By this, we mean explicating the relationship between the evolution of the spatio-political configuration of a state, as well as its intervention strategies to economy/society (Brenner, 2004; Jessop, 1990) and the historical pattern of urbanization in a country.

In the countries from the southern geographies of the world, it might be argued that nation-state building has been the major political concern shaping the institutionalization process of capitalism there, especially given that most of those countries are post-colonial. Nation-state building in the South is, no doubt, an unfinished business. This is especially so for the spatio-political configuration of the nation-states in the Middle East (Alsayyad & Roy, 2004). We think that this observation also resonates with the case of India, given its post-colonial history.

After colonial periods, when nation-building is a central concern, economic policies aiming to institute a national market economy had to be backed up by an official discourse of social cohesion (Türel & Altun, 2013), emphasizing the need for redistributive public policies (Bayırbağ, 2013a). The question of redistribution, thus, has always constituted an important axis of political struggles at the national and local scales for decades to come after independence (Tuğal, 2012; Veltmeyer, 2011; Sharma, 2011; Brumberg, 1992).

In the above regards, a transition to neoliberal policies would inevitably put the legitimacy and integrity of the national political regimes in those countries to the test. In the case of India, for example, Shatkin (2014) outlines the key tensions resulting from this transition: "Between the egalitarian ethos inherited from traditions of socialism and Gandhian thinking, and the hard-driving utilitarianism of a globalizing business class; between the pluralist nature of Indian democracy, and the allure of authoritarian models of urban governance; between the modernist vision of a globally connected class, and the daily incursions on the planned order of the city by the poor." While the cases of Egypt and Türkiye also suffer from the first and last tensions, the second one is not directly relevant to those two cases. This is mainly because of the history of authoritarianism in Egypt and Türkiye and the territorial configuration of their states.

The territorial configuration of the Indian state corresponds to its ethnic/religious/cultural/socio-economic diversity, finding its expression in its federal structure. For that reason, one is likely to come up with different modes of redistribution and different containment strategies across its territory, even if the country's transition to neoliberalism has been initiated by a strong central government (Sharma, 2011). The cases of Egypt and Türkiye display rather different characteristics. Being unitary states with relatively less heterogeneous populations, central governments in Egypt and Türkiye have dominated local governments and have tended to maintain direct control over urban policies.

In most cases of the global South, neoliberalization amounts to something different than the death of a past socio-political order that had provided its members with free, secure, and decent conditions for life. To the contrary, these conditions had already been missing (or incomplete) there. In that regard, for example, we find Roy's (2011) suggestion to employ the theoretical categories revolving around the notion of uncertainty ("peripheries," "urban informality," "zones of exception," and "gray spaces") to better examine urbanism practices. As Roy (2011) argues, the concept of informality is necessary to comprehend India's urbanization processes: "Urban informality is a heuristic device that uncovers the ever-shifting urban relationship between the legal and illegal, legitimate and illegitimate, authorized and unauthorized."

Following Roy's emphasis on the ever-shifting set of relationships (McFarlane, 2012), we further argue that such countries have offered a more suitable environment for neoliberalization to take root faster than it would happen in the countries/geographies of the global North, where capitalism originated and developed over a long historical process. In contrast, the contemporary processes of neoliberal urbanization in the South have operated through the institutionalization of uncertainty, the legalization/formalization of (previously) illegal/informal urban conditions, or vice versa. This institutionalization process, however, serves to further deepen the socio-economic contradictions and faultlines besetting the nation-states in the South (Bayat, 2000), while the future of socio-economic and political change increasingly gains an "indeterminate" character (Shatkin, 2014; Stadnicki et al., 2014; Simone, 2014; Simone & Rao, 2012).

The geographies of uncertainty created by these socio-economic transformations, especially the territorial patterns of urbanization instigated by neoliberal policies, tend to vary across the cases. In the case of India, the neoliberal urbanization process moves in two different directions: (1) In-migration from the rural areas to major urban centers (Roy, 2011) and (2) speculative urban growth towards the urban-rural periphery (Goldman, 2011; Balakrishnan, 2013; Sami, 2013). Here, it should be noted that the former movement is not new. Yet, the neoliberal turn in economic policy (Sharma, 2011) and the subsequent administrative reform in 1992 have increased in-migration while also triggering urban growth (Shatkin, 2014). As we shall discuss in detail later, the in-migration processes in the country have created visible inter-class tensions revolving around the politics of commons.

The rate of increase in migration from rural to urban in Türkiye and Egypt began to slow down by the end of the 1990s, compared to India. (For Egypt, see Bayat & Denis, 2000; for Türkiye, see Işık & Pınarcıoğlu, 2002). Moreover, in both countries, neoliberal policy turns took place earlier, around the 1980s, and the neoliberalization process gained further momentum during the 1990s and 2000s (For both cases, see Tuğal, 2012; for Egypt, see Brumberg, 1992; for Türkiye, see Bayırbağ, 2013a; Türkün, 2011). Thus, urban classes have constituted those sections of their respective societies hardest hit by neoliberal policies in those countries (Simone & Rao, 2012; Bayat, 2000).

Here, it should be noted that the Egyptian state's powerful role in the economy, especially its strong grip over the production and distribution of national wealth, has long made publicly owned and controlled resources the center of the national political struggles (Brumberg, 1992). Hence, the anti-authoritarian protests in Egypt between 2011 and 2013 could also be seen as the expression of a now unbearable political pressure on the central government, created by the

gap between: (1) the heightened expectations from the state by an urban population left to the mercy of an emergent market economy, and (2) its increasingly undermined capacity to deliver public benefits equally. Thus, the politics of commons and representation played a more central role in the case of Egypt, and the protests have had long-term effects on the political processes in the country.

The picture Bayat (2004) portrays for Egypt has certain similarities with the case of Türkiye. The Gezi protests first started as an individual protest in Istanbul but then became a country-wide social unrest. Moreover, the proletarianization and precarization processes of the middle class have played an important role in fueling the Gezi protests (Bürkev, 2013; Boratav, 2013). Although 10 years have passed, the Gezi protests were the first sign of a broader crisis of social reproduction. However, at the same time, they apparently revealed that an oppositional social movement could develop against the urban-rent-based policies of the authoritarian Turkish government (Eraydın & Taşan-Kok, 2013; Kuymulu, 2013). In Türkiye, since the 1980s, urban land has turned into an enormous source of wealth and capital accumulation (Şengül, 2012; Şengül, 2009). On the one side, key actors in politics and real estate markets like property owners and developers, political agents, and investors possess the urban land/housing, and because of this possession, they receive huge benefits from these urban-rent-based policies (Ünsal & Türkün, 2014; Türkün, 2011; Dinçer, 2011). On the other side, as the housing crisis in Türkiye indicates, the low-income middle classes, poor and unemployed people, students, and other vulnerable groups have gradually found it increasingly difficult to buy a house or to afford the rents (Işık, 2022; Uzun, 2022; Türkün, 2014). In those regards, as the Gezi protests embarked on the first signs of crisis, we argue that the unsustainable politics of exploitation (of labor and land) has played a key role in the Turkish case (Enlil & Dinçer, 2022; Bayırbağ, 2013a).

To summarize, just like the Egyptian case, the Gezi protesters targeted an authoritarian government, and the urban protests were also about the politics of representation. The reason, however, was rather different as there has been no state around that distributed public benefits directly. The distribution of wealth in Türkiye has taken place via authoritarian interventions of the state into the labor and land markets, deepening the processes of exploitation. Moreover, the sites of representation targeted by the protesters during the Gezi protests also involved the municipal governments, and concerns with local/bottom-up democracy and equity came to the forefront after the protests (Bayırbağ, 2013b). With the 2019 local elections, all these demands for democracy and equity led to the change of political parties controlling municipal governments in most of the metropolitan cities (Savaşkan, 2021; Penpecioğlu, 2019). So far, we have discussed the underlying currents preparing the grounds for (potential) urban crises in our cases. Below, we will discuss how the containment strategies have worked and/or failed across those different cases, concentrating on the four dimensions of urban politics.

DISCUSSION II

The Diversified Urban Policies to Contain Urban Crisis

In this part of the article, we elaborate on the main question: How have diversified urban policies been formulated and implemented to contain urban crisis? By focusing on three significant cases, the article indicates the success and/or failure of these policies in containing urban crisis. The findings from the cases are discussed respectively.

The Case of India

For the reasons discussed earlier, the politics of possession/dispossession and the politics of commons come to the fore as the key axes of urban political struggles in India. Yet, the containment strategies in these domains seem to work relatively well in India.[1] To reiterate another point we raised earlier, a dispersed institutional landscape of political representation emerges as a key factor containing the likely discontent with neoliberal urbanization processes (Sami, 2013).

In this political landscape, the most dangerous segments of society (in terms of their political mobilization capacity and the resources they possess), such as "the small-scale enterprise owners," "the new middle class," and "the salaried workers in public and private sector enterprises," are incorporated into the local governance structures, which have been institutionalized in cities like Delhi. This political empowerment of the middle class not only precludes any possibility of potential challenges to the neoliberal urban policies but also pits its membership against the expanding ranks of the urban poor in using the commons, especially in the use of public spaces, where the urban poor are forced to conduct their daily economic activities to earn their livelihood (Schindler, 2013a; Schindler, 2013b). This rivalry is not a zero-sum game, and there is a degree of interdependency between these two groups, where the former moves to regulate the presence (activities and circulation) of the latter, thereby performing a political control function over the urban poor (Schindler, 2013a).

Therefore, while the urban poor in India are also engaged with street politics via strategies of "silent encroachment" (in the form of social nonmovement) as in the case of Egypt (Bayat, 2010), this time their potential enemy and the target of their potential discontent with neoliberalism would not be the public institutions, but those different elements of the middle class. Yet, there is an interdependency, and the conflicts with the middle class are resolved, though

temporarily, via the informal negotiations between the citizens from the middle classes and the state. Besides, Schindler (2013a) also notes that members of the middle class do not always act as a common front, because part of its membership is cognizant of that interdependency.

Second, the dispersed institutional landscape of urban governance also opens some room for the urban poor to have access to public benefits, albeit via clientelist channels of representation. Here, the dispersed institutional landscape of urban governance also helps in containing the tensions generated by struggles revolving around access to public benefits. In this context, "the struggles and negotiations among these actors serve to establish the boundary between formal/informal, and this boundary is never permanently fixed, it is perpetually contested" (Schindler, 2013b). The blurred—and always changing—boundaries between the formal and the informal provide leverage to the powerful in containing the weak in the politics of commons (McFarlane, 2012; Roy, 2011; Roy, 2004; Schindler, 2013b). Yet, Bawa (2011) also notes that these blurred boundaries keep the poor's hopes alive, allowing them, albeit negotiated, access to commons.

Our discussion on the politics of commons sheds light on the politics of possession/dispossession, too. The dispersed landscape of decision-making and the role played by informal channels of representation in urban governance are key to understanding the politics of possession/dispossession. The processes of dispossession of peasants/farmers in rural areas in India do not always occur by a top-down imposition of the capitalist forces (Doshi, 2011; Solomon, 2007). Peasants/farmers could engage in informal negotiations with state/public authorities, and these negotiations occur in three ways: personal networks of entrepreneurs (Sami, 2013), social networks/organizations (Balakrishnan, 2013), and political parties (Roy, 2004). As a result of these informal channels of representation/negotiations, the peasants/farmers could attempt to find opportunities to resist the process of dispossession or to receive some economic benefits from the state/public authorities.

To explain how uncertainty is institutionalized in the case of India's urban politics, Solomon (2007; 2008) proposes the concept of "occupancy urbanism." This atmosphere of uncertainty gives the urban poor political leverage in advancing their claims to possession and exploitation of land. His emphasis on "the plurality of land and law" and "the negotiated boundaries between the formal and the informal" (and between the legal and the illegal) is based upon a conception of "cities as open-ended spaces of politics," where the public authorities seem to lose their central place in the analysis and the poor gain, by default, the status of agency (Roy, 2011). If we follow this line of reasoning, we could conclude that the poor could indeed reap the benefits of neoliberal processes of urbanization. However, we should also note that urban politics in all developing countries do not always revolve around a "land-based economy." Hence, this conclusion cannot be stretched to all developing countries and even to all Indian cities, given the uneven nature of capitalist economic development.

Regarding the politics of commons, it could be argued that contemporary urban policies of "climate change mitigation," "waste management," and "green policies of resilience" have been developed as a strategy of neoliberal crisis management. For instance, as both the cases of waste management in West Bengal (Blok, 2016) and urban resilience building in Surat (Cornea et al., 2016) indicate, large-scale urban change in India is not an easy business and is mostly challenged by the politics of urban commons. There are situated tools, practices, and knowledge in the government of such urban commons, and the resultant forms of urban crisis (like unjust urban transformation, climate injustice, and unsustainable forms of urban metabolism) have been shaped and contested around specific places, spaces, and cities in the country (Demaria & Schidler, 2016).

The dispersed scene of urban governance in India has been going through a process of centralization, where more power is now invested in the hands of the public authorities and bureaucrats. Those authorities could execute the urban development projects using different tactics, articulating with "class, gender, and ethno-religious identity" in different cases, with different results (Doshi, 2011). Besides, the politico-institutional infrastructure of urban governance is not that dispersed in every Indian city, as in the case of Calcutta under the rule of the Communist Party. Such coordinated/centralized urban governance scenes could make use of the informality of the status of land, both to give the poor increased access to land and to evict them from these lands as a result of neoliberal urban development practices (Roy, 2004; Yiftachel & Yakobi, 2004).

The Case of Egypt

As we argued earlier, the politics of commons and representation have constituted the major axes of political struggles leading to the urban crisis in Egypt. Below, we will further concentrate on the reasons why these two fields have come to the fore.

To reiterate, unlike the Indian case, the Egyptian state enjoys a monopoly over the policy-making process. Of course, this does not mean that it has developed a clear and consistent urban policy framework and did not directly regulate the processes of urbanization. Nevertheless, given the state's central role in regulating the economy and in the production/distribution of socially produced wealth, the political regime constituted the target of the urban protests in 2011.

Just like India, uncertainty is the rule as long as one is concerned with the legal status of urban land, and the production process of housing is mostly informal in the Egyptian cities, where most of the population inhabits informally developed neighborhoods (called "Ashwaiyyat"). Soliman (2004) detects 22 different patterns of informal housing production (built on agricultural land, desert land, and public/private land) and identifies a diverse set of actors involved in this informal housing production. It could be argued that those negotiated boundaries between the informal and the formal, and between the legal and the illegal, have facilitated the housing production process. However, more importantly, this diversified pattern of housing production (and the range of actors involved) also suggests that it is hard to define one single axis/theme of confrontation between the suppliers and those who demand housing. In fact, as Soliman (2004) indicates, in certain instances, self-control mechanisms emerge among the poor, where the first wave of immigrants would move to establish controls over the late-comers, as the latter have settled on the lands occupied by the former first.

What is more, it is also hard to argue that, in Egypt, the neoliberal policies of the central government did have a clear reference to the urban space as the focus/locus of the capital accumulation process (unlike the cases of India and Türkiye), which would otherwise bring the dispossession process to the center of urban politics/governance.[2] In addition, just like the Indian case, we could talk about the existence of a dispersed scene of urban governance. Hence, at least, the discontent with neoliberalism could not be directed against a single local public institution. Nevertheless, the processes of neoliberal urbanization have definitely laid the grounds for urban protests, mainly around the politics of commons. As Bayat (2013) puts forward: "the Egyptian urban poor protested against the high price of food, especially bread, against the demolition of illegal homes, and the shortage of drinking water; Cairo's garbage collectors waged a series of unprecedented collective protests, and the young got involved in civic activism and voluntary work on a scale seen never before" (Bayat, 2013). Stadnicki, et al. (2014) argues that the financial toll the neoliberal urbanization process took on the urban masses, and the public authorities' capacity to deliver the services needed, contributed to fueling the protests in 2011.

The politics of representation constitute the second key dimension of the urban crisis in Egypt. Here, one may rush to conclude that the urban poor would constitute the natural riverbed for the formation of explosive political demands in that regard. The urban poor, however, have subscribed to the strategy of "silent encroachment" (Bayat, 2004; Bayat, 2000). If there has been a potential for political mobilization, this has been due to the organizational capacity of the religious groups, whose organizational base, according to Bayat (2007), was drawn from the "middle-class over-achievers who have felt marginalized by the dominant economic, political, or cultural processes in their societies, those for whom the failure of both capitalist modernity and socialist utopia has made the language of morality (religion) a substitute for politics." In other words, unlike the Indian case, this time, it was the middle class that confronted the state and challenged the neoliberal processes of urbanization. Bayat (2013), however, urges us not to over-emphasize the role of religion in the country-wide protests in 2011 while labeling it a non-religious and civil one.

After the military coup in 2013, military forces suppressed urban revolts and uprisings in Egypt. The new political regime has introduced new urban policies to contain urban crises in the last 10 years, and it has identified informally developed neighborhoods as a "threat" to the nation. However, as Sharp (2022) thoroughly explains in his article on Egypt's urbanization, the new political regime's attempt to eliminate informality has not resulted in greater control over the root causes and consequences of urban informality. Contrary to its aim, the new regime deepened the hazardization of urban life that exacerbates socio-spatial injustice and unsustainable development in the country.

The Case of Türkiye

The historical development of urban policies in Türkiye has varied over different periods. As urban crisis containment strategies, we propose to analyze these policies in line with four successive periods: (1) the background and the first rise of neoliberal urban policies (1950–1993); (2) local government policies as the base of urban crisis containment strategies (1994–2001); (3) the urban rent-based policies institutionalized as the driving force of urban crisis containment by the central government (2002–2012); and (4) the limits to neoliberal urbanization and the signs of the collapse in urban crisis containment (since 2013 and continuing).

In this article, we argue that the politics of representation and the politics of exploitation have constituted two key domains of political tensions in the case of Türkiye, which led to serious urban protests (known as the Gezi Park Protests that became countrywide events in 2013) and resurrected reactions and criticism (after the devastating Kahramanmaraş Earthquakes in 2023) against neoliberal urban policies in the last decade. Although the politics of commons and the politics of dispossession equally influenced both national and local politics (Fırat, 2022; Hazar-Kalonya, 2021; Kuymulu, 2013), the findings in this article indicate that they have been contained through the operation of key neoliberal urban policies since 1994 (a key turning point after the local elections). However, in the last decade in Türkiye, there are urban protests, oppositional movements, and devastating disasters that are serious signs showing the collapse of these policies.

In Türkiye, policies of the post-1950 governments initiated the urbanization process, deepening the uneven development in the country while pouring labor power into the emerging metropolitan centers (emergence of urban poverty and squatter settlements). Coupled with the post-1960 Keynesian policies and especially during the 1970s, class-based political tensions began to dominate the scene. Alienation then was under check via social networks of the immigrants and the sense of rising class solidarity among the urban masses. Just before the military coup of 1980, a new neoliberal economic program (January 24 Decisions) was introduced to end Keynesianism. The subsequent neoliberal policies, especially during the 1980s and the associated state reforms, increasingly targeted the metropolitan areas through the "urbanization of capital," while the associated economic policies and the political discourses promoted began to dissolve the solidarity networks, promoting individualization (Şengül, 2012).

The 1994 local elections were a turning point in the history of urban policies, not only because they changed the political parties controlling Metropolitan Municipalities (like Istanbul and Ankara), but also because it was a fundamental shift in the logic of urban crisis containment strategies. The new municipal governments ruled in Istanbul and Ankara between 1994 and 2002 introduced local social aid programs, stimulated urban transformation schemes, and developed mechanisms of generating and distributing urban rent (Bayırbağ, 2013a; Şengül, 2011). Via such policies, both in the formal and informal spheres, they sought to retain control of the rent/surplus generated by profit-driven urban transformation, which was distributed to a range of actors to engender broad-based political support. As one of the chief city planners who worked in this period explains, "Municipality increases building densities, politicians take their share, investors win more money, and the residents own new flats" (Bayırbağ et al., 2022). This is a typical neoliberal win-win game that took its roots from the municipal policies of the 1990s. While this neoliberal logic made urban rent a dominant phenomenon in the containment of the urban crisis, it also created temporary influences that kept social and class-based inequalities under control.[3]

The urban rent-based policies became the driving force of urban crisis containment between 2002 and 2012. In this period, the central government triggered a series of comprehensive policy reforms to recover from the economic crisis of 2001 and continued to further strengthen the local governments while enhancing its political grip over them. Yet, the labor market policies pursued (including precarization of the middle classes), along with the urban rent-based economic recovery program, exacerbated social and spatial inequalities, furthering the alienation process of the populations living in metropolitan Turkish cities (Penpecioğlu et al., 2022; Türkün, 2014).

However, the central government in this period relied on effective political discourse, such as "majority," "stability," and "growth." These discourses, in fact, reflect the concerns of and target an urban population suffering from the institutionalized uncertainty of neoliberalism. Hence, on the part of the electorate from different class backgrounds, a pure pragmatic concern with saving the day and thus their need for stability to survive under the uncertainties of neoliberalism (Simone & Rao, 2012) could be seen as a key factor in throwing their support behind the central government.

As a crisis containment strategy suppressing class conflicts and radical political mobilizations, some "divide and rule tactics" (through selective employment of consent-coercion mechanisms and through the redefinition of the formal-informal divide) have been used by the central government in the formation and implementation of neoliberal urban policies/projects (Penpecioğlu, 2013). For instance, in the implementation of urban transformation projects, "growth"-oriented neoliberal hegemonic discourses are used to mobilize the consent of large sections of civil society. Most politicians and mayors, investors, and property developers subscribe to "development" and "investment"-based discourses. These discursive practices help them institutionalize a neoliberal hegemonic power over the formation of urban policies between 2002 and 2012 (Penpecioğlu, 2013; Türkün, 2011).

What is more, several new laws and changes to existing laws are also used as coercive instruments of state power to bypass and overcome opposition against these projects. These laws included, but were not limited to, Law No. 5216 (Metropolitan Municipalities), Law No. 5393 (Municipalities, 2005), Law No. 5366 (Transformation of Dilapidated Real Estate of Historical and Cultural Value), and Law No. 5104 (North Ankara Urban Transformation Law), as well as various changes to Law No. 3194 (Development Law) and Law No. 6385 (Mass Housing Administration Law).

This selective use of legal coercive instruments, in fact, has been made possible and indeed amounted to redefining the boundaries between the legal and the illegal and between the formal and the informal. For example, the law on the transformation of the areas under disaster risk (Law No. 6306) passed to facilitate urban transformation projects creates a formal/legal pressure on those unwilling to vacate their apartments, stating that securing the approval of two-thirds of the apartment owners would suffice to demolish the building. Moreover, only to bypass the resistance from the district municipality in the implementation of a specific urban transformation project, Article 73 in the municipality law was amended. In yet another case, the master plan of Istanbul was ignored altogether to build the third bridge over the Bosporus (while such an intervention inevitably

renders the plan—as an official document—dead). Such instances indicate how formal/legal frameworks (laws, master plans, etc.) are quickly bypassed and labeled as ex-legal conditions (having no validity) by the central government to sustain neoliberal urbanization in this period (Kahraman, 2021).

This period between 2002 and 2010 witnessed great changes in Turkish cities. However, towards the end of the period, it became obvious that not all ordinary people would benefit from neoliberal urbanization processes and that there would be losers as well as winners. Profit-driven urban transformation projects failed in most of the metropolitan cities, and it became difficult to generate rent as development extended further into the urban periphery (Bayırbağ et al., 2022). The limits of neoliberal urbanization were apparent in Türkiye, especially after the Gezi protests became a countrywide social unrest in 2013. Although it did not completely change the existing/dominant politics of representation, it became a serious and first sign of the collapse in urban crisis containment strategies (Bayırbağ & Penpecioğlu, 2017).

The last signs indicating the total collapse of neoliberal urbanization were the Kahramanmaraş earthquakes in 2023. This devastating earthquake added physical destruction to the multiple (economic, social, political) crises of Türkiye. This huge disaster, unprecedented in the history of the country, is likely to have long-term consequences that deepen the already existing multiple crises. Contrary to the expectations that were created by oppositional political actors, the authoritarian political power holders-networks won the 2023 general elections, and they continue to dominate the operation of the central government in Türkiye. Although it seems that there is political stability in the country currently, it is very difficult to argue that the multiple forms of urban crises are contained. The remarkable results of the 2024 local elections revealed the central government's failure of neoliberal crisis containment strategies and marked the success of the main opposition party. In the upcoming years, it might be possible to observe renewed social policies and poverty alleviation strategies by some municipalities to cope with the destructive effects of the urban crisis.

CONCLUSION

Concluding Remarks and The Future Lines of Comparative Urban Studies

The article has two aims: (1) to discuss the reasons behind and consequences of the urban crises experienced in the two cases of the global South and Türkiye, and in that regard, (2) to investigate the logic(s) of variation across different instances of urban crises in the cases examined. We elaborated on these issues through a comparative analysis of the cases of Egypt, India, and Türkiye. The article draws on Robinson's (2022) comparative methodological approach ("thinking with elsewhere") in urban policy, and the cases were selected on the bases/nature of the urban crises experienced.

Regarding the former aim, we emphasized that the political-economic development and urbanization processes of such countries have been shaped around a major political project, that of nation-state building. This unfinished project, which has involved the hard task of constructing social and territorial cohesion, was caught off-guard by the destabilizing effects of economic globalization in socio-political terms. The neoliberal policies introduced and the resultant processes of urbanization have further deepened the social and territorial divides while capitalizing upon and institutionalizing the uncertainties inherent in this unfinished project. This institutionalization process, across all three cases, has worked through a constant effort to redraw the boundaries between the formal and the informal, and between the legal and the illegal. This effort could be seen as the underlying logic of the containment strategies employed by the public authorities to keep potential unrest/dissent produced by the processes of neoliberal urbanization in check. This process, we argue, has been coupled with the selective employment of consent and coercion strategies, addressing different classes (or class fractions)/social groups differently through divide-and-rule tactics.

In certain contexts, those tactics have been more effective than in others. The degree of effectiveness of the containment strategies in general, and the divide-and-rule tactics in particular, have been determined by three factors: (1) the spatio-institutional design of the urban policy-making mechanisms; (2) the historical pattern of urbanization; and (3) the role of the nation-state (especially the central government) in the politics of (re)distribution, i.e., the struggles among different social classes/groups about access to (or exclusion from) resources needed in the production of material wealth and socially produced (surplus) value. These three factors also constitute a powerful analytical framework for the future lines of comparative urban studies.

We identified four different axes of struggle (possession/dispossession, exploitation, commons, representation) and indicated that the logic of variation across our cases has been determined by the public authorities' success/failure in managing these different domains of struggle, which have gotten increasingly tense under neoliberal policies and processes of urbanization. Especially in that regard, the public authorities' success/failure in pitting the middle class against the urban poor (and in pitting different sections of the middle class against each other) in these domains has emerged as the distinguishing aspect of those different cases.

NOTES

[1]India's central and local policy-making processes and their inherited historical and ideological-cultural dynamics have some remarkable differences when compared to other two countries elaborated in the article. Although the years between 1951 and 1977, Indian National Congress Party ruled the country, the 1990s saw the end of single-party domination and the rise of coalition governments, which was quite similar to Türkiye. After the elections in 2019, the Hindu Nationalist Party (Bharatiya Janata Party) forms the government currently in the country. The widening support behind this party has its roots, partly in the public's discontent with the destructive consequences of past neoliberal policies in the country.

[2]After the military coup in 2013, the political power has changed dramatically in Egypt and a republican semi-presidential system was created under the dominance of Morsi government. Despite a political-ideological change in government, it is possible to observe striking continuities in the key urban policy-making processes of Morsi (current) and Mubarak (previous) governments. Morsi government does not adopt an aggressive policy towards to the elimination of informal urbanization. Despite the significant change in the national politics, Morsi government's does not implement an aggressive policy to eliminate informal urbanization.

[3]The dominant political trends in Türkiye indicate a unique combination of conservative identity politics and neoliberal economic programs took its roots from this period in the second part of 1990s. It should be noted that Welfare Party and its municipal power and practices in the 1990s provided a key government logic for Justice and Development Party in the upcoming years of Türkiye.

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Article

Spatial transformation of agriculture in urban-rural relations: Torbalı district (İzmir)

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ABSTRACT

In the 19th century, with the development of industrialisation, there has been a process of change and transformation from rural to urban areas. In fact, with industrialisation, the employment opportunities of the city in the fight against poverty have taken their place as one of the main factors accelerating rural-urban migration. Increasing migration and the fact that the city has exceeded its current carrying capacity have created the need for spatial expansion towards the periphery. Globalisation and competition in world markets, which became dominant in the 1980s, have been identified as another important factor that has increased urban-rural occupation.

The aim of this study is to prevent the destruction of agricultural areas, which are of primary importance for vital activities, in the urban-rural relationship and to raise awareness on this issue. Within the scope of the study, Torbalı district of Izmir was selected as the sample area. Geographical Information Systems and plans of Torbalı district at different scales were used as a method. In this direction, the aim is to monitor the impact of urban development trends in Torbalı on agricultural areas in temporal (1990, 2000, 2012, and 2022) and spatial terms. Consequently, it has been established how much of the urban settlement areas in the Torbalı district, particularly the development and pressure on agriculturally important areas, and how much of the agricultural lands have been destroyed by this urbanisation pressure and what kind of land use type they have transformed into. In addition, in light of the data obtained, strategies have been developed to prevent this urbanisation pressure on agricultural land.

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INTRODUCTION

Urbanisation is an important concept that has been on the global agenda in recent years. Although it has many definitions, according to Masek et al. (2000), urbanisation is only one of the many ways in which humans have changed the world's land cover. According to Weber & Puissant (2003), it is defined as a territorial and socio-economic process that causes a transformation in land cover or land use categories. The process of urbanisation, which is directly related to the concentration of population and activities, leads to the formation of urban areas with hundreds of thousands of inhabitants. Urbanisation has an impact on

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the rural and natural environment and increases its impact with rapid population growth, especially in developing countries (Weber & Puissant, 2003). This population increase necessitates change and transformation in existing and new settlement areas together with urban development trends. However, in this process, rural areas are consumed as a solution to the need for urban areas, and production areas that are critical for urban nutrition or food security are destroyed (Yenigül, 2016).

Comparing the urban-rural population ratios in Türkiye over the years: While in the pre-1950 period the population was higher in rural areas, in 1985 the urban-rural population ratio was equal. Looking at the post-1950 population ratios, the fact that the current urban population ratio is around 93.4% is an important indicator that the rural population will disappear in the coming years due to the pressure of urbanisation. In this context, it is inevitable to experience a serious change and transformation process in agricultural areas, which can also be described as rural agriculture in urban-rural integration (Alğın, 2021). In fact, according to TURKSTAT data, the total agricultural area of Türkiye, which was 27,856 thousand hectares in 1990, will decrease to 23,136 thousand hectares in 2020 (BUGEM, 2020), which shows the importance of the situation in question.

Agricultural areas, which have a high return for the performance of vital activities and the national economy (Karataş, 2023), have an important place in the Torbalı district of Izmir, which has fertile soils. In fact, the economy of the Torbalı district is dominated by agriculture and agriculture-based industries. In addition to its fertile agricultural areas, Torbalı is considered to be a district with high potential in terms of agricultural production diversity and quantity (agricultural and animal production) due to its climate, geopolitical location, and industry. The main agricultural products grown in the district, which can produce three crops a year, are tomatoes, leeks, cauliflower, olives, grapes, figs, peaches, and maize (Torbalı Kaymakamlığı, 2023).

In this context, the aim of this study is to address the change-transformation process experienced by agricultural areas, which are of vital importance in the urbanising countryside, after urban growth in a temporal hierarchy, to reveal the spatial and visual results of spatial losses by comparing them with the previous ones, and to infer the basic factors underlying this change and transformation process.

The scope of this study, which deals with agriculture in the urban-rural relationship, is to determine the variables that direct the urban development of the Torbalı district, which is the research sample area, and, in this context, the changes in the agricultural areas of the district between 1990, 2000, 2012, and 2022.

THE PLACE AND IMPORTANCE OF AGRICULTURE IN URBAN-RURAL RELATIONS

Cities are mostly defined as places that are shaped in different time periods, especially in accordance with increasing needs and aspirations. Demographic structure, natural structure, climate, and socio-economic conditions are accepted as variables that direct urban development (Alğın, 2021).

The period dominated by rural areas before industrialisation changed its course with the impact of industrialisation in the 19th century. The industrialisation process that started especially in 1950 led to the dissolution of the rural population and the increase of the urban population (Alğın, 2021). Therefore, the 1950s are accepted as the starting point of rural dissolution in the history of urbanisation and settlement in Türkiye (Özdemir, 2012).

Since the twentieth century, there have been many developments in production, transportation, and communication with the development of technology. As a result of these developments, different forms of spatial organisation have emerged and the existing boundaries of settlement areas have been crossed. This situation has manifested itself in the form of sprawling growth on metropolitan peripheries (Karataş, 2007).

The development of cities over rural areas is an important indicator that cities have chosen the countryside as an expansion (urban development) area (Ceylan & Somuncu, 2018). The development process of urban areas on rural areas is mostly concentrated on agricultural areas, which can also be described as the agriculture of the countryside. This situation not only creates a de-identification of the urban-rural distinction but also causes a serious change and transformation process in agricultural areas.

As part of the study, a number of national and international studies were reviewed in order to understand the process of change and transformation experienced by agricultural areas, which are particularly important in urbanising rural areas, following urban growth. Among these studies:

Gidey et al. (2023) investigated the spatial and temporal patterns of urban and peri-urban spatial growth and its impact on arable land in Shire Indaselassie, Northwest Tigray. Multi-temporal and spectral Landsat satellite imagery was used as input. In addition, a Cellular Automata Markov Chain Model was used to predict the future. At the end of the study, it was found that the arable land decreased by -0.1 km^2 from 1976 to 2019, as well as the areal growth of the city and its surroundings.

Iddrisu et al. (2023) investigated the pressure of the horizontal expansion of the city of Tamale, Ghana, on the agricultural lands around the city, which are an important source of livelihoods in the region, according to the Sustainable Livelihoods Framework. Household data, Landsat Thematic

Mapper (TM) for 1986, Enhanced Thematic Mapper Plus (ETM+) for 2004, and Landsat 8 Operational Land Imager/ Thermal Infrared Sensor (OLIS/TIRS) for 2019 were used as methods. At the end of the study, it was found that urban expansion provides new employment opportunities in trade and services, but also poses some threats to the main livelihoods of the people living in the region, as it causes a decrease in agricultural land.

In a study by Karaman et al. (2022), which analysed the pressure of urban growth on agricultural land between 2001 and 2021, the Selçuk district of Konya province in Türkiye was selected as the study area. The methods used in the study were remote sensing (RS) and geographic information systems (GIS). The geology and land use capability classes of Selçuklu district were analysed, and it was found that the settlement areas were mainly spread on alluvial and agricultural production areas.

The aim of the study by Martellozzo et al. (2018), which investigates the loss of natural and agricultural areas in Italy, is to redefine planning priorities and create policies that support ecological conservation. To this end, a comparison of land use/cover change (LUCC) projections corresponding to different policy-oriented scenarios was carried out using a combination of multi-criteria analysis and cellular automata modelling (SLEUTH). The results show that the amount of vegetation lost due to urbanisation and agricultural substitution is of high ecological and sustainability value. It was also found that the areas converted to agriculture are of much lower quality and suitability. At the same time, it was found that the planning policies of the past and present do not provide adequate protection for natural landscapes and are inadequate in this respect.

Partigöç (2018) investigates the "spatial changes and transformations of rural areas in the process of urbanisation" through the city of Denizli (Pamukkale and Merkezefendi districts). The research criterion was the "Metropolitanisation Law" numbered 6360, which came into force in 2012. The study, which examines the impact of the law on settlements before and after the law, finds that rural areas (agricultural land, forests, pastures, etc.) in particular are negatively affected after the law.

Masek et al. (2000) analysed urban growth projections in relation to economic and demographic factors. The study used Landsat satellite imagery (1973-1996) and was tested on the Washington DC region. At the end of the study, it was found that the metropolitan area of Washington DC was expanding at a rate of about 22 km² per year. At the same time, comparisons with census data suggest that the physical growth of the urban plan as observed from space can be reasonably related to regional and national economic patterns.

Agriculture is defined as the endeavour/activity undertaken to obtain animal and plant products through the use of soil and seeds (Uzundumlu, 2012). The uncontrolled growth of cities with urbanisation has a negative impact on agricultural livelihoods and disrupts the balance between food supply and demand. Agriculture is a sector that meets the basic nutritional needs necessary for the continuity of people's vital activities, provides resources for industry, and contributes to economic returns and the development process. Therefore, ensuring social food security and agricultural supply security (Tokatlıoğlu et al., 2018) is considered an essential necessity.

Therefore, this study agrees with the research that urban growth/development trends are increasing and that these development trends put pressure on agricultural areas in particular. In addition, it has common features with some of the national and international studies mentioned above on the pressure of urban growth on agricultural areas in terms of spatial comparison. However, it differs from these studies in terms of its approach to the subject, the methodology used, and its original content.

The studies analysed mostly examine the spatial change/ transformation of agricultural areas as a result of urban growth using remote sensing methods and geographical information systems. However, in this study, in addition to geographical information systems, the effects of planning decisions at different scales on agricultural areas are analysed both temporally and spatially. The factors that influence the changes and transformations that occur in agricultural areas, or the variables that are effective in the development of the district, are also analysed. In addition, it is noted that the laws and regulations enacted to protect agricultural areas do not provide sufficient protection in the name of "public interest."

Some Laws and Regulations on Agriculture

In order to make sense of the legal process for the protection of agricultural areas in the urban-rural relationship, this section of the study examines some of the laws and regulations enacted for the protection of agricultural areas and adaptation to the rapid urbanisation process after 1950. The period covering the 1950s and after is the period of the fastest agricultural transformation (Oyan, 2004). Some of the laws and regulations enacted in this period and some important developments related to the period are briefly summarised below.

The period between 1950 and 1960 saw the beginning of the process of adaptation to rapid urbanisation in Turkey. One of the important developments in this period was the establishment of the Ministry of Housing and Settlement in 1958 with Law No. 7116, which was enacted to find solutions to the problems created by rapid and unhealthy urbanisation (Efe, 2003).

In the period 1960-1980, a planning period was adopted to ensure economic and social balance.

- In 1960, the State Planning Organisation (SPO) was established and the preparation of five-year development plans began. Since 1963, attempts have been made to secure agriculture through state intervention through development plans (Eştürk & Ören, 2014).
- The "Gecekondu Law" of 30 July 1966, numbered 775, is the most comprehensive law enacted in the field of gecekondu in order to prevent reconstruction by rehabilitating and liquidating gecekondu and to protect agricultural and public lands (T.C. Resmi Gazete, 1966). This law paved the way for a new construction phenomenon by introducing new concepts such as "local development plan" and "rehabilitation plan" into planning literature (Efe, 2003).
- The "Land Office Law" numbered 1164, which came into force in 1969, created the "General Directorate of Land Office" within the Ministry of Housing and Settlement, in order to allocate land and plots to meet the needs of the State in the areas of housing, industry, tourism, and public spaces, when necessary. However, the content of this law does not include any provision to prevent the misuse of agricultural land (Efe, 2003).
- The "Land and Agrarian Reform Law" No. 1757, passed on 25 June 1973, aimed to "use, protect, improve, develop and maintain the productivity of land and water resources in agriculture according to technical and economic requirements" (T.C. Resmi Gazete, 1973). According to the law, expropriation is based on the "public interest."

In the post-1980 period, the urban-rural opposition began to lose its significance (Tekeli, 2019). In addition, the liberal trend aimed at minimising state intervention in agriculture came to the fore (Eştürk & Ören, 2014). Important developments in this period include the first strategic approach to agriculture in 2004 and the preparation of the Law on Agriculture.

- The "Mass Housing Law" No. 2985, which came into force on 2 March 1984, decided that the areas where mass housing was to be built were to be determined by the governorships in order to meet housing needs (T.C. Resmi Gazete, 1984a). However, there is no provision to prevent the misuse of agricultural land.
- On 22 November 1984, the "Agricultural Reform Law No. 3083 on Land Regulation in Irrigation Areas" was enacted. Article 19 of this law states that agricultural land cannot be used for other purposes unless there are compelling reasons (T.C. Resmi Gazete, 1984b). However, in addition to this, Article 65 (Amended: 12/3/2018-2018/11519 K.) of the implementing regulation of the said Law states that the provisions of the "Soil Conservation and Land Use Law dated 3/7/2005 and numbered 5403" shall be applied to the misuse of agricultural lands in necessary cases (T.C. Resmi Gazete, 1985).
- In 2005, the "Law on Soil Protection and Land Use" No. 5403 came into force. The purpose of the law is to "establish the procedures and principles to ensure the protection and development of soil by preventing its loss and deterioration by natural or artificial means, and to ensure planned land use in accordance with the principle of environmentally sustainable development" (T.C. Resmi Gazete, 2005). The phrase "absolute agricultural land, special crop land, planted agricultural land and irrigated agricultural land cannot be used for purposes other than agricultural production" (Article 13) in the relevant law has a preventive character against the misuse of agricultural land. However, in the continuation of Article 13 of the relevant law:

Provided that there is no alternative area and the Board deems it appropriate:

(a) strategic defence requirements,

(b) temporary settlement needs following natural disasters,

(c) exploration and exploitation of oil and natural gas,

(ç) mining activities for which a decision of public interest has been taken by the competent Ministry,

(d) for plans and investments for which a decision of public interest has been taken by the ministries, the Ministry may approve the applications for non-purpose use of these lands, provided that soil conservation projects are complied with.

The inclusion of this sentence indicates that there may be some exceptions to the off-purpose use of agricultural land. On 31 January 2007, with the entry into force of the "Law on Amendments to the Law on Soil Conservation and Land Use" No. 5578, an additional sentence was added to Article 13 of the said Law No. 5403: "e) Investments in road infrastructure and superstructure activities in the public interest" and the sentence "The Ministry may delegate this authority to the Governorates" (T.C. Resmi Gazete, 2007) was added to the end of the 1st paragraph.

- On 12 November 2012, Law No. 6360 on the Establishment of Metropolitan Municipalities and Twenty-Six Districts in Thirteen Provinces and Amendments to Certain Laws and Decree Laws came into force (T.C. Resmi Gazete, 2012). With this law, the legal personality of approximately 16,500 villages was abolished, and the authority to make decisions regarding agricultural lands, pastures, and coastal areas belonging to these villages was given to metropolitan municipalities (Yenigül, 2016). This situation has led to a blurring of the urban-rural distinction (Tekeli, 2016) and concerns that municipalities focusing on urban development will encourage rural areas to urbanise

(Yenigül, 2016).

- The purpose of the "Regulation on the Protection, Use and Planning of Agricultural Lands" published in the Official Gazette No. 30265 on 9 December 2017, is to determine the procedures and principles for the determination of soil and land assets, classification and development of agricultural lands, permitting off-purpose use in mandatory cases, protection of soil and large plains with high agricultural production power, preparation and implementation of soil protection plans and projects, determination of erosion-sensitive areas, formation, duties and activities of the soil protection board, and planned use of lands in accordance with the principle of environment-first sustainable development (T.C. Resmi Gazete, 2017). In the relevant regulation, in addition to the protection of agricultural lands, it is stated that agricultural lands can be opened to misuse in mandatory cases.

As a result, as seen above, many laws and regulations have been enacted for agriculture. However, when the loss of agricultural land in the urban-rural dichotomy is taken into account, it becomes clear that these laws and regulations are not sufficient to protect agricultural land. In fact, one of the most important planning problems to date is rapid and unhealthy urbanisation.

Law No. 6360, which is particularly important in terms of institutional and administrative structuring and spatial planning processes, has significantly increased the rate of urbanisation throughout Türkiye. Another change with the entry into force of the law is the abolition of the legal personality of towns and villages and the beginning of the characterisation of all settlement units as "cities" (Partigöç, 2018). In this new order, which caused a confusion of meaning between urban and rural, what constitutes the countryside and the future of agricultural areas, characterised as rural agriculture, became a matter of debate.

MATERIAL AND METHODS

Study Area

This study examines the spatial transformation of agriculture in the urban-rural relationship through the Torbalı district of İzmir province.

Torbalı is a district of İzmir province in the Aegean region of Türkiye, built on the Küçük Menderes basin and has very fertile soils. It is bordered by Kemalpaşa to the north, Bayındır to the east, Menderes to the west, and Selçuk to the south (Figure 1).

According to Turkish Statistical Institute (TUIK) data, the population of the district in 2022 is 207,840 people (Figure 2). Its total area is 577 km². The total number of municipalities connected to the district is 60.

The economy of the district is mainly based on agriculture and industry. Torbalı District, which is located on the Izmir-Aydın motorway, is also connected to Ankara via Kemalpaşa Road. It is also a point of attraction for industrial investments due to its easy access to Menderes Airport and Izmir Port.

The Torbalı district has a Mediterranean climate. Summers are hot and dry, and winters are mild and rainy. The fertile soil structure is suitable for growing all kinds of cereals

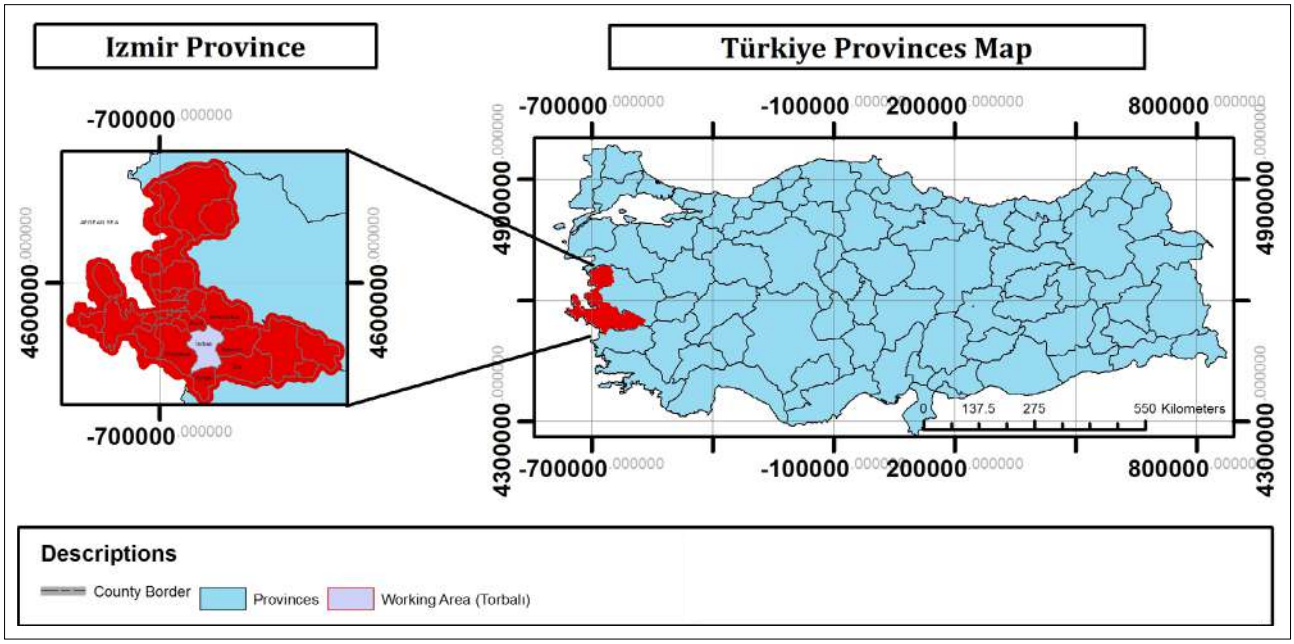

Figure 1. Map of the study area.

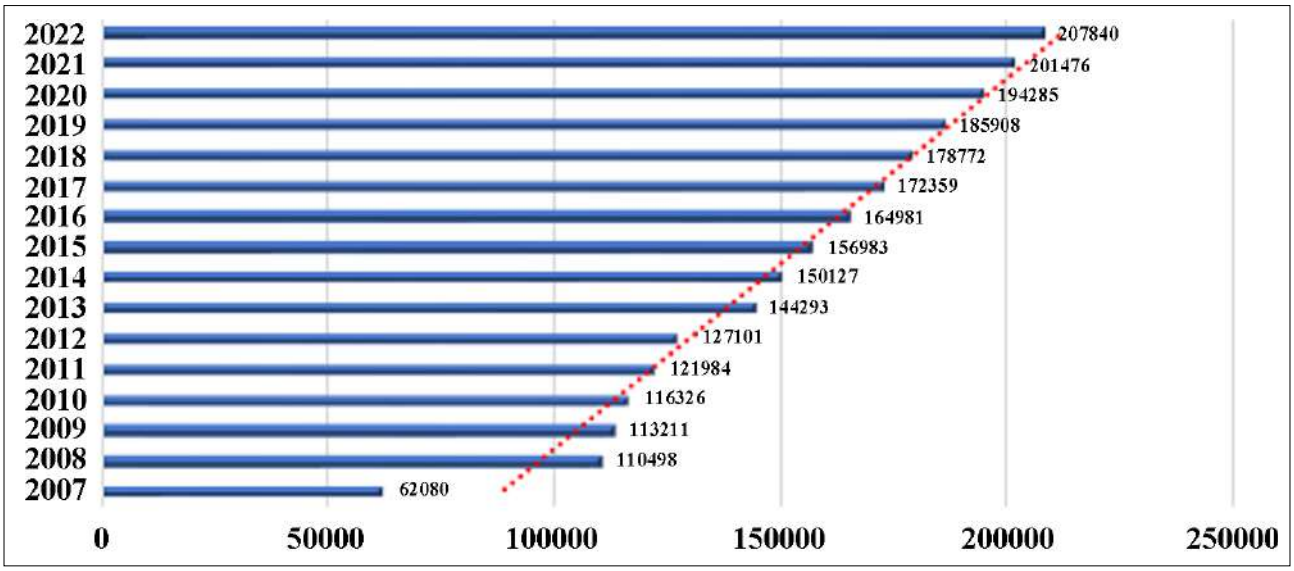

Figure 2. Population growth of Torbalı district by years (TUIK, 2023).

and industrial crops (tobacco, cotton, etc.), vegetables, and fruits.

Methodology

In this study, the pressure of urban development trends on agricultural areas was analysed using both geographic information systems and plans of Torbalı at different scales. Within the scope of the study, firstly, CORINE (Coordination of Information on the Environment) land use data from 1990, 2000, and 2012 and Dynamic World sourced land use data from 2022 were used in order to monitor the direction in which the urban development of the district continues and the areal examination of agriculture in this development in the historical process. These data were re-digitised using ArcGIS software. Thus, a new land use map consisting of four categories—artificial areas, agricultural areas, forest areas, and semi-natural areas—was created. For this four-category land use classification, CORINE land use descriptions were taken into consideration (Figure 3).

These land use data were used to carry out a spatial analysis of the change and transformation process of agricultural areas by comparing the land use capacity produced in the study within the framework of agricultural and forest areas. Finally, all the analyses were overlapped, and a synthesis map of the sample area was produced in order to make temporal and spatial inferences and to discuss the impact of different scales of planning decisions taken for urban development in Torbalı on agricultural areas.

FINDINGS

In the last 35 years, Turkish cities have experienced a great change in the spatial dimension of urban development. As in all cities of the country, İzmir has also experienced this process of change and transformation. The Torbalı district in particular has the most fertile land in the Aegean region. However, in recent years, agricultural land has been opened up for misuse due to unplanned urbanisation and industry (Kurucu & Küçükyılmaz, 2008).

Since 1989, Torbalı has become the largest industrial centre in Izmir. In particular, the fact that Torbalı is located on the İzmir-Aydın motorway and the 45 km double-track railway connecting İzmir and the neighbouring provinces has made the district an important point of attraction for industry. This situation has reached a dimension that increases unemployment and employment deficit as a factor that increases migration to the district over time (Torbalı Ticaret Odası, 2020).

When analysing the urban-rural and total population of Torbalı district for the years 1990, 2000, 2012, and 2022 within the framework of TUIK data, it can be seen that although there has been a decrease in the rural population rate over the years, the rural population rate in 1990 and 2000 is higher than the urban population rate. With Law No. 6360, villages were transformed into districts, and all settlement units were defined as urban, resulting in a significant increase in urban population rates in 2012 and 2022 (Table 1).

One of the reasons for this increase in the district's population is the intensive migration to the district. As a result of the intensive migration to the district, the existing carrying capacity has been exceeded over time, and the demand for new housing has increased. This situation has manifested itself in rapid urbanisation, and the district has continued its urban development by showing an uncontrolled growth trend on agricultural land.

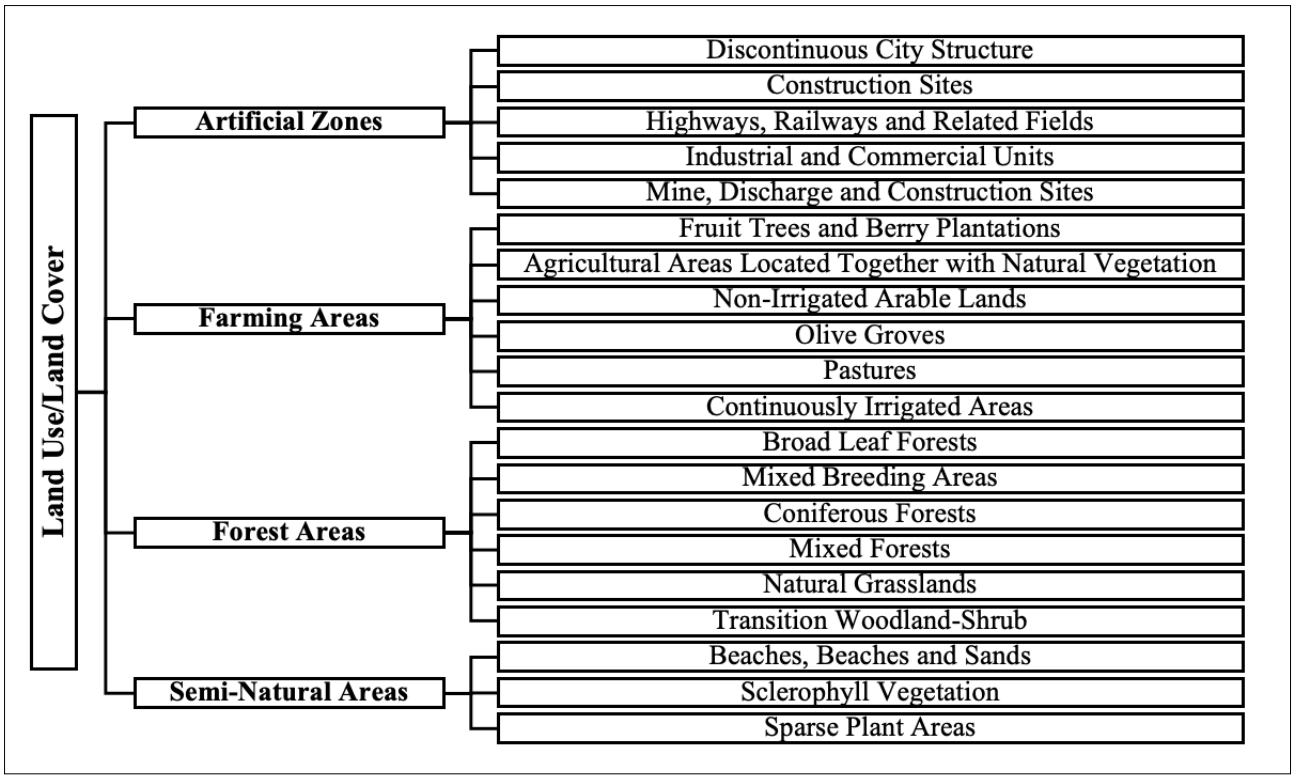

Figure 3. CORINE land cover classes.

Table 1. Urban-Rural and total population of Torbalı district by years (TUIK, 2023)

County Population	1990			2000			2012	2022
	Urban (%)	Rural (%)	Total (Person)	Urban (%)	Rural (%)	Total (Person)	Total (Person)	Total (Person)
Torbalı	29,74	70,26	71.172	40,87	59,13	93.216	138.040	207.840

Torbalı District is located on the alluvial land of the Fetrek River in a rift valley (graben) formed as a result of tectonic activity. Developed on a flat plain, the Torbalı district has suitable conditions for all kinds of agricultural activities. However, the intensive demand for housing in parallel with industrialisation and population growth poses a serious threat to agricultural areas (Kurucu & Küçükyılmaz, 2008).

When analysing the land use change of Torbalı district between 1990 and 2000, it can be observed that Torbalı has continued its urban development mainly towards the periphery and north-west, especially on agricultural areas, as shown in Figure 4.

When analysing the land use change of Torbalı district between 2012 and 2022, it can be seen that Torbalı has continued its urban development in the same direction from the past to the present, as shown in Figure 5. In the historical process, there is a significant decrease in forest areas. In addition to the existing settlements along the transport axis, the tendency of small settlements in agricultural areas to grow over time has reached a dimension that threatens the integrity of agricultural areas.

The settlement area, which was 1,152 ha in 1990, reached 7,247 ha in 2022. In other words, between 1990 and 2022, there was an increase of 84.1% in the settlement areas. At the same time, it should be noted that the agricultural area has decreased over the years. The agricultural area, which amounted to 36,721 hectares in 1990, decreased to 25,593 hectares in 2022. This situation shows that between 1990 and 2022 there was an areal reduction of 43.5% in agricultural areas. In addition to agricultural areas, there was a 6.3% decrease in forest areas between 1990 and 2022. The area of semi-natural areas increased by 49.3% between 1990 and 2022 (Table 2).

When analysing the land use capability of Torbalı District, it can be seen that the existing urban structure is mostly developed on land with I and II class land use capability, i.e. land suitable for tillage agriculture (Figure 6).

If we look at the development of urban settlements on

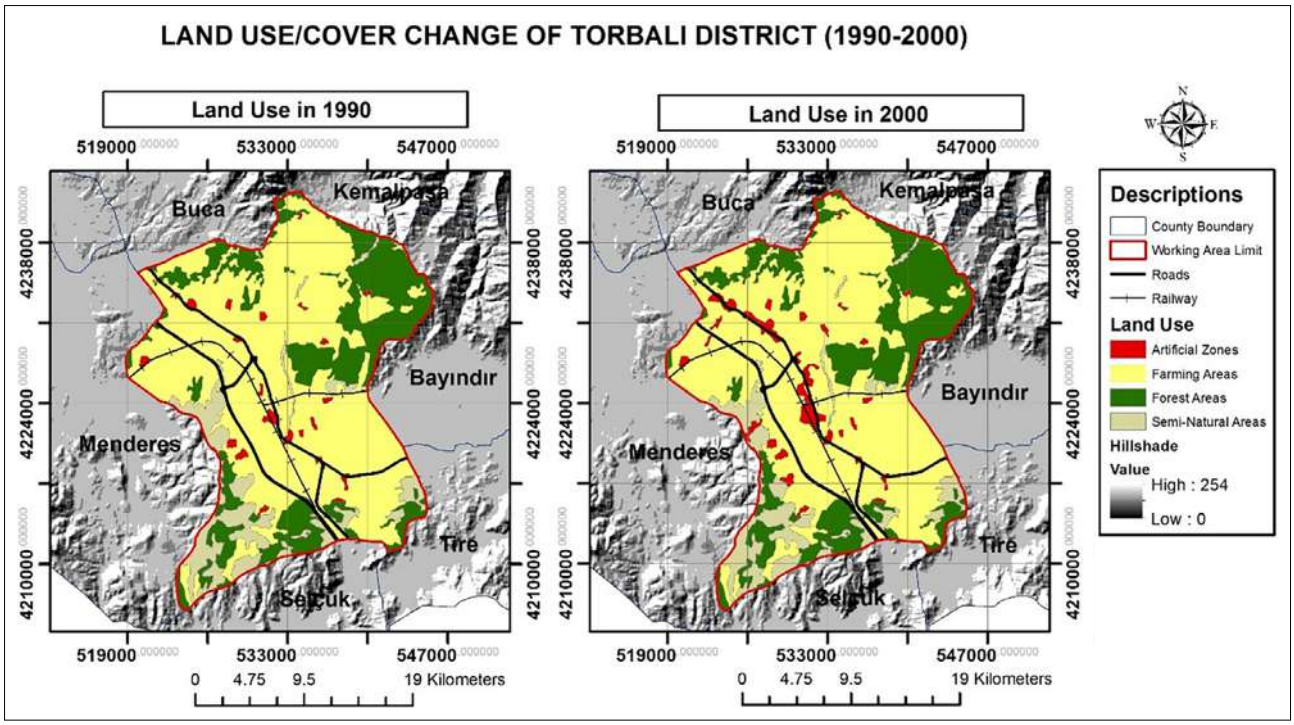

Figure 4. Land use/cover change in Torbalı district (1990-2000).

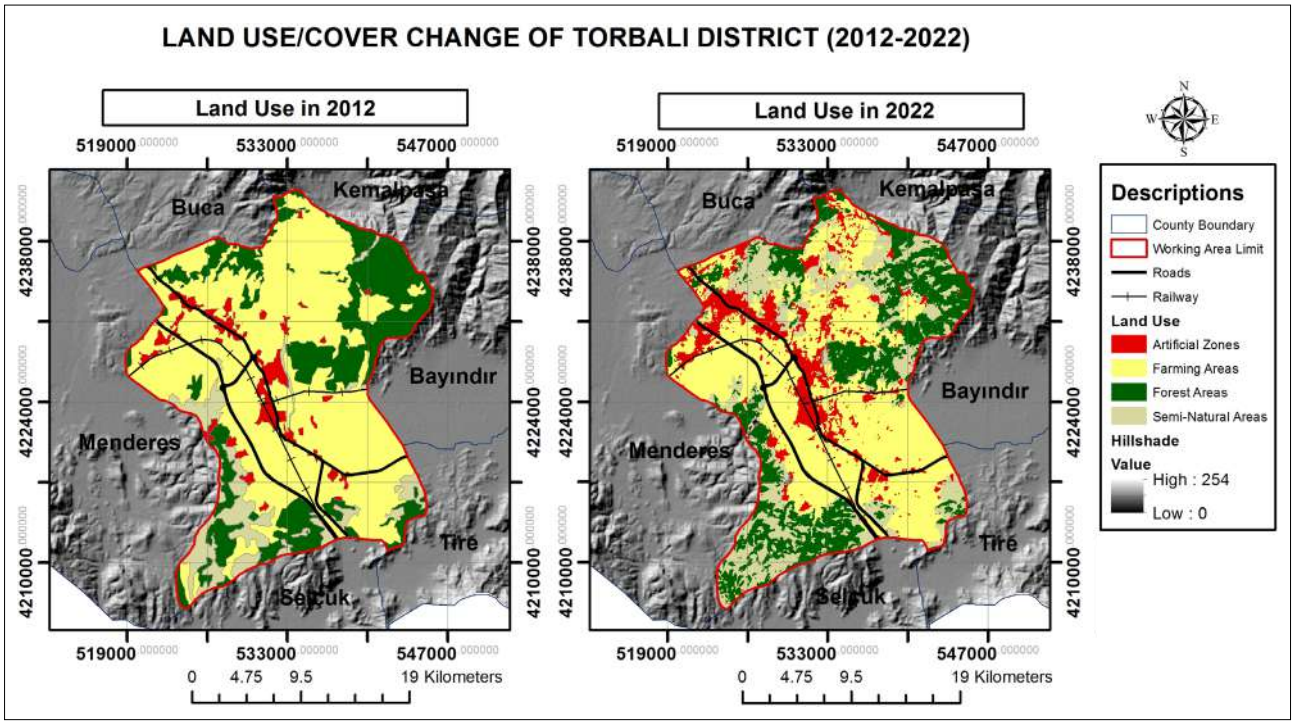

Figure 5. Land use/cover change for Torbalı district (2012-2022).

agricultural and forest areas in Torbalı district according to years, it can be seen that the urban texture that emerged in 1990 and 2000 developed mainly on irrigated agricultural areas in the centre and on dry agricultural areas in the north and northwest. It can be observed that in 2012 and 2022, the urban texture shows a significant increase in area compared to previous years. In this process, the tendency of urban settlement areas to develop on irrigated and dry agricultural areas continues. In addition, the emergence of new settlement areas, as well as the areal growth of existing

Table 2. Land use change in Torbalı district by years

Land Use	1990	2000	2012	2022	1990-2022 Rate of Change (%)
	Area (hectares)				
Artificial Zones	1.152	2.494	3.562	7.247	84,1
Farming areas	36.721	35.673	34.534	25.593	-43,5
Forest Areas	13.734	13.646	13.963	12.921	-6,3
Semi-Natural Areas	5.993	5.787	5.541	11.839	49,3
Total	57.600	57.600	57.600	57.600	---

settlements, is noteworthy (Figure 7).

As can be seen in Figure 8, Class I and II land is mostly used for irrigated agriculture, and Class I and II land in the north and northwest, close to the settlement boundary, is used for dry agriculture. It can be observed that the areas with Class I and II land use capability, which are located along the transport axis from the centre towards Kemalpaşa, are used as olive groves. Olive groves, other orchards, and greenhouses are used on the land with Class III and IV land use capability. Although Class VI, VII, and VIII areas on the map are unsuitable for arable farming, they are mostly used as woodland in the northeast and as woods, bushes, and shrubs in the southwest. The urban development trends in the county from 1990 to 2022 will mainly affect agricultural areas with Class I and II land capability.

When analysing the Ministry of Agriculture and Forestry's CORINE land use data for Torbalı (Figure 9), it can be seen that in addition to the increase in settlement areas, especially since 1990, the industrial areas, especially in the northeast of the settlement areas, tend to develop towards the northwest. As a result of the joint growth of settlements (discontinuous urban structure) and industrial areas (industrial and commercial units, quarry discharge, and construction areas), especially since 2000, there has been a reduction in the area of agricultural land. An analysis of the 2012 land use data shows that irrigated agricultural areas have increased under pressure from housing and industry, especially in the southwest compared to previous years. In other words, it can be observed that the non-irrigated agricultural areas in the southwestern direction of Torbalı district have been replaced by continuously irrigated areas in 2012.

It can be observed that the increasing population, the existing transport axis, and the topography of Torbalı, which tends to continue urban development on agricultural areas, are the guiding factors for this urban growth.

When the İzmir-Manisa Planning Region 1/100,000 Scale

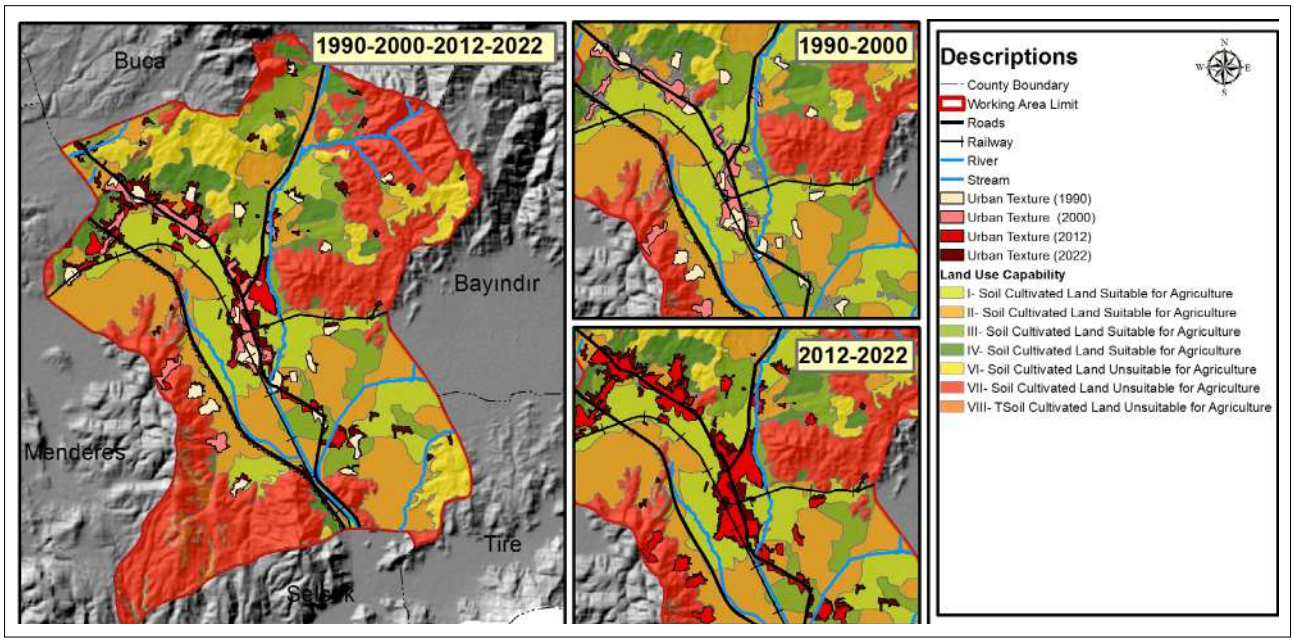

Figure 6. Land Use Capability (LUC) of Torbalı district.

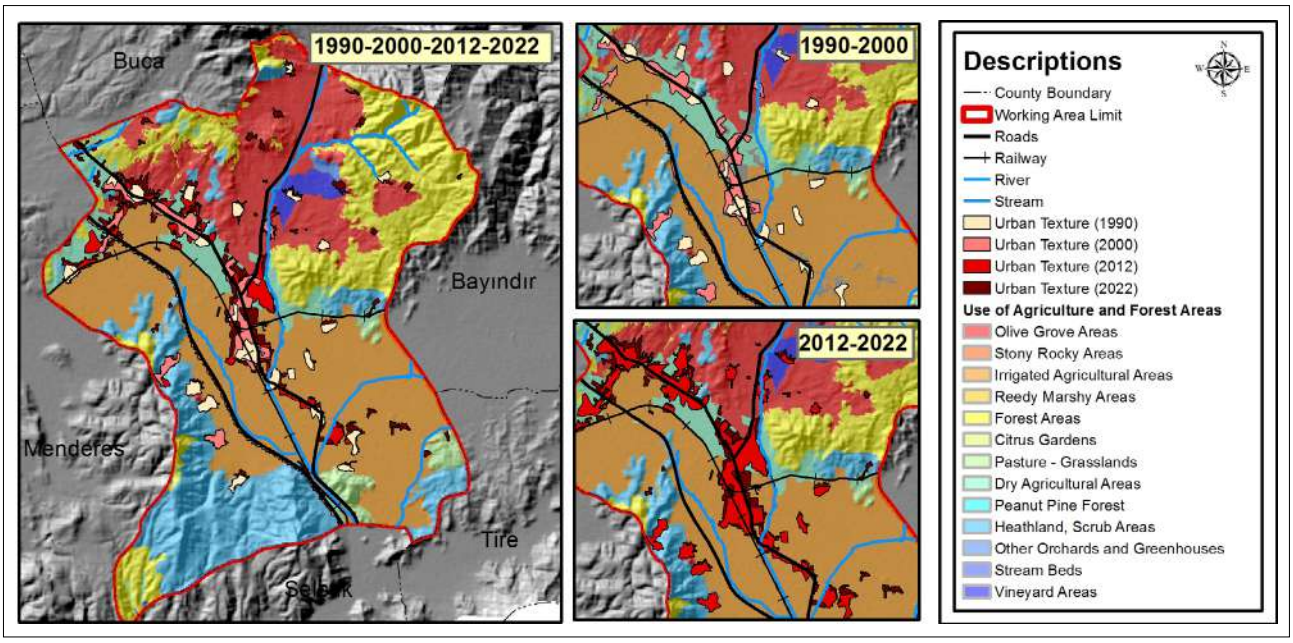

Figure 7. Development of urban settlement areas on agricultural and forest land in Torbalı district by year.

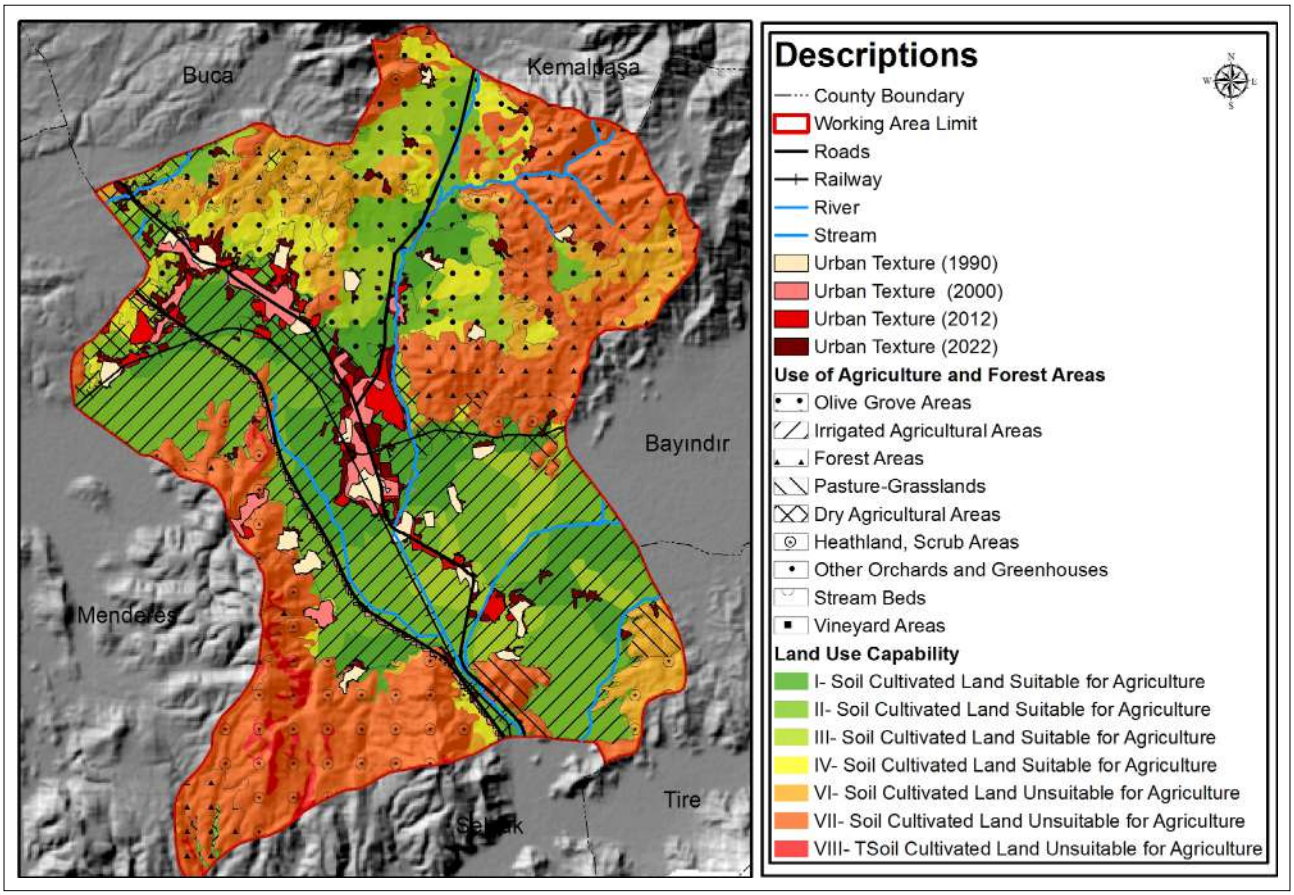

Figure 8. Synthesis map of Torbalı district.

Regional Master Plan, which was approved with the Ministry's approval No. 9948 of 23/06/2014, is analysed within the boundaries of the study area, it is seen that the areas suitable for settlement in the planning decisions made for Torbalı and its surroundings do not have a protective/preventive function for the integrity of agricultural areas. In other words, it can be

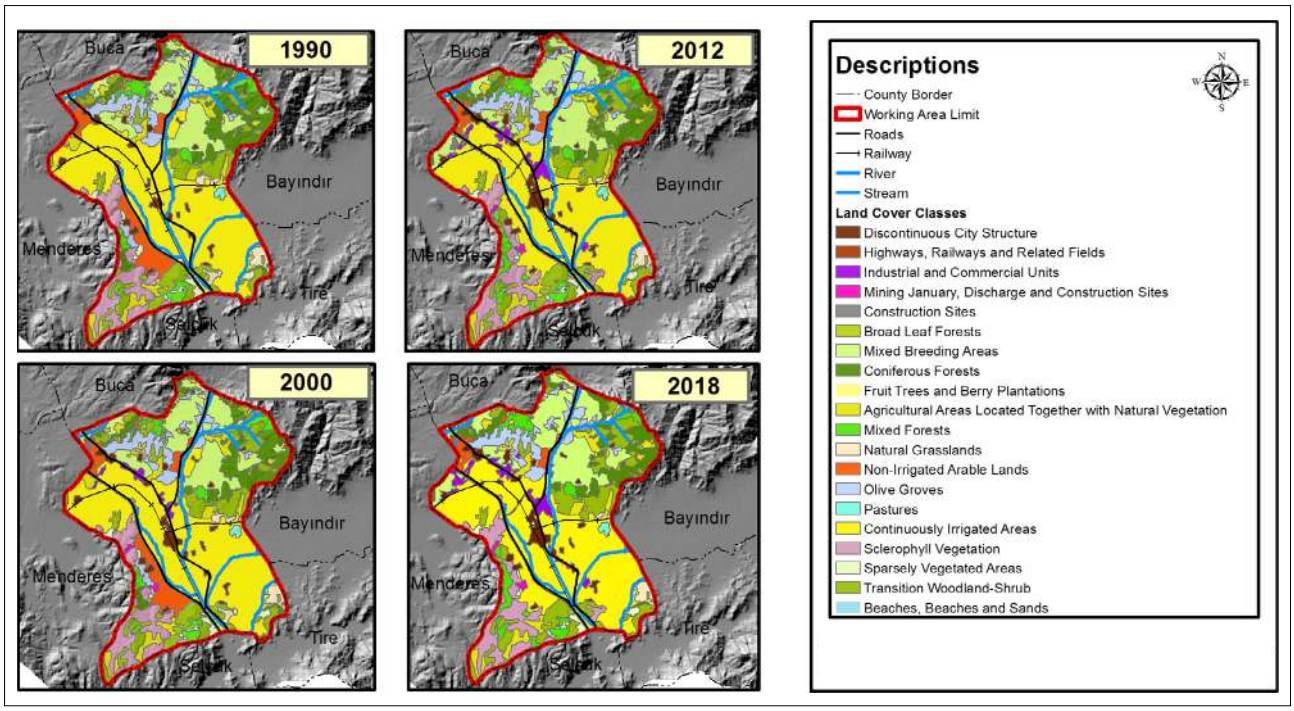

Figure 9. Land use/cover change in Torbalı district (1990, 2000, 2012 and 2018).

seen that the industrial areas, which have an important place in the development of the city, and the new settlement areas opened in this context have a disruptive effect on the integrity of the agricultural areas (Figure 10).

If one examines the master development plan of the Torbalı district centre on a scale of 1:5,000 from 1983, it seems that the planning decisions taken were mainly agricultural-oriented. While agricultural areas are located to the north of the settlement areas, industrial areas are located to the northeast. In addition to the existing settlement areas, new development areas are oriented east-west and north-south. When examining the master plan revision on a scale of 1:5,000, dated 13.03.2017, it can be seen that the planning decisions made are industry-oriented. It can be seen that the settlement areas have increased in size compared to 1983, and that the new development areas have been treated

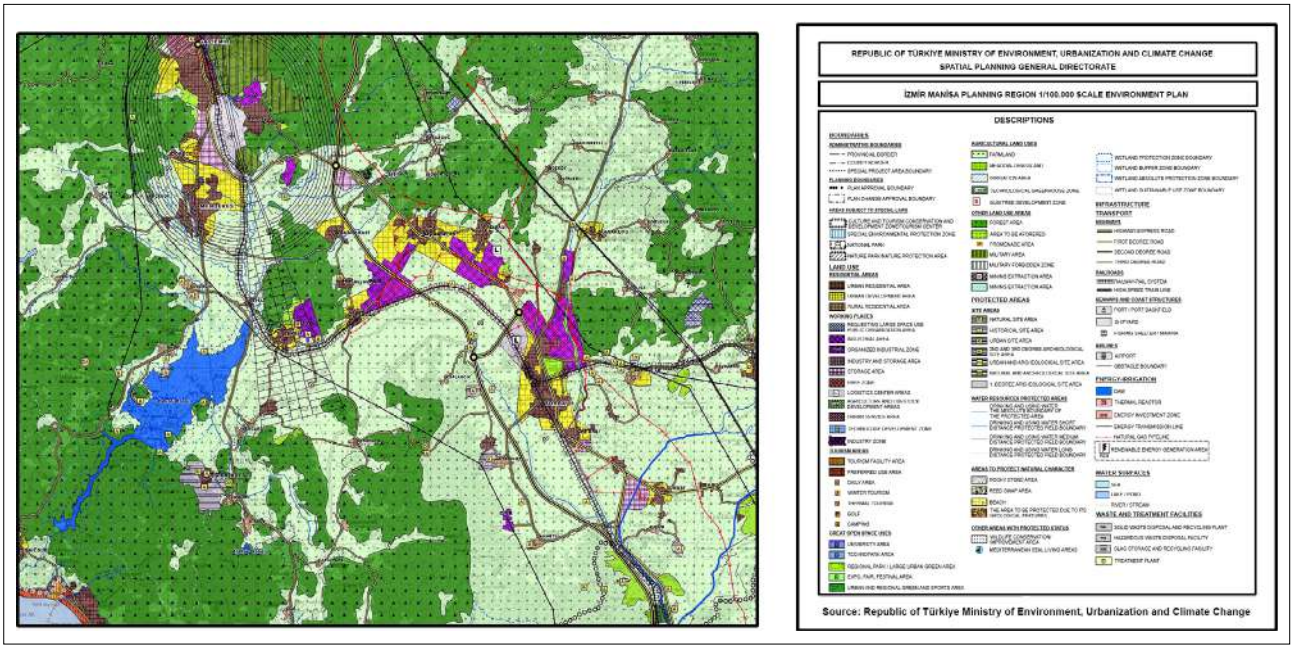

Figure 10. 1/100.000 Scale Regional Master Plan of Torbalı District.

in such a way that they surround the existing residential areas. In this process, it can be said that agricultural areas are being used as residential and industrial areas. The industrial areas, which tend to develop in a north-easterly direction, have increased compared to 1983 and have been integrated with the residential areas (Figure 11).

EVALUATION AND CONCLUSION

Since 1950, due to developments (opportunities brought by the industrial revolution), urban areas have shown a tendency to spread/agglomerate over rural areas. This situation has, over time, caused a serious process of change/transformation in agricultural areas and has reached a dimension that threatens the future of agricultural areas. This situation has been clearly demonstrated in many studies. In the above-mentioned studies, the transformation of agricultural areas was revealed using geographic information systems and remote sensing methods. In this study, in addition to identifying this change, the impact of plans drawn up at different scales on this process has been evaluated in terms of both time and space. In addition, other variables related to settlement (industrialisation, development of transport, etc.) were studied together with the planning process, taking into account the change in agricultural areas.

In this context, when the historical change of land use in Torbalı District is analysed within the framework of the study, it is found that in 2022, compared to 1990, artificial areas increased by 84.1%, agricultural areas decreased by 43.5%, forest areas decreased by 6.3%, and semi-natural areas increased by 49.3%. It is an undeniable fact that the increase in artificial areas is directly related to the increase in population. Developed industry and transport facilities are the main factors that are effective in the population increase of Torbalı district.

It has been observed that the existing urban fabric in Torbalı has developed on first and second class land, which is suitable for agriculture in terms of land use capacity. In addition, it has been observed that in the plans made specifically for Torbalı, decisions were made to support this situation, the settlement was planned on agricultural land, and no planning decisions were made to protect these areas.

The urban growth trend of Torbalı since 1990 has been on irrigated agricultural land in the centre and partly on dry agricultural land in the north and northwest. Therefore, it can be said that the urban developments from 1990 to 2022 will be mainly on irrigated agricultural areas.

In the land-use plans for the future, urban development is spreading in an uncontrolled and unplanned manner to meet the growing population and its needs. In this process, agricultural areas, which are of primary importance for human life, are neglected due to increasing needs, demands, economic interests, and concerns. As in the case of Torbalı, as a result of urbanisation and industrialisation, fertile agricultural land is being used for purposes other than those for which it was intended, and the relevant laws and regulations are providing a suitable environment for this to happen. For this reason, the protection of agricultural areas through planning decisions is a priority. In order to prevent the sprawling and rapid growth of residential areas of high agricultural quality, such as Torbalı, a planning and

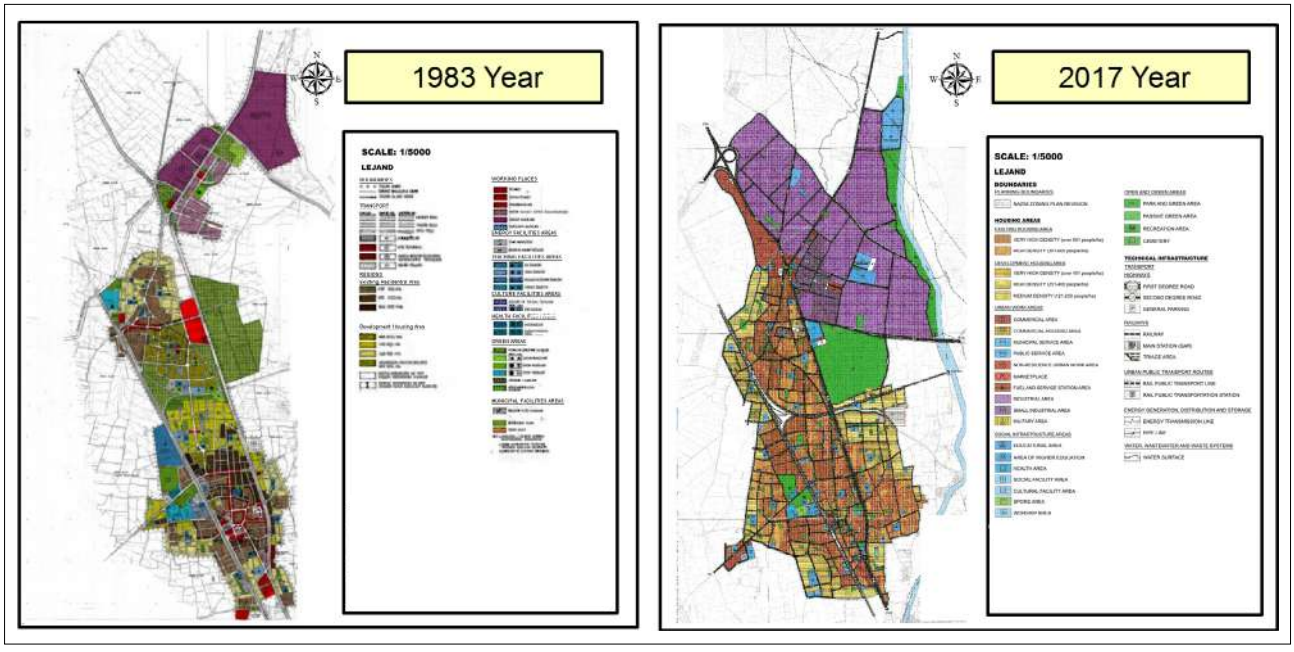

Figure 11. Torbalı District Centre Master Plan on A Scale of 1:5000 from 1983 and 13.03.2017.

zoning scheme should be proposed to ensure more compact development. In addition, in order to protect agricultural land and prevent it from being used for purposes other than those for which it was intended, construction decisions, especially in agricultural areas, should be avoided as much as possible, or the minimum construction conditions should be prepared in such a way as to prevent misuse (housing, etc.).

A study has simulated the urban growth of Izmir in 2050. According to the simulation results, the urban growth of Izmir is expected to reach 126,422 hectares in 2050. Another study for 2050 shows that the population of Izmir will reach 8.1 million in 2050, according to the population projection of the Izmir Water Master Plan for 2050. In this context, the agricultural area per capita is predicted to decrease to about 0.0268 ha in 2050 (Alğın, 2021).

As in many settlements, producers in Torbalı focus more on the economic aspect of farming than on the environmental and social aspects. Moreover, 50.82 percent of the producers do not plan to continue agricultural production in the future (Çukur & Işın, 2008). It is predicted that this situation will lead to a possible food crisis in the future. For this reason, it is necessary to take measures not only to protect agricultural land but also to protect the quality and ecological structure of the agricultural area. For this purpose, it is important to determine the building plans for the protection of the rural quality and the social structure of rural settlements where productive agricultural areas are located. Determining the incentives and legal restrictions to protect the quality of agricultural areas will also be effective in protecting the quality of the soil, the continuity of agricultural use of the area, the unique agricultural product pattern, and the socio-economic structure of the area.

Agricultural areas are of great importance for the continuity of vital activities and the national economy. For this reason, the development of settlements on agricultural land should be prevented within the framework of relevant laws and regulations. Decisions taken during the transition between plans should be monitored by the relevant institutions. Discouraging provisions should be introduced for those who pursue economic interests in the decisions taken. When the existing carrying capacity is exceeded, or in cases of necessity, the most appropriate site should be selected in the context of the analyses to be carried out for the region concerned, in such a way as not to disturb the integrity of the agricultural area, and the development layout should be rearranged in such a way as to protect the agricultural integrity.

ETHICS: There are no ethical issues with the publication of this manuscript.

PEER-REVIEW: Externally peer-reviewed.

CONFLICT OF INTEREST: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Article

A method proposal for determining bicycle paths in cities: The case of Denizli (Türkiye)

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ABSTRACT

Despite technological advancements, bicycle transportation has a historical role that has endured and shaped human transportation history. For effective transportation with non-motorized vehicles, it is essential to identify infrastructure opportunities and understand the impacts of the current situation on transportation behaviors. The study area includes the Merkezefendi and Pamukkale districts of Denizli city center. Four different interrelated methods were used in the research: Landscape Analysis, Delphi Technique, Questionnaire Application, and AHP (Multi-Criteria Factor and Weighting). The research consists of four main parts: data collection, evaluation, analysis, and results. Thus, a method proposal allowing for a comprehensive evaluation for establishing a bicycle lane network in the city center of Denizli was aimed. To achieve this, the natural, cultural, and socio-economic characteristics of the selected districts of Merkezefendi and Pamukkale, chosen as the research area, were highlighted. Opinions of employees in various institutions, individuals volunteering in relevant non-governmental organizations (to use the Delphi Technique with 15 experts), and the public (by questionnaire with 863 people) were gathered to develop a bicycle lane network proposal using a holistic planning approach. As a result, a comprehensive set of criteria was evaluated, and inclusiveness was applied extensively. In contrast to other studies, the factors influencing bicycle use in Denizli city center were not limited to literature reviews only but involved a Delphi technique with expert opinions, a survey with the views of bicycle users in the city center, and the researcher's experience and observations. The results obtained through versatile decision-making processes forming the basis of landscape planning studies were evaluated together. Consequently, a method proposal that can be used in planning studies in our country's cities in this regard was developed.

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INTRODUCTION

Despite technological advancements, bicycle transportation has a historical role that has endured and shaped human transportation history. In urban and rural centers where daily travel is short (less than 5 km), bicycles are a suitable means of reducing traffic congestion. Additionally, bicycles offer advantages such as safety, efficiency, low cost, health benefits, and environmental friendliness. Due to these advantages, bicycles can

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play a significant role in sustainable land use planning, transportation, recreation, and economic development initiatives. For effective transportation with non-motorized vehicles, it is essential to identify infrastructure opportunities and understand the impacts of the current situation on transportation behaviors. The suitability of bicycle infrastructure systems (bicycle lanes, corridors, boulevards, and traffic-free streets) has a significant impact on promoting bicycle usage (Moudon et al., 2005; Krizek & Johnson, 2006; Dill, 2009; Schepers et al., 2017). The expansion of bicycle and pedestrian paths plays an active role in encouraging non-motorized travel, contributing not only to attracting new users but also fostering a perception of high safety and secure riding (Kellstedt et al., 2021; Larsen & El-Geneidy, 2011; TEAC, 2011). Studies on this subject have observed an increase in bicycle users in areas where physically separated bicycle paths were created (Li et al., 2012; Frondel & Vance, 2017), or bicycle infrastructure was developed (Iacono et al., 2010; Emond & Handy, 2012; Konstantinidou & Spyropoulou, 2017; Le et al., 2019). The idea of assessing the suitability of an area for bicycle use is a product of studies aiming to explain mobility models based on structural features (Cervero & Kockelman, 1997; Ewing & Cervero, 2010). To develop and evaluate future scenarios of bicycle transportation, compiling data on current bicycle trends in different regions worldwide, analyzing the current state of bicycle transportation, and presenting the existing picture of urban bicycle use is crucial. Therefore, in the literature, specific routes for bicycle paths (or bicycle usage) have been assessed in studies encountered (Altunkasa et al., 2006; Milakis & Athanasopoulos, 2014; Sönmez, 2019; Alkılınç et al., 2021). This is a significant issue in urban bicycle transportation because cyclists do not travel on just one route. Users have requirements for selecting routes at different levels. Therefore, there is a need to determine the suitability of used paths in a few studies (Hsu & Lin, 2011; Alkılınç et al., 2021) rather than conducting studies for appropriate route determination for a single route, as pointed out by Sener et al. (2009). The researcher should initially evaluate all alternative routes between the starting and destination points for cyclists. Criteria used for determining bicycle routes vary depending on the natural, economic, social, and cultural structure. Therefore, planning and designing bicycle paths require specific evaluation criteria tailored to the study area. Many studies have focused on limited evaluations, considering only criteria such as road width (Altunkasa et al., 2006; Küçükpehlivan, 2015; Cengiz & Kahvecioğlu, 2016; Sönmez, 2019), road usage status (Altunkasa et al., 2006; Sener et al., 2009; Hsu & Lin, 2011; Milakis & Athanasopoulos, 2014; Yılmaz, 2014; Cengiz & Kahvecioğlu, 2016; Saplıoğlu & Aydın, 2018; Sönmez, 2019; Mansuroğlu & Dağ, 2020), traffic (flow) speed (Sener et al., 2009; Hsu & Lin, 2011; Milakis & Athanasopoulos, 2014; Yılmaz, 2014), relationship with parks and green areas (Altunkasa et al., 2006; Milakis & Athanasopoulos, 2014; Küçükpehlivan, 2015; Cengiz & Kahvecioğlu, 2016; Sönmez, 2019; Özkan et al., 2020; Alkılınç et al., 2021), relationship with public transport (bus) stops (Cui et al., 2014; Milakis & Athanasopoulos, 2014; Yılmaz, 2014; Küçükpehlivan, 2015; Saplıoğlu & Aydın, 2018; Alkılınç et al., 2021), which allows limited evaluations. In addition to these criteria, some studies have used criteria such as parking conditions on roads (Sener et al., 2009; Yılmaz, 2014; Saplıoğlu & Aydın, 2018), presence of signalization on roads (Sener et al., 2009; Yılmaz, 2014; Saplıoğlu & Aydın, 2018), road/sidewalk landscaping (Mansuroğlu et al., 2019; Sönmez, 2019), relationship with existing bicycle paths (Sener et al., 2009; Yılmaz, 2014; Saplıoğlu & Aydın, 2018; Özkan et al., 2020), relationship with existing bicycle parking areas (Yılmaz, 2014; Saplıoğlu & Aydın, 2018), slope-distance relationship (Milakis & Athanasopoulos, 2014), sidewalk width (Hsu & Lin, 2011). Criteria such as the relationship with bicycle maintenance places and the relationship with existing bike share stations were evaluated for the first time within the framework of comprehensive planning methodology in this study. In this study, considering the impact of recent economic issues in our country and the shift of users towards bicycle use, especially in Denizli due to its completed urban development, the suitability levels of roads for bicycle use in urbanized areas of Denizli were determined by considering all alternative routes within the study area boundaries. Thus, a method proposal allowing for a comprehensive evaluation for establishing a bicycle lane network in the city center of Denizli was aimed. To achieve this, the natural, cultural, and socio-economic characteristics of the selected districts of Merkezefendi and Pamukkale, chosen as the research area, were highlighted. Opinions of employees in various institutions, individuals volunteering in relevant non-governmental organizations, and the public were gathered to develop a bicycle lane network proposal using a holistic planning approach. As a result, a comprehensive set of criteria was evaluated, and inclusiveness was applied extensively. In contrast to other studies, the factors influencing bicycle use in Denizli city center were not limited to literature reviews only but involved a Delphi technique with expert opinions, a survey with the views of bicycle users in the city center, and the researcher's experience and observations. The results obtained through versatile decision-making processes forming the basis of landscape planning studies were evaluated together. Consequently, a method proposal that can be used in planning studies in our country's cities in this regard was developed.

MATERIAL AND METHODS

Material

The study area includes the Merkezefendi and Pamukkale districts of Denizli city center (Figure 1). Despite being recognized primarily as an industrial city, Denizli is also a significant tourism destination. In Denizli, there are 22 ancient cities, including the Pamukkale-Hierapolis World Heritage Site and the Laodikea Archaeological Site, both listed on the World Heritage Tentative List. The increasing use of transportation, mainly by road, in the developing industrial and tourism sectors exacerbates transportation issues in the city. The transportation issues in the Merkezefendi and Pamukkale districts, which form the city center of Denizli, and the associated problems such as environmental pollution, noise pollution, and various health issues have been decisive factors in selecting these two districts as the study area (Figure 1). The boundary of the study area was selected to include the area within 4 km of the centers (Çamlık Park and Pamukkale University), determined by considering the average cycling distances of the public (3-5 km) and literature reviews.

To determine the suitability of the city for bicycle use, various numerical, vector, qualitative, and quantitative research materials were utilized. This includes data from ASTER GDEM (ASTER Global Digital Elevation Map) for creating slope and aspect maps (United States Geological Survey, 2021), Open Street Map data (Open Street Map, 2020) for digitizing transportation infrastructure systems, Denizli Meteorology Provincial Directorate (2019) data for evaluating the city's bioclimatic comfort, Turkish Statistical Institute (2023) data for assessing the population and other socio-economic characteristics, KGM (General Directorate of Highways, 2023) statistics for analyzing and evaluating the city's transportation system, and various reports (Denizli Provincial Directorate of Culture and Tourism, 2023; General Directorate of Forestry, 2023;) for evaluating natural and cultural features. Additionally, efforts toward promoting bicycle transportation in Denizli were examined. Furthermore, ArcGIS 10.0 and IBM Statistics SPSS Version 20.0 programs were used in the evaluation and interpretation of data obtained from the components of bicycle transportation systems, regulations, standards, and literature reviews for the planning of bicycle transportation systems.

Method

Four different interrelated methods (Landscape Analysis, Delphi Technique, Questionnaire Application, and AHP; Multi-Criteria Factor and Weighting) were used in the research. The research consists of four main parts: data collection, evaluation, analysis, and results (Figure 2). All methods used in the research and their stages are interconnected. Therefore, using multiple methods in different sections is believed to validate and increase the reliability of the obtained data.

The first phase of the study covers all kinds of data collection. At this stage, information on national and international standards and national legislation related to the creation of bicycle lanes (construction techniques, routes, and networking) and the dissemination of cycling (training activities and other activities, user characteristics) were presented. In this context, the

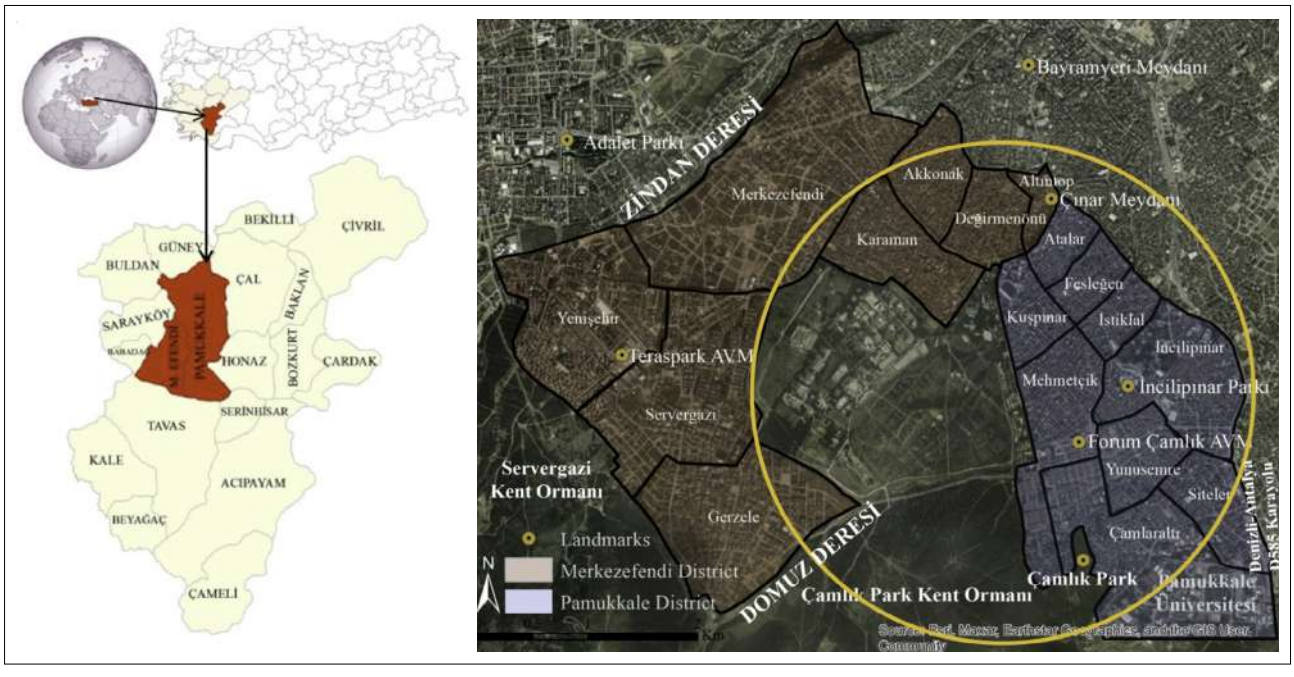

Figure 1. Study area location and some important areas.

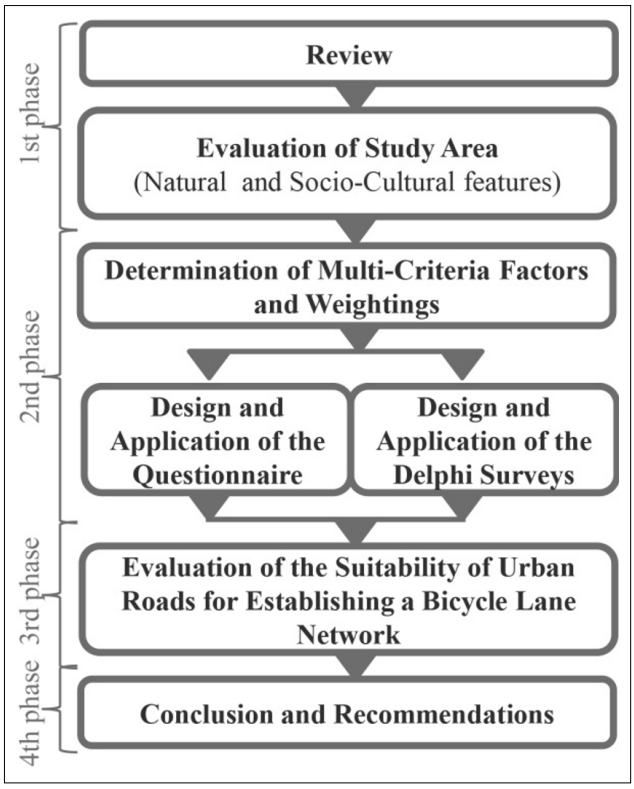

Figure 2. Method flow chart.

"Regulation on Bikeways" (Official Gazette, 2019) and the relevant standards were also examined in detail. At this stage, natural (climate, topographical features, vegetation cover) and socio-cultural structure characteristics (population, transportation facilities, and data on bicycle transportation, current land use status, protected areas) of Merkezefendi and Pamukkale districts were revealed. These data were obtained through interviews with the institutions and organizations described in the material section, plans, projects, and reports made by these institutions, as well as field observations and surveys.

In the second phase of the study, qualitative and quantitative studies were conducted to analyze the opinions of the participant groups. At this phase, the Delphi technique was utilized, and expert opinions and the opinions of the public (to use questionnaires) and bicycle users living in Denizli were consulted. Thus, the consistency, accuracy, and reliability of the data obtained (by using qualitative and quantitative data together) were tested.

In the third phase of the research, criteria influencing bicycle usage in Denizli were determined by evaluating data obtained from expert forms through the Delphi technique and survey applications. Within the framework of these criteria, field studies were carried out, and the suitability of the roads for bicycle use was evaluated using the weighting method. Evaluations were made in terms of suitability for bicycle use in the transportation network providing access to 2 centers (Pamukkale University and Çamlık Park) in Denizli city, where people want to reach by bicycles. In the final phase of the research, utilizing all this data, the suitability of roads in Denizli for bicycle usage was determined and mapped. The methods and techniques used in these study phases are described below:

Delphi Technique

The Delphi technique is a valuable tool for collecting data when researchers need insights from relevant individuals in the problem-solving phase. This technique, conducted in three stages with multidisciplinary participation, involved experts from both technical (2 architects, 3 landscape architects, 1 map technician, 3 urban planners, or 4 civil engineers) and sociological (3 NGOs, 1 public health specialist, 1 sociologist) disciplines. The Delphi technique survey consisted of three rounds, with responses analyzed from 18 experts in the first round, 17 experts in the second round, and 15 experts in the third round. Previous studies by Karacaoğlu (2009), Gencturk & Akbas (2013), Meijering et al. (2015), Kalaycı (2017), Adu-McVie et al. (2021), and Lei et al. (2023) faced similar situations, concluding their research when the number of expert feedbacks was acceptably more than the minimum required (7 experts). Following this approach, the data collection phase of the research using the Delphi technique was concluded by evaluating the opinions of 15 experts.

In the first part of the Delphi questionnaire, there were statements (11) related to the determination of the demographic structure of the participants. In the second part, opinions about the evaluation criteria were included. In this section, experts were asked to express their opinions on the main evaluation criteria that are thought to have an impact on cycling comfort in urban transportation. After the completion of the first-round Delphi technique survey, the responses of all experts were compiled and evaluated. Based on this evaluation, criteria that could be considered in creating a bicycle path were categorized, and second-round survey forms were prepared. The second-round survey form, prepared using standard forms, was sent to experts with adjustments based on a 5-point Likert scale. The results obtained from the second-round survey were re-evaluated. Following the second-round evaluation, a third-round survey form was created. At the end of the research, criteria with a consensus among experts were determined through statistical analyses. These agreed-upon criteria were then utilized in the assessment of the suitability of roads for bicycle use.

Questionnaire

Concurrently with the Delphi technique, a survey was conducted with 863 people using face-to-face interview techniques through standard forms for individuals residing in the Denizli city center. The purpose of the survey was to determine the opinions of individuals within the study area regarding bicycle usage. Data obtained from the survey

forms were coded, computerized, and evaluated using IBM Statistics SPSS Version 20.0 software. Frequency analysis was conducted to determine the socio-economic characteristics of the participants, their levels of participation in the survey scales, and the frequency of respondents. To assess the suitability of comparison tests for two or more variables, normality testing was performed using the "Kolmogorov-Smirnov" and "Shapiro-Wilk Test."

AHP; Multi-Criteria Factor and Weighting

In the third phase of the study, various methods were explored to identify suitable roads for bicycle usage. Although multi-criteria methods have been widely used in the transportation context (Giuliano, 1985; Schwartz & Eichhorn, 1997; Yedla & Shrestha, 2003; Tudela et al., 2006; Macharis & Pekin, 2009; Chow et al., 2013), limited applications have been found in bicycle transportation research so far (Gold, 1980 (utilized by Altunkasa et al., 2006); Aultman-Hall et al., 1997; Altunkasa et al., 2006; Hsu & Lin, 2011; Milakis & Athanasopoulos, 2014). The criteria for the methods used in the study were developed by drawing on the mentioned studies for value assignment and calculation. A new evaluation framework (Table 1) was created to align with the research objectives and the study area. In the assignment and calculation of the values of the criteria, an evaluation system was created in accordance with the purpose of the study (Table 1). The subunits of the evaluation factors were given scores ranging from "-1 to +3" (-1 is not appropriate, +1 is slightly appropriate, +2 is appropriate, and +3 is very appropriate).

In the final phase of the research, utilizing all this data, the suitability of roads in Denizli for bicycle usage was determined and mapped. In this context, maps for each criterion affecting bicycle usage in the city center of Denizli were prepared in ArcGIS. These maps were evaluated using the Analytic Hierarchy Process (AHP), one of the multi-criteria decision-making methods, to identify roads suitable for bicycle usage. The AHP was applied in ArcGIS using the "Weighted Overlay" sub-tool under the "Overlay" function in the "Spatial Analyst Tools" of the "Arctoolbox." As a result of the analysis, the roads in the city center were classified based on their suitability for bicycle usage. Thus, the suitability of roads for bicycle usage in the city center was determined. In this context, urban roads were categorized into 4 groups based on suitability levels: not suitable, less suitable, suitable, and highly suitable. However, recognizing that this classification alone was insufficient, a systematic proposal for a bicycle network covering the entire study area of Denizli was developed, considering the connection of the roads with determined suitability levels to existing bicycle paths within the city. The aim was to create comprehensive and safe bicycle riding areas within the city.

FINDINGS

In this section, the characteristics of the area and the results of quantitative and qualitative research are presented. In line with the findings, the suitability of the roads for bicycle usage is discussed and presented using the analytical hierarchy process, one of the multi-criteria decision-making methods.

Features of the Area

The features of the research area that affect bicycle usage and routes were examined under the titles of natural and socio-cultural structure.

Natural Features

Climate features: The average temperature in Denizli is 16.2 °C, the average relative humidity is 59.3%, and the average total precipitation is 571.9 mm according to the long-term averages (1957-2019) (Table 2). Considering the studies on the effect of urban climatic comfort on the rate of bicycle use, it was necessary to evaluate the climatic data in the city. At this stage, the climate characteristics of the city were evaluated using Denizli Provincial Directorate of Meteorology (DPDM, 2019) climate stations' data. Thermal comfort/biocomfort distribution was calculated using the discomfort index (temperature-relative humidity relationship) and classes formulated by Cetin et al. (2019). The study area is located within the comfort zone in terms of thermal comfort classifications.

Topographic features: Slope is an important factor affecting comfortable and safe cycling. Slope is categorized as 0-2% (8.79%), 2-6% (25.60%), 6-12% (22.04%), 12-20% (17.22%), 20-30% (11.99%), and 30+% (14.22%). Aspect also has some influence on bicycle use. It is important in terms of providing comfort by considering the prevailing wind direction in the city center. In rural areas, it affects recreation and mountain biking route determination studies more. According to the results of the aspect analysis in Denizli city, the areas with West (15.08%), Southwest (14.11%), North (14.12%), and Northeast (13.67%) aspects have the highest rates.

Vegetation: In densely populated urban areas, the anthropogenic effects on natural and sensitive areas, as well as protected areas, tend to be more significant compared to rural areas. Additionally, aesthetic/visual concerns within the city and the misdirection by local authorities often result in the frequent use of exotic plant species (*Acer negundo, Ailanthus altissima, Albizia julibrissin, Koelreuteria paniculata, Lagerstromia indica, Liriodendron tulipifera, Magnolia grandiflora, Melia azedarach, Morus platanifolia, Morus papyrifera, Paulownia tomentosa, Prunus cerasifera 'Nigra', Robinia pseudoacacia, Sophora japonica, etc.*) in urban landscape applications. All these factors contribute to the reduction of natural vegetation within the city, and

Table 1. Evaluation criteria and suitability values

Evaluation Criterion	Sub-Criteria	Score*
Road Widths (RW)	2,75 m ≤ RW < 5,50 m	+1
	5,50 m ≤ RW < 11,00 m	+2
	11,00 m ≤ RW ≤ 20,00 m	+3
Sidewalk Width (SW)	SW < 2,90 m	-1
	2,90 m ≤ SW < 4,00 m (one-way bicycle path)	+1
	4,00 m ≤ SW < 5,40 m (two-way bicycle path)	+2
	5,40 m ≤ SW ≤ 10,00 m (two-way bicycle path and green strip)	+3
Slope-Distance Relationship	< %5,00 (distance not significant)	+3
	%5,00 ≤ Slope < %7,00 (max. 240 m)	+2
	%7,00 ≤ Slope < %8,00 (max. 120 m)	+1
	%8,00 ≤ Slope < %9,00 (max. 90 m)	
	%9,00 ≤ Slope < %10,00 (max. 60 m)	-1
	Other (roads not suitable according to the Bicycle Paths Regulation in terms of Slope-Distance relationship)	
Parking Condition	Roads Without Parking	+2
	Parked Roads	+1
Road Usage Status	Pedestrianized Street	+2
	One-way Vehicle Road	
	Two-way Vehicle Road	+1
Traffic (flow) Speed (TS)	TS ≤ 30 km/h	+3
	30 km/sa < TS < 50 km/h	+2
	50 km/sa ≤ TS < 70 km/h	+1
	≥ 70 km/h	-1
Existing Bike Path Relationship	≤ 250,0 m.	+2
	> 250,0 m.	+1
Existing Bike Park Areas Relationship	≤ 250,0 m.	+2
	> 250,0 m.	+1
Existing Bike Share Stations Relationship	≤ 250,0 m.	+2
	> 250,0 m.	+1
Bike Maintenance Areas Relationship	≤ 250,0 m.	+2
	> 250,0 m.	+1
Relationship with Parks and Green Areas	Roads connected to parks and green areas	+2
	Roads not connected to parks and green areas	+1
Relationship with Public Transport (bus) Stops on Roads	Roads with stops	+2
	Roads without stops	+1
Existence of Traffic Signalizations on Roads	Roads with signalization	+2
	Roads without signalization	+1
Road/sidewalk Landscaping	Roads with suitable landscaping for bicycle use	+3
	Roads/sidewalks without landscaping (not hindering bicycle use)	+2
	Roads/sidewalks with faulty landscaping hindering bicycle use	+1

*-1 is not appropriate, +1 is slightly appropriate, +2 is appropriate, and +3 is very appropriate.

Table 2. Climatic data at Denizli climate station (using DPDM, 2019)

Climatic Data	Value
Average High Temperature (°C)	22.5
Average Low Temperature (°C)	10.7
Average Temperature (°C)	16.2
Average Relative Humidity (%)	59.3
Average High Relative Humidity (%)	93.1
Average Low Relative Humidity (%)	23.4
Average Total Precipitation (mm)	571.9
Average Number of Rainy Days	91.1
Average Wind Speed (m/sn)	1.3
Average Number of Stormy Days	5.7

research indicates that these areas may have a lower level of aesthetic/visual appreciation.

Studies conducted by Gürcan (2014) and Acar (2016) in the city center of Denizli reveal the presence of various plant cover types, including maquis, rock, forest, hygrophilic, and cultural vegetation types. The natural plant cover in Denizli city center encompasses 103 families, 379 genera, 568 species, and 576 taxa (Gürcan, 2014). Some common natural plant species observed in the city include *Arabis alpina* subsp. *brevifolia, Arbutus unedo, Asparagus acutifolius, Carlina biebersteinii* subsp. *brevibracteata, Cedrus libani, Cistus creticus, C. salviifolius, Dianthus elegans* var. *elegans, Juncus acutus* subsp. *acutus, Laurus nobilis, Lathyrus saxatilis, Platanus orientalis, Myrtus communis, Phillyrea latifolia, Pinus brutia, P. nigra, Pistacia terebinthus, Populus alba* subsp. *alba, Quercus coccifera, Q. petrea, Q. robur, Salix babylonica,* and *Vitex agnus-cactus*.

Socio-Cultural Features

Population: The population of Merkezefendi and Pamukkale districts has been steadily increasing. The population of Merkezefendi district was 336,818 in 2022, while Pamukkale district had a population of 347,926 (Turkish Statistical Institute, 2023). The presence of a university in Pamukkale district contributes to a higher number of young, dynamic individuals who are potentially inclined towards bicycle usage.

Transportation facilities and studies on bicycle transportation: Denizli, being a crucial intersection connecting the Aegean and Central Anatolia regions and recognized for its significance in agriculture, industry, and cultural tourism, has heavy motor vehicle traffic. According to the obtained data, as of the current situation, there are 14.85 km of bicycle lanes in the city center, and plans for proposed bicycle lanes have been made. However, it is noteworthy that as of 2022, the proportion of bicycle lanes within the transportation system in Denizli is only 0.63%. In addition, considering the city's population of 684,744 people in 2022 and the number of registered automobiles (215,984) and motorcycles (77,472), the motor vehicle ownership rate in the city is quite high, reaching 28.29%. This situation indicates the dominance of motor vehicles in the transportation preferences of the city's residents. The lack of connectivity among existing bicycle lanes contributes to the inadequacy of the bicycle transportation network. Consequently, due to insufficient bicycle infrastructure, the public perceives bicycle usage for transportation as unsafe.

Land cover: The land use status of Denizli city was evaluated according to the CORINE Level 3 land cover class. It is observed that coniferous forests have the largest share in the city, accounting for 24.67%. Continuous urban structure represents 2.71%, indicating that the city is continuously developing and there is a need for new settlements.

Protected areas: In terms of protected areas, the largest conservation area within Pamukkale district boundaries is the Pamukkale Special Environmental Protection Area (Pamukkale ÖÇKB-6,656 ha), with 97 registered conservation areas in the district. The protected areas within the district include various types such as ancient city (2), tumulus (5), archaeological site (13), necropolis area (10), marble quarry (1), rock tomb (8), cultural structure (7), religious structure (12), cemetery (6), civilian architecture example (36), agricultural industry structure (2), and military structures (Dağ & Mansuroğlu, 2023).

In the Merkezefendi district, the most well-known conservation area is the ancient city of Laodikeia, which is included in the Temporary Cultural Heritage List with reference number 5823 in UNESCO's meeting on April 15, 2013. In the district, there are 1 ancient city, 4 tumulus, 6 archaeological sites, 5 necropolis areas, 7 rock tombs, 12 cultural structures, 17 religious structures, 3 industrial structures, 3 cemeteries, and 58 examples of civilian architecture, totaling 112 registered conservation areas (Dağ & Mansuroğlu, 2023).

Delphi Technique and Questionnaire Application

Of the 18 experts who participated in the Delphi study, 16.7% were female, and 83.3% were male. Of these, 72.3% were married, 11.1% were single, and 5.6% were divorced. The youngest expert participating in the study was 30 years old (1 person) and the oldest was 55 years old (2 people), with the average age of the group being 41. Details about the participants' age, occupation, and education level are presented in Table 3.

Of the survey participants, 49.9% were female and 50.1% were male. The youngest respondent was 18 years old (48 people), and the oldest respondent was 78 years old (1 person), with an average age of 31.46 years. Participants in the 18-24 age group constituted the highest proportion

Table 3. Socio-economic characteristics of the expert group

Age	Percent (%)	Occupation	Percent (%)	Education Level	Percent (%)
30-34	33.3	Academician	44.4	High School/College	11.1
35-44	33.3	Civil Servant	33.3	University	33.3
45-54	22.2	Worker	5.6	Master's Degree	11.1
≥ 55	11.1	Private Sector	16.7	Doctorate	44.4

(45.3%), followed by the 25-34 age group (21.9%), the 35-44 age group (16.9%), the 45-54 age group (10.0%), the 55-64 age group (4.2%), and the 65 and over age group (1.7%). Some individuals beyond a certain age expressed a lack of interest in participating in the survey, possibly due to the common perception that bicycles are predominantly used by younger individuals. The rate of high school (46.3%) and university (34.1%) graduates is notable. Regarding occupations, 30.0% of participants are students, 16.3% are civil servants, and 13.6% work in the private sector (Table 4).

72.3% of the experts commute by car, 16.7% by public transportation, 5.6% on foot (1 km), and 5.6% by bicycle (6 km). Among the survey participants, 30.9% use private vehicles for transportation, 35.0% use public transportation, 19.0% walk, and 2.0% use bicycles regularly. 10.7% of private vehicle users mentioned that their transportation choice could be more economical; however, they continue to use a vehicle for the sake of shortening transportation time and comfort. Public transportation users express complaints about the overcrowding of vehicles (30.8%), lack of economic feasibility (25.4%), and untimeliness (22.4%). It was observed that bicycle users were satisfied with their transportation preferences. In Denizli, 78.8% of participants believe there is a traffic problem, and 37.1% consider infrastructure inadequacy as the most significant cause of traffic issues in the city. Additionally, participants believe that improving bicycle infrastructure will increase bicycle usage in the city (73.9%; mean: 3.97; Std. Dev.: 1.198; $p<0.001$) and partially solve transportation problems (76.1%; mean: 4.08; Std. Dev.: 1.125; $p<0.001$). Considering all these factors, the criteria to be considered for establishing a bicycle network in Denizli, based on the opinions of experts and survey participants, are presented in Table 5. After evaluations, 14 assessment criteria were identified for establishing bicycle infrastructure in Denizli, where there is a consensus between experts and bicycle users.

Determination of Multi-Criteria Factors and Weightings

In order to determine the multi-criteria factor weighting degrees, Delphi technique survey forms and data obtained from the questionnaire conducted with cyclists were used. Weight coefficients were graded according to the scores obtained. Accordingly, the difference between the highest (4.61) and the lowest (4.02) score (0.59) was calculated and proportioned to the total coefficient (3). The obtained value (0.19) was used to determine the weighting coefficient. According to Table 5, it is noteworthy that the priorities of experts and bicycle users in determining the evaluation criteria are different. For example, while experts prioritize safety-related criteria such as traffic flow speed and the presence of signalization, cyclists prioritize criteria related to road and sidewalk width, highlighting the importance of cycling comfort.

However, although cyclists indicate that the slope-distance relationship, an important criterion for cycling comfort, is of moderate importance (mean: 3.30), experts, approaching the issue technically, consider the importance level of the relevant criterion to be high (mean: 4.40) (Table 5). This situation is associated with bicycle users' awareness of the city having road features suitable for bicycle use in terms of slope distance. Additionally, differences in the opinions of experts and bicycle users are evident regarding the relationship between proposed bicycle paths and existing

Table 4. Socio-economic characteristics of the respondents

Age	Percent (%)	Occupation	Percent (%)	Education Level	Percent (%)
18-24	45.3	Civil Servant	16.3	Primary/Secondary S.	8.1
25-34	21.9	Worker	11.5	High school	46.3
35-44	16.9	Unemployed	5.9	High school (Univ.)	7.6
45-54	10.0	Student	30.0	University	34.1
55-64	4.2	Retired	5.6	Master/PhD	3.8
≥ 65	1.7	Private sector	13.6		
		Other	17.1		

Table 5. Evaluation criteria that can be used in the establishment of bicycle infrastructure according to the opinions of experts and bicycle users (public)

Evaluation Criterion	Experts' Opinions		Bicycle Users' Opinions		Average	Weight Degree
	Mean	SD	Mean	SD	Mean	
Traffic (Flow) Speed	4.80	0.41	4.12	1.09	4.46	3
Presence of Signalization	4.80	0.41	4.18	1.25	4.49	3
Road Widths	4.73	0.45	4.49	0.92	4.61	3
Sidewalk Width	4.73	0.45	4.49	0.92	4.61	3
Parking Condition	4.66	0.61	4.34	1.07	4.50	2
Relationship with Parks and Green Areas	4.60	0.50	4.26	0.97	4.43	2
Relationship with Existing Bicycle Parking Areas	4.60	0.50	4.39	0.99	4.49	2
Relationship with Existing Bicycle Paths	4.40	0.82	4.18	1.07	4.29	2
Slope-Distance Relationship	4.40	0.82	3.30	1.44	4.35	2
Relationship with Public Transport (Bus) Stops	4.53	0.51	4.41	0.99	4.47	1
Road Usage Status	4.46	0.51	3.58	1.37	4.02	1
Relationship with Bicycle Maintenance Areas	4.46	0.51	3.58	1.27	4.02	1
Relationship with Existing Bike Share Stations	4.46	0.51	3.58	1.27	4.02	1
Road/Sidewalk Landscaping	4.40	0.63	4.26	0.97	4.34	1

bicycle infrastructure. This is the consequence of the fact that existing bicycle infrastructure systems primarily serve recreational purposes. Thus, the hypothesis that more realistic and applicable planning studies can be conducted by considering expert and user opinions together is confirmed.

After obtaining responses from experts and bicycle users, the evaluation criteria used to determine the suitability of bicycle paths were examined based on the averages. Road and sidewalk widths received the highest score (4.61), while factors such as road usage status, relationship with bicycle maintenance areas, and relationship with existing bike share stations received the lowest score (4.02) (Table 5). Based on these criteria, factor degrees for the suitability of roads for bicycle use were determined according to the following suitability levels.

Evaluation of the Suitability of Urban Roads for Establishing a Bicycle Lane Network

According to 14 evaluation criteria, the suitability of the roads in the study area for the creation of a bicycle path network was evaluated (Figure 3). In terms of road widths, 56.69% of the roads in the study area are suitable for bicycle use (Figure 3a). The widest road in the study area is 20.00 m, while the narrowest is 3.00 m. The proportion of roads with a width between 11.00 m and 20.00 m (very suitable) is 11.08% (47.00 km). Roads with a width of 5.50 m to 11.00 m are suitable (56.69%; 240.25 km).

Sidewalks are mostly not suitable for bicycle use in terms of width (Figure 3b). The rate of roads with a sidewalk width of less than 2.90 m is 79.23%. 12.48% of sidewalks are 2.90-4.00 m wide and 4.48% are 4.00-5.40 m wide. Only 1.42 km of sidewalks have a width (5.40 m and above) suitable for the creation of two-way bicycle lanes and green belts.

Regarding the slope-distance relationship, the percentage of roads considered very suitable is 83.12% (Figure 3c). Roads with a slope between 5.00%-7.00% and a length of up to 240 m are suitable. For roads with a slope of 7.00%-8.00%, the maximum distance was 120 m. For roads with a slope of 8.00%-9.00%, the maximum distance was 90 m, and these roads were classified as less suitable.

In a significant part of the study area (64.62%), roads have parking, while the percentage of roads without parking is limited to 31.85% (Figure 3d). During the evaluation of the suitability of roads for bicycle use, roads with vehicle parking were considered as less suitable and roads without vehicle parking were considered as suitable because they negatively affect bicycle use (Figure 3d).

Pedestrianized streets (0.71%), one-way vehicle roads (12.58%), and two-way vehicle roads (83.18%) are present in the study area (Figure 3e). The percentage of roads with a traffic speed of 50 km/h and above is quite high (91.61% less suitable, 1.27% not suitable) in terms of traffic speed, and these roads are considered less suitable for bicycle use (Figure 3f).

Bicycle paths in the study area constitute only 3.52% of all

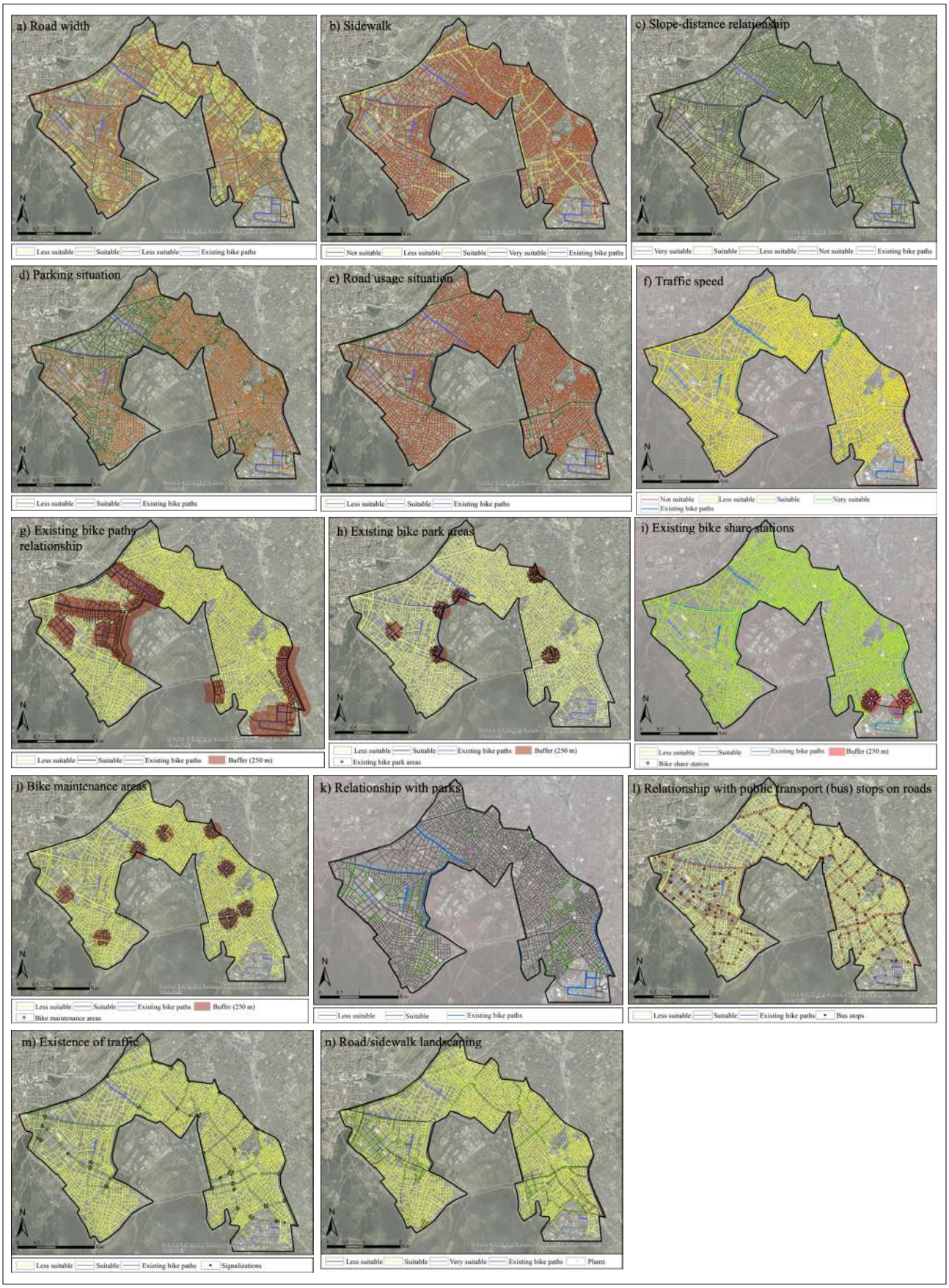

Figure 3. Suitability status of roads according to criteria.

roads (Figure 3g). Due to the inadequacy of existing bicycle paths (14.96 km) in Denizli city, the percentage of suitable roads related to existing bicycle roads is also quite low (19.03%). A total of 22.68 km (5.35%) of roads related to existing bicycle parking areas were identified as suitable for bicycle use (Figure 3h). Due to the low number of bicycle parking areas, the rate of unsuitable roads (91.11%) is quite high. Bike share stations within the study area cover 2.93% (12.44 km) of the roads according to the suitability zone (Figure 3i).

In terms of the relationship with bicycle maintenance/repair facilities that bicycle users may need at any time, 8.31% of the roads evaluated are suitable (Figure 3j). As a component of the urban green infrastructure system, the relationship of bicycle paths with existing green spaces should be taken into consideration (Figure 3k). In this context, roads that are connected to existing green spaces are considered suitable for bicycle use (11.66%), while roads that are not directly connected are considered less suitable (84.80%).

The public transportation (bus) vehicle route is considered suitable for bicycle use with the aim and objective of integrating bicycles into public transportation (Figure 3l). In this context, 20.27% of the roads within the boundaries of the study area (on which there is a bus stop) are considered suitable.

Roads with signalization are preferred by cyclists as they feel safer. Therefore, 70.66 km (16.67%) of roads with signalization in the study area are suitable for cycling (Figure 3m). In the study area, roads with vegetation suitable for cycling (13.49%) are very suitable. Roads with no planting were considered suitable (80.29%), and roads with faulty planting (2.68%) were considered less suitable (Figure 3n).

In the specific context of Denizli city, the suitability of roads for bicycle use was determined using a weighting technique based on the 14 evaluation criteria (Figure 4). In terms of bicycle use, there is 5.74 km (1.35%) of very suitable roads, 65.63 km (15.48%) of suitable roads, 242.89 km (57.30%) of less suitable roads, and 94.65 km (22.32%) of unsuitable roads in the research area.

CONCLUSION AND DISCUSSION

In this study, the natural and socio-cultural features of Denizli city were comprehensively evaluated using a landscape planning approach, and the suitability of roads for bicycle use was determined based on the criteria identified through the Delphi technique and a survey. Suitability maps for 14 criteria influencing bicycle use in Denizli were created, and these maps were evaluated using a weighting method to determine the suitability of roads for bicycle use in the city. As a result, the suitability of roads for bicycle use in the city center was revealed. In this context, urban roads were classified into four groups (not suitable, less suitable, suitable, and very suitable) based on their suitability levels. However, this classification alone was not sufficient. Considering the goal of creating comprehensive and safe cycling areas in the city, a systematic bicycle route network proposal was developed for the study area covering Denizli, considering the connection of the identified roads with existing bicycle paths. Criteria identified through the Delphi technique and user surveys were used in the development of the proposed bicycle route network, which considered factors such as the centrality of the route, the number of intersections, access to educational institutions (schools, education centers), readability, access to desired destinations (official buildings, squares, historical and cultural sites/structures, parks), and compatibility with existing bicycle infrastructure systems. The proposed bicycle route network is presented in Figure 5. A total of 26.49% of the roads within the study area are prioritized for

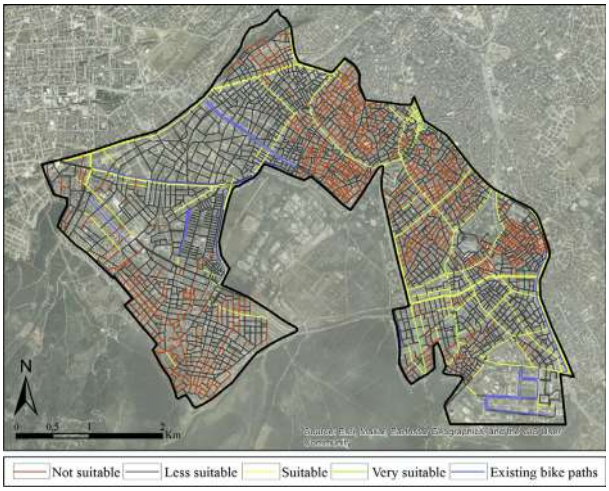

Figure 4. Suitability of roads for bicycle use.

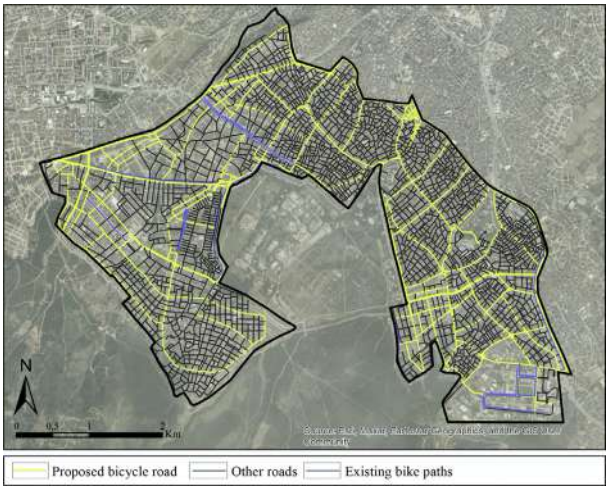

Figure 5. Proposed bicycle road network.

the proposed bicycle route network. The proposed bicycle route network exhibits a comprehensive structure covering the study area (Figure 5).

In this study, the weighting method of evaluation criteria used to determine the suitability of roads for bicycle use differs from previous studies. In the weighting of roads, Milakis & Athanasopoulos (2014) consulted the opinions of 10 professional cyclists, Altunkasa et al. (2006) consulted 10 design experts, 10 bicycle users, and 10 decision-makers (local government authorities), Cengiz & Kahvecioğlu (2016) consulted 10 cyclists, and Sönmez (2019) consulted the opinions of 5 landscape architects, 5 architects, 5 urban planners, and 5 cyclists. Alkılınç et al. (2021), Özkan et al. (2020), and Hsu & Lin (2011) did not provide any information about the number and characteristics of the expert group in their studies that mentioned relying on expert opinions for the weighting of criteria. Çeyiz & Koçak (2015) conducted interviews with 12 professionals, and Mansuroğlu & Dağ (2019) interviewed 30 professional cyclists to identify problems encountered in bicycle use. In the scope of this study, an interdisciplinary approach was followed in determining and weighing the criteria used to evaluate the suitability of roads for bicycle use, as stated in the Bicycle Paths Regulation (Official Gazette, 2019). In this context, both user (public) surveys and expert opinions were consulted.

The route selection model for bicycles is much more complex than the model used for motorized vehicles. This is because there are many criteria that influence cyclists' route selection decisions (Ryu et al., 2021). The evaluation criteria used in the research were determined through Delphi technique expert surveys and evaluations conducted in Denizli, in line with the opinions of bicycle users. In this context, compared to other studies, a comprehensive study has been conducted both in terms of the stages of determining the criteria and the versatility of the criteria used. Comprehensive participatory principles were utilized, and all roads were experienced by the researcher by bicycle. Such a comprehensive study has not been encountered in previous research. Many studies have focused on limited evaluations (explained in the introduction section), which allows limited evaluations. Criteria such as the relationship with bicycle maintenance places and the relationship with existing bike share stations were evaluated for the first time within the framework of comprehensive planning methodology in this study.

In conclusion, it is considered that the bicycle infrastructure system in Denizli is insufficient; there are limited safe and comfortable cycling areas within the city, and for the fulfillment of the increasing transportation needs in the city, the bicycle should be seen as a means of transportation. It is thought that this can be achieved by implementing the bicycle infrastructure system as a transportation network model. It is crucial to consider ecological and technical data prepared with landscape plans that preserve these values and contribute to the preparation of transportation plans in cities with important values in terms of natural, cultural, and social features. This is important for ensuring urban integrity, and it is essential to consider the participatory demands of urban residents.

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Article

Determination of the relationship between housing characteristics and housing prices before and after the Kahramanmaraş earthquake using machine learning: A case study of Adana, Türkiye

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ABSTRACT

Earthquakes have a significant impact on the real estate sector. Damage caused by earthquakes leads to an imbalance in the supply and demand for housing, thus temporarily causing stagnation in the real estate sector. Two earthquakes occurred in the Pazarcık and Elbistan districts of Kahramanmaraş on February 6, 2023, at 04:17 am with a magnitude of 7.7 and at 13:24 pm with a magnitude of 7.6. A machine learning-based model was created to analyze the change in house prices and the variables affecting the price during the earthquake, which is called "the Disaster of the Century." After the earthquake, the prices of houses for sale in the central districts of Adana province (Seyhan, Yüreğir, Sarıçam, and Çukurova), where there was the least damage, were collected from the relevant website with a web scraper. These data were classified as categorical and numerical datasets, and the necessary pre-processing stage for machine learning algorithms was performed. The characteristics that change and are effective in housing preferences before the earthquake (February 2022) and after the earthquake (February 2023) were determined by the decision tree method, which is one of the machine learning algorithms. In this context, it is aimed to determine the housing variables that are effective in before- and after-earthquake pricing in the central districts of Adana province. In the study, while 'Building Age and Number of Rooms' are effective in determining the price in 2022, 'Housing Shape and Facade' features come to the fore in 2023. The housing characteristics that affect the price change in two years. The change in housing preference criteria after the earthquake shows that the lifestyle in cities has also changed. According to this change, it requires the development of new approaches in urban design and planning approaches and is expected to be a reference for future studies.

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INTRODUCTION

Türkiye is geographically located on the North Anatolian, East Anatolian, and West Anatolian fault lines. Among these, the North Anatolian and East Anatolian Faults are the active fault lines (Caglar et al., 2023). There were 269 earthquakes that caused damage in Türkiye between 1900 and 2023. According to the Republic of Türkiye Presidency Strategy and Budget Directorate (TCCSBB) Kahramanmaraş and Hatay Earthquakes Report (TCCSBB, 2023), the largest earthquakes in terms of damage were, respectively, the Kahramanmaraş, 2023, Gölcük 1999, and Erzincan-centred 1939 earthquakes. On February 6, 2023, earthquakes occurred in Türkiye at 04:17 and 13:24 Turkish time, demonstrating this damage once again. According to the TCCSBB, (2023), two earthquakes of magnitude 7.7 and 7.6 occurred in districts of Kahramanmaraş (Pazarcık and Elbistan). This severe earthquake was felt over a wide area in southeastern Türkiye (Adana, Adıyaman, Diyarbakır, Elazığ, Gaziantep, Hatay, Malatya, Kahramanmaraş, Kilis, Osmaniye, Şanlıurfa provinces) and northwestern Syria. According to Turkish Statistical Institute (TÜİK) data, 14,013,196 people were affected (KRDAE, 2023; TÜİK, 2023a). The official report on the Kahramanmaraş earthquake stated that many people were trapped under the buildings due to the severity of the earthquake.

This caused extensive damage to the region, with over 45,000 people reported dead and many injured (Dal Zilio & Ampuero, 2023). According to the TCCSBB Kahramanmaraş and Hatay Earthquake Report, the cities of Hatay, Kahramanmaraş, Adıyaman, and Malatya were identified as the cities with the highest destruction. In total, damage assessment studies were conducted on 1,712,182 buildings in 11 provinces. Accordingly, it was determined that 35,355 buildings were destroyed, 31,421 buildings were slightly damaged, 40,228 buildings were moderately damaged, and 179,786 buildings were severely damaged. 46,640 independent units in 6849 buildings were moderately damaged and 439,647 independent units in 59,995 buildings were slightly damaged (TCCSBB, 2023).

Earthquakes, which cause large-scale damages, negatively affect the economy at regional and national levels and many sectors. One of these is the real estate sector. After the earthquake, there are changes in the prices of housing and land in the disaster area, causing a decrease in sales rates as people will not prefer to buy real estate in the earthquake zone (Beron et al., 1997; Nakagawa et al., 2009; Naoi et al., 2009). In addition, the purchase and sale of real estate for investment purposes will slow down in areas with high earthquake risk.

Related Work

There are many studies examining the impact of earthquakes on house prices, but most of these do not use machine learning methods.

The study by Brookshire et al. (1985) calculated the change in housing prices in earthquake-prone areas in California. They concluded that earthquakes directly affect prices. In another study conducted in California, the hedonic model was used to analyze housing prices before and after the earthquake. This study especially focused on the post-earthquake market values of single-family houses (Beron et al., 1997). There are many similar studies conducted in California. These studies emphasize that earthquake risk reduces housing prices (Beron et al., 1997; Brookshire et al., 1985; Fekrazad, 2019; Jung & Smith, 2022; Murdoch et al., 1993; Singh, 2019).

Similar results were obtained in Japan, a country where earthquakes are quite frequent. After severe earthquakes in Japan, earthquake risk maps were created using geographic information systems (GIS) and associated with house prices using a hedonic model. Accordingly, it was revealed that housing prices were lower in areas with high earthquake risk (Nakagawa et al., 2007). In another study, the effect of earthquake risk on land prices in the Tokyo metropolitan area was examined (Nakagawa et al., 2009). This study revealed that land with high earthquake risk is priced approximately 8% less than land with lower risk.

However, these studies were not very successful in establishing a relationship between earthquake risk and variables affecting house prices. The effect of such variables (housing variables, environmental variables, etc.) on house prices and their relation with earthquake risk maps in Japan was analyzed using a hedonic price model (Naoi et al., 2009). This study showed that housing prices decreased after the earthquake risk maps were created and stated that houses in earthquake risk areas were more discounted.

Hidano et al. (2015) investigated the impact of earthquake risk on real estate prices in Tokyo. They compared the Two-Dimensional Regression Discontinuity (2DRD) model, hedonic model, and the traditional one-dimensional regression (RD) approach. They found that housing prices fall in earthquake-prone areas and that newly constructed buildings are more resistant to earthquakes. The study emphasized that 2DRD was better than traditional approaches.

In another study examining the effects of earthquakes on the economy and housing, three different results were obtained with the hedonic model (Koster & Ommeren, 2015). According to this: (a) houses are sold at lower prices due to the damage caused by earthquakes, (b) people prefer to sell their houses as damaged buildings are repaired after earthquakes, leading to an oversupply, (c) demand for houses in the region decreases due to the fear that future earthquakes will cause more damage, leading to lower prices.

Lara-Pulido et al. (2022) analyzed the short- and medium-

term effects of the earthquake in Mexico on the housing market using a hedonic model. As a result, they stated that people's lack of sufficient information about the earthquake risk or the lack of proper understanding of the earthquake risk had an impact on real estate prices.

Several studies have reported that the hedonic model (HM) is often used to identify post-earthquake price changes (Beron et al., 1997; Hidano et al., 2015; Lara-Pulido et al., 2022; Murdoch et al., 1993; Nakagawa et al., 2007; Nakagawa et al., 2009; Naoi et al., 2009). However, hedonic models such as regression-based computation focus on numerical prices and their categorical price classification performance is generally poor (Yücebaş et al., 2022). Therefore, regression-based price estimation is not preferred in this study. According to the methods and analyses used in current studies, it is determined that real estate prices depreciated due to the earthquake (Beron et al., 1997; Murdoch et al., 1993; Nakagawa et al., 2007, 2009; Naoi et al., 2009).

However, the existing literature has not analyzed in detail the features affecting house prices before and after the earthquake using machine learning methods.

Although Adana has the largest population in the earthquake zone, it was the least affected by earthquake damage. In this study, a machine learning-based model is developed to analyze the change in house prices and the variables affecting the price before and after the earthquake. For the related study, pre-earthquake (February 2022) and post-earthquake (February 2023) house prices in the central districts of Adana province were collected via a web scraper. A machine learning model based on decision trees is built over this data to reveal the variables that affect house prices before and after the earthquake and to reveal any changes.

This study is designed to fill the gaps explained above and to reveal the potential of the decision tree model to explain the housing variables that are effective in pre- and post-earthquake pricing.

MATERIALS AND METHODS

Study Area

Adana province is located at coordinates 37.5005°N 35.715°D in the Çukurova, the Mediterranean Region in southern Türkiye (Figure 1). It is bordered by Kayseri to the north, Osmaniye to the east, Kahramanmaraş to the northeast, Hatay to the southeast, Niğde to the northwest, and Mersin to the west. According to the Turkish Statistical Institute (TÜİK) data for the year 2022, Adana is the 7th largest city in Türkiye with a population of 2,274,106. The area of the province is 13,844 km². It has 15 districts, five of which are central (Seyhan, Yüreğir, Sarıçam, Çukurova) and has 831 neighborhoods

Figure 1. Location of the study area.

(Wikipedia, 2023; TÜİK, 2023b). In 2022, the population of Çukurova, Sarıçam, Seyhan, and Yüreğir districts was 389,195, 221,733, 795,012, and 404,726 respectively. Sarıçam district has the highest annual population growth rate of 62.8% in Adana province (TÜİK, 2023a).

Material

In order to build a decision tree model, two datasets covering house sales in the four main districts of Adana (Seyhan, Yüreğir, Çukurova, and Sarıçam) before the earthquake (February 2022) and after the earthquake (February 2023) were created through a web scraper. Two datasets, pre- and post-earthquake, were created by removing extreme data and uncommon variables (pre-processing) from the house sale prices collected from the open access internet sales site (HepsiEmlak, 2023) using the web scraper. In the pre-earthquake dataset, 3017 sales data and in the post-earthquake dataset, 3391 sales data were made ready for analysis with 11 variables (Table 1).

As Table 1 indicates, data types are numeric and categorical. Furthermore, the range of values of numeric variables is also inherently wide. When we tested the available data, we found that this caused the decision tree to branch too much and, in some cases, the data was memorized by the software. To avoid this, some of the numeric data sets have been converted into categorical data types. The price and area variables are categorized into three classes as 'High,' 'Medium,' and 'Low.' Standard deviation (σ) and mean ($\bar{x}$) are used to determine the range of values in these classes. The formulas (1,2,3) used are given below (Yücebaş et al., 2022).

$$\textbf{Low} = [MinUnit\_Price, MinUnit\_Price + \sigma] \quad (1)$$

$$\textbf{Medium} = [MinUnit\_Price + \sigma + 1, \bar{x} + \sigma] \quad (2)$$

$$\textbf{High} = [\bar{x} + \sigma + 1, MaxUnit\_Price] \quad (3)$$

Table 1. Variables and data types

Variables	Data Type
Current Floor	Numeric
Number of Floors	Numeric
Unit Price (TL)	Categorical
Area Attribute (m2)	Categorical
Residential Type	Categorical
Building Age	Categorical
Heating	Categorical
Number of Rooms	Categorical
Building Type	Categorical
Facade	Categorical
District	Categorical

After the transformation, there are 1537 low-priced, 1167 medium-priced, and 315 high-priced houses in the pre-earthquake dataset. In the post-earthquake dataset, there are 1786 low-priced, 1345 mid-priced, and 260 high-priced houses. Using the same formulas for the area attribute, there are 76 low, 2723 medium, and 217 high area attribute houses in the pre-earthquake dataset. In the post-earthquake dataset, there are 439 low, 2687 medium, and 265 high area attribute houses. In the case of building age, the range of values in the attribute is very sparse. The average building age in the pre-earthquake (2022) dataset is 10, and the average building age in the post-earthquake (2023) dataset is similarly 10. Therefore, the boundary value 10 was accepted as the average value and divided into 2 classes. Apart from these variables, for the 'Building Age' variable, buildings newer than 10 years are categorized as 'New,' and buildings older than 10 years are categorized as 'Old.' With this transformation, there are 1540 new and 1476 old buildings in the pre-earthquake dataset; and there are 1924 new and 1467 old buildings in the post-earthquake dataset. Variables, their value ranges, and frequencies of each value range are given in Table 2.

According to Table 2, the most preferred residential type in the central districts of Adana is 'Flat,' the most common heating type is 'Combi boiler,' and the most preferred building type is 'Reinforced Concrete' structures. In addition, the most common number of rooms is '3+1,' and these dwellings are mostly '3 Facade.'

In this dataset, the number of houses with a 1+1 number of rooms between 2022 and 2023 is higher. This may be an indication that affordable houses are being built in Adana. In addition, the increase in the number of houses with 4 facades in 2023 compared to 2022 is also noteworthy in the real estate sector. The tables in which the variables are analyzed in detail in terms of frequency, mean, standard deviation, minimum, and maximum values of the datasets obtained with the web scraper before and after the earthquake are given below. The purpose of analyzing these tables is to provide a better understanding of the datasets used for decision trees (Table 3 and Table 4).

Since the mean, standard deviation, minimum, and maximum values with less than 2 frequency cannot be calculated, they are not shown in Table 3 and Table 4. In Pre-Earthquake, the maximum price was 5,000,000 and the minimum price was 400,000, while in Post-Earthquake the maximum and minimum prices were 15,000,000 and 600,000 respectively. In Pre-Earthquake, the minimum value for the area attribute was 45 m^2 and the maximum was 950 m^2. In Post-Earthquake, the minimum value for the area attribute was 35 m^2 and the maximum area attribute was 980 m^2. For the number of rooms variable, it is observed that the average price and area attributes generally increase as the number of rooms increases. However, the opposite was observed for the current floor variable. In Pre-Earthquake and Post-Earthquake, the minimum current floor of the houses was current floor (0), while the maximum current floor of the houses was on the 21st floor. As the number of rooms increases, the current floor number and the number of floors generally decrease. In Pre-Earthquake, the houses with the highest number of rooms were detached houses. The building age variable varies according to the differences in the number of rooms. The minimum building age was 0, while the maximum building age was 45. In the number of floors variable, it is seen that in Pre-Earthquake and Post-Earthquake, there were buildings with a minimum number of 1 floor and a maximum number of 27 floors (Table 3 and Table 4).

The change in the average price of houses for sale in Adana province before and after the earthquake is analyzed and presented in Figure 2.

In 2022, the average prices in Çukurova, Sarıçam, Seyhan, and Yüreğir districts are similar. However, in 2023, there is a significant increase in the prices of houses for sale, especially in Çukurova and Seyhan districts.

Method

Decision trees are among the most widely used algorithms in machine learning (Salzberg L., 1994). It is preferred because the result of the decision tree is visually easier to interpret. In this study, decision trees were used to analyze the change in house prices and to determine the affecting variables before and after the earthquake. The decision tree determines the most discriminative variable in the training set (T) and assigns it to the root node of the tree. While there are several metrics to calculate the discriminative power of the variables, entropy-based

Table 2. Species and frequency values in the dataset

Variable	Type	Frequency Pre Earthquake (2022)	Frequency Post Earthquake (2023)
Residential Type	Flat	2773	3132
	Detached House	128	175
	Residance	10	10
	Villa	107	75
Heating	Not Specified	63	50
	Natural Gaz Stove	21	31
	Solar Energy	33	38
	No Heating	105	110
	Floor Heating	10	19
	Air Conditioning	490	629
	Boiler	2177	2362
	Central	116	91
	Stove	39	83
	Underfloor Heating	1	10
Building Type	Reinforced Concrete	2986	3381
	Steel	4	3
	Brick	8	3
	Stone	19	5
Facade	Single Facades	103	179
	2 Facades	523	525
	3 Facades	1932	2073
	4 Facades	458	615
Number of Room	1+0	0	1
	1+1	76	214
	2+1	420	643
	3+1	1691	1565
	3+2	2	2
	4+1	628	848
	4+2	14	6
	5+1	99	56
	5+2	13	11
	5+3	0	2
	6+1	15	13
	6+2	7	6
	6+3	8	5
	7+1	6	2
	7+2	3	4
	7+3	2	2
	8+1	23	0
	8+2	1	4
	8+3	3	4
	9+3	6	2

Table 3. Standard (std.) deviation, mean, min-max values by number of rooms (Pre-earthquake: February 2022)

Number of Room	Frequency	Parameter	Unit Price	Area Attribute (m^2)	Current Floor	Building Age	Number of Floor
1+1	76	Mean	574.753	63	5	2	10
		Std. Dev.	90.972	13	4	2	4
		Min.	400.000	45	0	0	3
		Max.	720.000	120	12	6	18
2+1	420	Mean	732.550	123	5	7	10
		Std. Dev.	264.307	34	4	9	4
		Min.	405.000	65	0	0	1
		Max.	3,250,00	366	18	40	20
3+1	1691	Mean	1.009.438	170	6	12	10
		Std. Dev.	323.896	32	4	10	4
		Min.	410.000	100	0	0	1
		Max.	3.750.000	510	20	45	24
4+1	628	Mean	1.620.302	225	7	12	11
		Std. Dev.	562.625	173	4	8	4
		Min.	440.000	130	0	0	1
		Max.	4.250.000	950	18	40	26
4+2	14	Mean	1.184.540	368	3	11	5
		Std. Dev.	632.372	226	4	9	5
		Min.	435.000	130	1	1	2
		Max.	4.873.000	726	18	30	19
5+1	98	Mean	2.331.727	299	6	12	9
		Std. Dev.	1.132.498	102	4	9	5
		Min.	620.000	130	1	0	1
		Max.	4.950.000	720	21	35	25
5+2	13	Mean	1.194.878	305	3	11	6
		Std. Dev.	623.119	109	3	10	5
		Min.	465.000	100	2	0	2
		Max.	4.750.000	450	11	30	16
6+1	15	Mean	1.241.750	357	9	13	8
		Std. Dev.	648.766	111	5	9	6
		Min.	550.000	110	2	0	2
		Max.	5.000.000	550	21	35	22
6+2	7	Mean	1.446.645	383	5	14	3
		Std. Dev.	415.929	167	2	7	1
		Min.	980.000	220	1	6	2
		Max.	3.000.000	700	6	25	4
6+3	8	Mean	954.741	222	6	21	3
		Std. Dev.	253	123	2	9	0
		Min.	490.000	100	2	7	3
		Max.	1.425.000	420	6	35	4
7+1	6	Mean	2.066.609	378	9	8	8

Table 3. Standard (std.) deviation, mean, min-max values by number of rooms (Pre-earthquake: February 2022) (Cont.)

Number of Room	Frequency	Parameter	Unit Price	Area Attribute (m²)	Current Floor	Building Age	Number of Floor
		Std. Dev.	596.628	65	5	5	6
		Min.	1.450.000	300	6	0	4
		Max.	3.800.000	450	19	13	20
7+2	3	Mean	2.076.818	450	2	8	3
		Std. Dev.	467.310	87	0	6	0
		Min.	1.569.000	400	2	2	3
		Max.	3.400.000	500	2	13	4
8+1	23	Mean	1.159.346	397	6	11	4
		Std. Dev.	550.631	67	1	7	0
		Min.	450.000	210	1	5	2
		Max.	3.500.000	500	6	40	4
8+3	3	Mean	1.372.111	245	2	25	3
		Std. Dev.	146.004	153	0	9	1
		Min.	1.150.000	140	2	15	2
		Max.	1.700.000	420	2	30	4
9+3	6	Mean	1.157.057	323	2	19	3
		Std. Dev.	329.561	123	3	8	0
		Min.	685.000	193	2	5	3
		Max.	2.150.000	50	3	25	3

Information Gain is widely used (Salzberg L., 1994). If we assume the target variable as X, the number of values that the target variable can take as n, and the number of values that the predictor variable can take as v (Paul & Thomas, 2016), then information gain can be calculated as follows:

$$\sum_{i=1}^{m} (pi \log_2 pi) \quad (1)$$

$$\sum_{j=1}^{v} \frac{|xj|}{|x|} x \; Entropy\ (Xj) \quad (2)$$

$$Information\ Gain\ (T,X)=Entropy\ (T)-Entropy\ (T,X) \quad (3)$$

The tree starts branching according to the predictor variable that provides the highest information gain. The process tests all predicted variables to form sub-branches. In this study, the maximum depth for the decision tree was set to 8, and pre-pruning was applied to prevent overtraining. The minimum gain variable for pre-pruning was set as 0.01, and the minimum number of data for a leaf (min samples leaf) was set as 2.

The dataset contains both categorical and numeric data. Due to the high number of numeric data, it is difficult to read the tree as it increases the branching in the decision tree. For this reason, some numeric variables were converted to categorical data types. The remaining numeric variables (current floor and number of rooms) were left as numeric since they are the main factors affecting housing preferences. Since both numeric and categorical data are used together, the C4.5 algorithm (Salzberg L., 1994) with the information gain ratio was used for classification.

Decision Tree Modeling

In this section, decision tree models established with pre-earthquake (2022) and post-earthquake (2023) data are compared (Figure 3-Figure 10). Since the size of the decision tree models is very large, they do not fit in a single figure. For this reason, the sub-branches of the trees are given separately. In all figures, % indicate the decision certainty of the price prediction. In some branches of the decision tree, the classification rate may be 100% when going to the leaves. This indicates that all examples belonging to that leaf belong to the same class and does not mean overfitting. It indicates that the samples in that leaf have a homogeneous distribution under the decision path. Overfitting and underfitting are terms for an entire learning model (Montesinos López et al., 2022). They are measured through the overall performance metrics of the model (Aliferis & Simon, 2024). If these metrics, for example, accuracy and/or precision, are very high (close to 100%), and/or the test performance of the model is higher than

Table 4. Standard (std.) deviation, mean, min-max values according to the number of rooms + halls (Post-erathquake: February 2023)

Number of Room	Frequency	Parameter	Unit Price	Area Attribute (m2)	Current Floor	Building Age	Number of Floor
1+1	214	Mean	965.981	66	4	2	11
		Std. Dev.	302.022	17	3	4	3
		Min.	600.000	35	0	0	1
		Max.	2.000.000	203	13	26	22
2+1	643	Mean	1.441.740	118	5	7	9
		Std. Dev.	505.666	28	4	9	4
		Min.	610.000	50	0	0	1
		Max.	4.500.000	300	21	40	22
3+1	1566	Mean	2.178.079	170	5	12	10
		Std. Dev.	910.008	43	4	10	4
		Min.	620.000	70	0	0	1
		Max.	10.900.000	750	21	45	27
4+1	848	Mean	3.538.704	221	6	12	11
		Std. Dev.	1.494.036	48	4	8	4
		Min.	930.000	125	0	0	1
		Max.	15.000.000	800	21	42	27
4+2	6	Mean	2.011.667	249	1	23	3
		Std. Dev.	1.371.210	111	1	8	4
		Min.	750.000	150	0	10	2
		Max.	4.120.000	418	2	31	11
5+1	56	Mean	5.945.482	301	6	13	10
		Std. Dev.	3.383.456	92	4	11	5
		Min.	1.200.000	150	0	0	2
		Max.	15.000.000	750	16	45	21
5+2	11	Mean	5.405.909	368	3	13	5
		Std. Dev.	2.806.926	190	4	10	4
		Min.	1.400.000	165	0	0	2
		Max.	9.500.000	800	15	26	15
6+1	13	Mean	8.567.308	420	6	7	8
		Std. Dev.	4.158.392	150	6	6	7
		Min.	3.100.000	240	0	0	2
		Max.	15.000.000	750	21	20	25
6+2	6	Mean	4.208.333	329	4	4	5
		Std. Dev.	2.164.351	139	4	10	3
		Min.	2.000.000	150	2	6	2
		Max.	7.400.000	550	11	31	11
6+3	5	Mean	6.126.000	395	2	11	3
		Std. Dev.	5.725.022	202	1	8	1
		Min.	730.000	140	0	0	3
		Max.	14.500.000	600	2	20	4

Table 4. Standard (std.) deviation, mean, min-max values according to the number of rooms + halls (Post-erathquake: February 2023) (Cont.)

Number of Room	Frequency	Parameter	Unit Price	Area Attribute (m2)	Current Floor	Building Age	Number of Floor
7+2	4	Mean	8.900.000	367	2	6	3
		Std. Dev.	2.802.380	217	0	5	1
		Min.	5.400.000	120	2	0	2
		Max.	12.000.000	650	2	10	4
8+2	4	Mean	10.198.750	702	3	15	9
		Std. Dev.	3.203.853	210	3	12	6
		Min.	8.500.000	540	0	0	4
		Max.	15.000.000	980	6	25	14
8+3	4	Mean	10.198.750	702	3	15	9
		Std. Dev.	3.203.853	210	3	12	6
		Min.	8.500.000	540	0	0	4
		Max.	15.000.000	980	6	25	14

the training performance, overfitting may be suspected. However, when we look at the performance metrics given in Table 5 and Table 6, there is no concern of overfitting. Overfitting can be suspected if all samples belonging to any class are 100% distributed across all leaves in the tree.

The most distinctive variable for both years is the 'Area' variable (Figure 3). The pre-earthquake decision tree is divided into three branches (Number of Rooms, District, and Heating) according to whether the area variable is low, medium, or high. The post-earthquake decision tree is branched to Facade, Heating, and Residential Type. When the variables that form the branches in the first levels of these trees are examined, it is seen that variables affecting the house price changed after the earthquake, and the importance of residential type and facade variables increased (Figure 3).

In 2022 (pre-earthquake), for houses with a low area variable, the number of rooms is the most important variable as it is included in the tree root. 1+1 and 2+1 houses are projected to be low-priced. The price prediction of houses with a 3+1 number of rooms is based on the residential type variable. For these, detached houses and flats are considered to be medium-priced (Figure 4).

In the decision tree model in Figure 5, the most important variable for houses with a medium area variable in 2022 is the district. At the 2nd level, the facade in Sarıçam district, the number of floors in Yüreğir and Çukurova, and the number of floors in Seyhan were found to be important variables. Since the branching in the tree is very high and the district with the highest price change between 2022 and 2023 is Çukurova district (Figure 2), the decision tree model for this district is given.

In 2022, the most important variable affecting the price of flats for sale in Çukurova, which has a medium area variable, is the floor variable. Facade and building age variables are at the 2nd level of the tree. Number of floors, number of rooms, and residential type are assigned to lower levels. Accordingly, detached houses with an older building age are moderately priced; villas with more than 2.5 floors are low priced, while houses with less than 2.5 floors are high priced. In flats, it is seen that houses with a 2+1 number of rooms are low priced, while the branching continues in 3+1 and 4+1 according to different variables. The decision tree model is given in Figure 6.

It is found that the heating type variable affects price for both pre- and post-earthquake. This variable is related to the high area variable for the pre-earthquake dataset while it is related to the medium area variable for the post-earthquake dataset. The decision tree for dwellings with a high area variable in 2022 is given in Figure 7.

The floor and residential type variables are found at levels 2

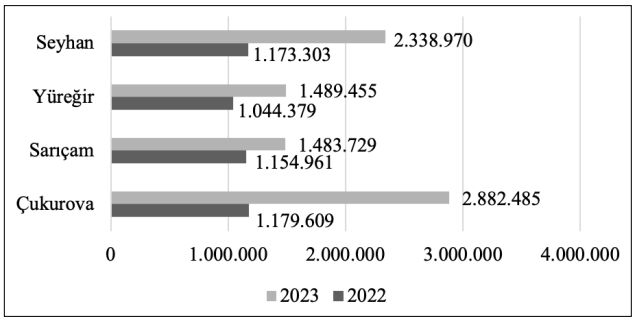

Figure 2. Change in the average price of houses for sale before and after the earthquake.

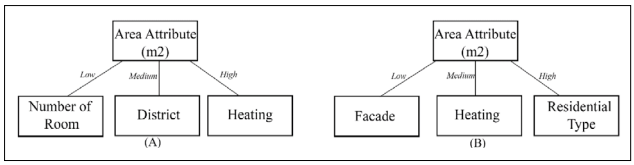

Figure 3. location of study area (Adopted from Wikipedia).

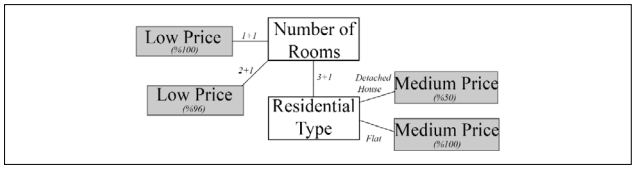

Figure 4. Pre-earthquake, sub tree for low area attribute.

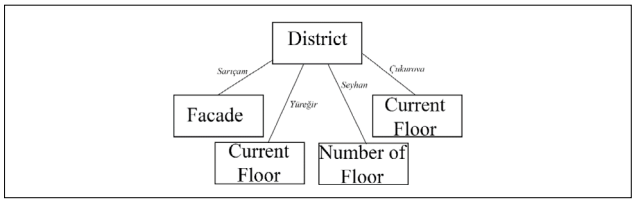

Figure 5. Pre earthquake, decision tree for dwellings with medium area attribute.

and 3 of the tree. Accordingly, houses with 2 facades were determined as medium priced, houses with 4 facades and a floor greater than 2.5 were determined as high priced, and houses with a floor less than 2.5 were determined as low priced. For 3-fronted dwellings, if the floor is less than or equal to 3, it is moderately priced, and if it is greater than 3, the residential type is considered.

The 2023 sub-tree for houses with a low area variable is presented in Figure 8. According to the figure, the most

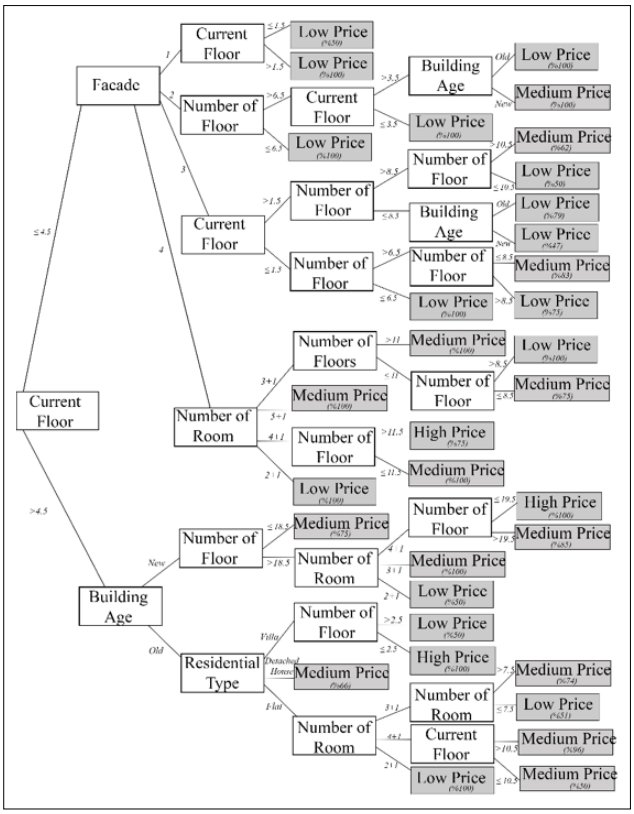

Figure 6. Pre-earthquake; Decision tree for Çukurova province with medium area attribute.

important variable affecting the price for houses with a low area attribute is the facade. However, the most important variable for houses with a low area attribute in 2022 is the number of rooms (Figure 4). In the tree for 2023, when the sub-branches of the area variable are analyzed, houses with one facade, 2 and 4 facades are

Table 5. Decision tree model performance values for 2022

Accuracy: %71.33	Value	Actual			
		Low	Medium	High	Class Precision
Model Prediction	Low	515	162	25	%73.36
	Medium	100	290	45	%66.67
	High	0	14	56	%80.00

Table 6. Decision tree model performance values for 2023

Accuracy: %74.63	Value	Actual			
		Low	Medium	High	Class Precision
Model Prediction	Low	584	144	18	78.28%
	Medium	128	383	41	69.38%
	High	2	11	45	77.59%

classified as low priced. For houses with 3 facades, the district variable comes forward.

When the District sub-branch is followed, the price prediction of Çukurova and Yüreğir districts is determined as low priced. In Sarıçam district, residential type stands out, with flat and detached houses being low priced. In Seyhan district, houses with less than 3.5 floors are considered to be low priced.

For the 2023 dataset, the most important variable affecting the price for houses with a medium area variable is the heating type (Figure 9). For the 2022 dataset, the most important variable affecting the price of houses with a medium area variable is the district (Figure 5). It is seen that houses with 4 facades and a 4+1 number of rooms with air conditioning heating type are moderately priced. Houses with a 2+1 number of rooms are low priced. When the number of rooms variable takes the value of 3+1, the houses in Seyhan, Yüreğir, and Çukurova districts are determined as low priced. In Seyhan district, the floor is checked as the next variable. Houses with 2.5 floors or less are determined as low priced, and the certainty rate is 100%. Buildings above 2.5 floors are also considered low priced, but the certainty rate is 50%.

In 2023, the most important variable affecting the price of houses with a medium area variable is the heating type. While in 2022, the most important variable affecting the price of houses with a medium area variable is the district (Figure 5).

When Figure 9 is analyzed, it is seen that the most important variables in pricing are residential type, number of floors, number of rooms, and the floor on which it is located. Other variables are the age of the building and the district. It is seen that houses with 4 facades and a 4+1 number of rooms with air conditioning are moderately priced. Houses with a 2+1 number of rooms are low priced. When the number of rooms variable takes the value of 3+1, the houses in Seyhan, Yüreğir, and Çukurova districts are determined as low priced. In Seyhan district, the floor is checked as the next variable. Houses with 2.5 floors or less are determined as low priced. Buildings above 2.5 floors are also considered low priced.

For houses with 3 facades, the district variable is checked first. In Yüreğir district, houses with 3 facades with air conditioning are predicted to be low priced (Figure 9). In Sarıçam district, the next variable, the type of housing, is checked, and it is seen that detached and flat-type houses are low priced. In Seyhan district, the next variable, which is the floor, is checked. Houses with 4.5 floors and below are low priced. For houses with a floor above 9.5, it is low priced, and if it is below 9.5, the number of floors variable is important. Houses with more than 6.5 floors are considered moderately priced, while houses with less than 6.5 floors

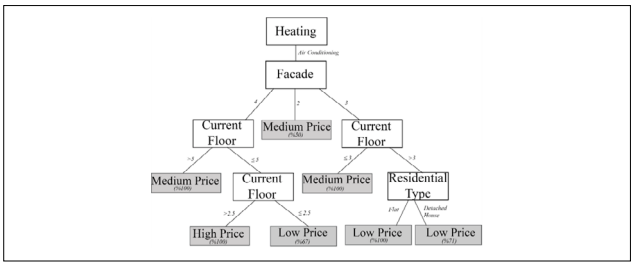

Figure 7. Decision tree for dwellings with high area attribute in 2022.

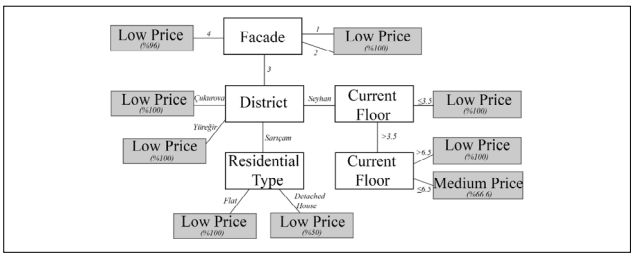

Figure 8. Decision tree for houses with low area attribute in 2023.

are considered low priced. In Çukurova district, the floor variable is checked. If the current floor is above 9.5, the medium price is determined, while if the current floor is less than 9.5, the current floor becomes more important. Houses with less than 3 floors are predicted to be low priced, while for houses with more than 3 floors, the number of rooms variable is important. In Çukurova, houses with a 3+1 and 2+1 number of rooms are considered low priced, while 4+1 houses are predicted as medium priced (Figure 9). Similarly, the other branches of the tree can be read by following the lines to the right.

In 2023, the most important variable for dwellings with a high area variable is the residential type. For detached houses, flats, and villas, the most important variable is the number of floors. The details of the corresponding sub-tree are given in Figure 10. Residence-type houses are considered to be high priced. District, building age, heating, facade, and floor variables are assigned to lower levels.

Evaluation of Decision Tree Models

The variables affecting the price in the decision tree models for February 2022 before the earthquake and February 2023 after the earthquake are shown in Figure 11. The importance level of these variables decreases from the root to the lower levels, and the levels in the model are shown between Level 1 and Level 5.

Pre- and post-earthquake trees are branched according to the 'Area' variable. In the pre-earthquake period, the variables 'Number of Rooms,' 'District,' and 'Heating Type' are at the first level, while in the post-earthquake period, 'Facade,' 'Heating Type,' and 'Residential Type' variables are

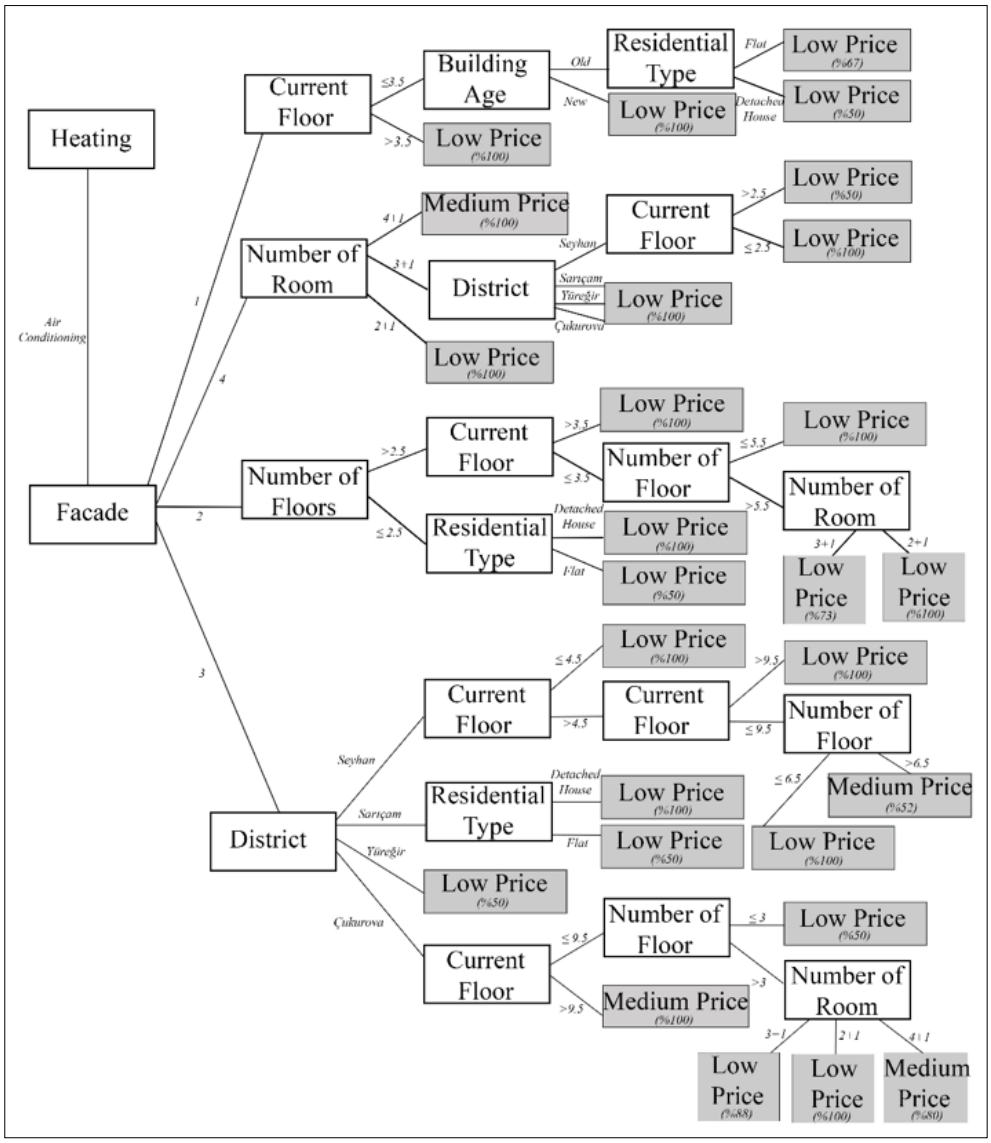

Figure 9. Decision tree for houses with medium area attribute in 2023.

important at the first level. For both datasets, the variables affecting the price vary, but it is noteworthy that the heating type variable is at the first level for both datasets. It can be said that the heating type is important in affecting the price due to the weather conditions of the region.

On February 6, 2023, the earthquake and the demolition of flimsy high-rise buildings increased the tendency of people to prefer detached houses. In this case, residential type stands out among the variables affecting the price in 2023. The fact that detached houses generally have multiple facades shows that the 'Facade' variable is also a significant determinant of the house price in 2023.

After the earthquake, the effect of building age on the price changed due to the demolition of non-durable buildings, regardless of whether they were new or old. In the 2022 decision tree model, the age of the building is at a higher level, while in 2023 its importance in determining the price decreases.

In 2022, the number of rooms is important in the factors affecting house prices. However, in 2023, this factor is found at lower levels of the decision tree. This shows that the number of rooms variable was more effective in the pre-earthquake period. The fact that this variable is less effective in housing preference criteria after the earthquake shows that the lifestyle in cities has changed.

Performance Evaluation of the Models

Accuracy was used to measure the prediction performance of decision tree models. Classification accuracy shows the rate of correct classification of the data in the sample. True Positive (TP) represents the result that the model correctly

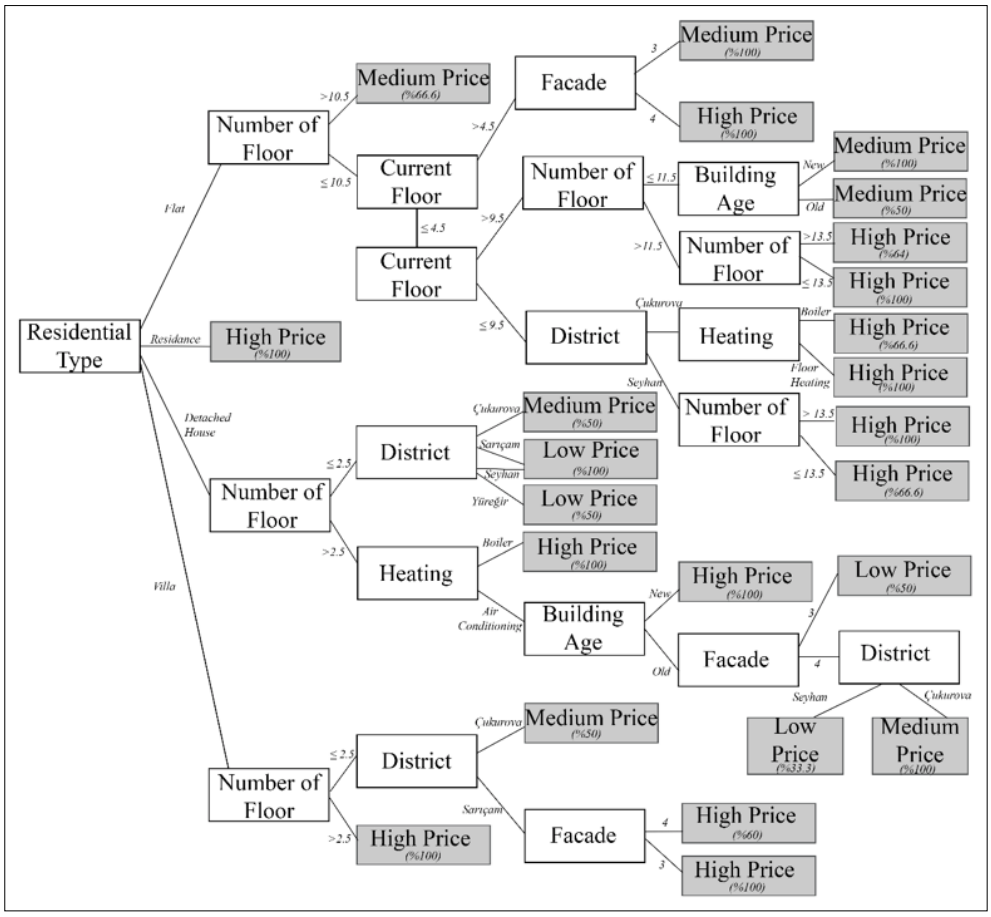

Figure 10. Decision tree for houses with high area attribute in 2023.

predicts the positive class, True Negative (TN) represents the result that correctly predicts the negative class, False Positive (FP) represents the result that incorrectly predicts the positive class, and False Negative (FN) represents the result that the model incorrectly predicts the negative class, and the way it is calculated is shown in formula (4) (Solanki et al., 2021).

$$\frac{True\ Positive(TP)+True\ Negative\ (TN)}{True\ Positive+False\ Positive\ (FP)+ True\ Negative+\ False\ Negative\ (FN)} \quad (4)$$

The accuracy values used to measure the success criteria of the decision tree model in this study are given in Table 5 and Table 6.

There are a total of 3 classes in the pre-earthquake cluster for the year 2022. There are 615 data in low class, 466 data in medium class and 126 data in high class. The accuracy of the pre-earthquake decision tree model is 71.33%.

In the February 2023 dataset, there are 714 data in the low class, 538 data in the medium class, and 104 data in the high class. The accuracy of the decision tree was calculated as 74.63%. When the relevant tables are analyzed, it is seen that the model for 2023 has a better classification performance.

DISCUSSION AND CONCLUSION'

As houses in the region were directly or indirectly damaged after the 7.7 and 7.6 earthquakes in Kahramanmaraş and Gaziantep, Türkiye on February 6, 2023, the real estate sector in the region was also affected. The earthquake caused changes in house prices and variables affecting these prices. Price changes and the variables affecting the price were analyzed using machine learning.

The decision tree approach is used to compare the price change of house sales and variables affecting the price for both pre- and post-earthquake datasets. The central districts of Adana province (Seyhan, Yüreğir, Sarıçam, Çukurova) were chosen as the study area because it is the largest province in the earthquake zone, yet it suffered relatively less damage.

The prediction performance of the pre-earthquake model is 71.33%, while it is 74.63% in post-earthquake. For both models, the first branching occurred according to the area

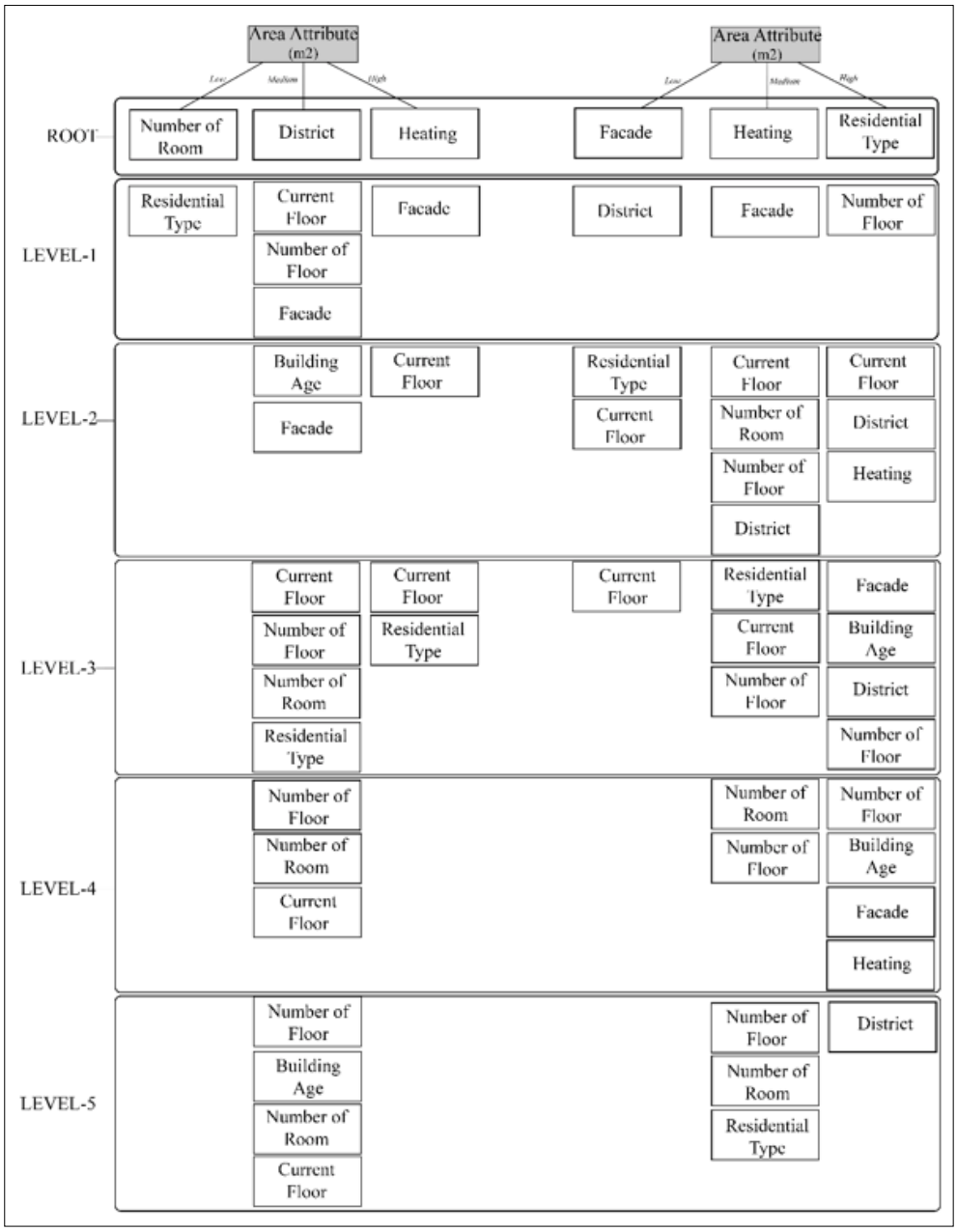

Figure 11. General representation of decision trees.

variable. The importance of this feature can be explained by the high population in the region. The socio-economic structure in the region may cause large families to live in a single house, and therefore structures with a high number of rooms may be preferred.

Features such as the number of rooms, district, and heating type were the determinants of housing preferences before the earthquake. Facade, heating type, and housing type were the reasons for preference in post-earthquake housing purchases. Due to the fact that Adana province is in a temperate region, housing purchase preferences, especially with air conditioning heating, have come to the fore. After the earthquake, it has been important in the sense that it strengthens the idea that there will be preferences for low-rise undamaged buildings, especially for detached houses. The preference for detached houses after the earthquake has automatically brought the facade feature to the forefront because detached houses have at least three facades. In this way, in addition to earthquake resistance standards, the variables revealed by the model can also be given importance in the new construction to be built in the region.

This study analyzes not only the earthquake effect but also the changes in house sales preferences before and after

the earthquake and their impact on pricing. It cannot be said that these concepts are directly caused by the earthquake effect, but all the prominent features in house sales preferences are evaluated according to the results of decision trees.

Decision tree models were constructed to analyze the changes in house prices before and after the earthquake and to find the variables affecting the prices. Covering 11 provinces, Adana was chosen to be a quick representation and preliminary study of the disaster area. The study is a pioneering study that shows that machine learning models can be used successfully to reveal the price differences before and after the earthquake and to identify the variables affecting this change.

In order to reflect the overall situation in the earthquake region, more comprehensive datasets should be used, including the variability in the destruction rate and socioeconomic structure of all provinces in the region. The housing characteristics obtained for the creation of the database used in the study are limited to the characteristics provided by the open-source website. Another limiting factor is that the datasets were not collected in more than one month. The web scraper was able to access February 2022 and February 2023 housing data for a month before and after the earthquake. It is possible to obtain different results according to the damage in different areas of the earthquake zone and the data on the real estate website.

In parallel with increasing data size and detail, different machine learning models may also need to be used. Efforts have been initiated to create relevant datasets and model them with different machine learning methods.

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PEER-REVIEW: Externally peer-reviewed.

CONFLICT OF INTEREST: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Article

Rumeli Railway estates in the historical peninsula in the light of archival documents; Sirkeci example[1]

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ABSTRACT

This study aims to examine the impact of the Rumeli Railway, built by the Ottoman Empire in the second half of the 19th century, on the transformation of the urban space in the Sirkeci District by evaluating the cooperation and conflicts between the state, foreign investors, and local actors and the political, social, and urban spatial effects of the construction process. The Industrial Revolution began a process of major changes and reforms across the world. These changes led to radical reform worldwide while closing and opening an era in economic, social, and technological terms. The revolution first started in the UK and then spread to Northern Europe and North America. Steam-powered machines and vehicles are among the reasons for the beginning of the Industrial Revolution. The discovery of steam-powered trains made the construction of railways essential. The Ottoman Empire also made use of this innovation and built the Rumeli Railway in the second half of the 19th century. As the majority of the railways were built by the Ottoman Empire in the 19th century, the Rumeli Railway was funded by foreign investors; many written sources describing the processes of obtaining their privileges, plan projects describing the construction processes, and many official correspondences describing the events during the construction process are available in the Turkish Republic Presidency State Ottoman Archives (OA). This study examines the expropriation processes carried out in the historical peninsula in the Sirkeci District during the construction of the Rumeli Railway in the light of archival documents.

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INTRODUCTION

Like most of the 19th-century railways constructed by the Ottoman Empire, the Rumeli Railway was also funded by foreign investors; therefore, there are many written sources describing the processes of obtaining concessions, plans, and projects describing the construction processes, and many official correspondences describing what happened during the construction process in the Turkish Republic Presidency State Archives, Ottoman Archives (Cumhurbaşkanlığı Başkanlığı Osmanlı Arşivi), shortened as OA in the article[2]. In this study, the expropriation processes carried out in the historical peninsula during the construction of the Rumeli Railway are examined in the light of archival documents, and the results of the construction of the railway in the

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Sirkeci district are examined both in terms of the economic, political, and social dimensions and the transformation of the urban space and physical environment.

In the documents of the Turkish Republic Presidency State Ottoman Archives, the entrance of the Rumeli Railway from Edirne to Istanbul, the Rumeli side of Istanbul, and finally the historical peninsula and its distribution in these regions can be seen on the maps (Figures 1-4).

Literature

The archival documents are the main source of the original part of the study. In 1874, the booklet printed in Istanbul about the contract for the Rumeli railways, "Actes De La Concession Des Chemin De Fer De La Turquie D'europe," (Anonymous, 1874) the book published by the Ottoman government to raise public awareness "La Question Des Chemins De Fer De La Turquie D'europe Devant L'opinion Publique," and the local newspaper of the period, "La Turquie," constitute the main sources on the subject. Engin's (1993) study is one of the most important sources dealing with the Rumeli Railways in a holistic manner. Emre Madran (2002) provides a broad perspective on the conservation understanding of the period, while Quataert's (1985) article "Railways in the Ottoman Empire in the 19th Century" is another important source. Tekeli's publications (Tekeli, 1985; Tekeli, 2012) about the Tanzimat period, along with old maps and many sources in the references, which describe the social, political, economic, and physical situation of the city during the period, shed light on the study.

The Ottoman Empire prioritized military and political objectives over commercial ones when building railway lines. The purpose of building the Rumeli Railways was purely political and military. This route was seen by the Tanzimat administrators as a means of political integration with Europe, intervening with the states' instability, especially during the uprisings in the Balkans, and emphasized the need to build the Rumeli railway. In addition, this railway

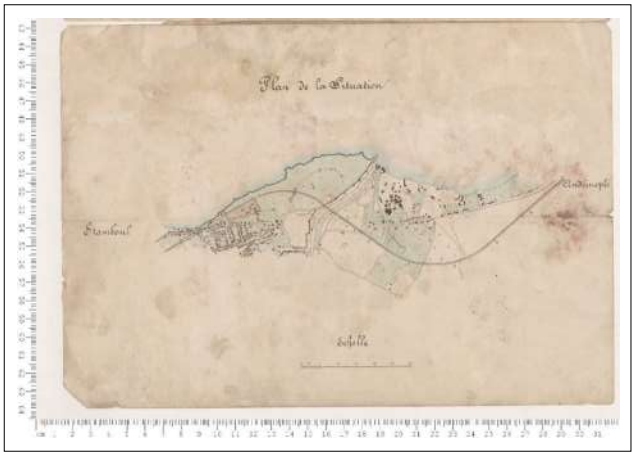


Figure 1. Entrance of the Railway from the Yedikule city walls (Ottoman Arcihve, 1870).

Figure 2. Edirne-Istanbul railway plan (Ottoman Arcihve, 1868).

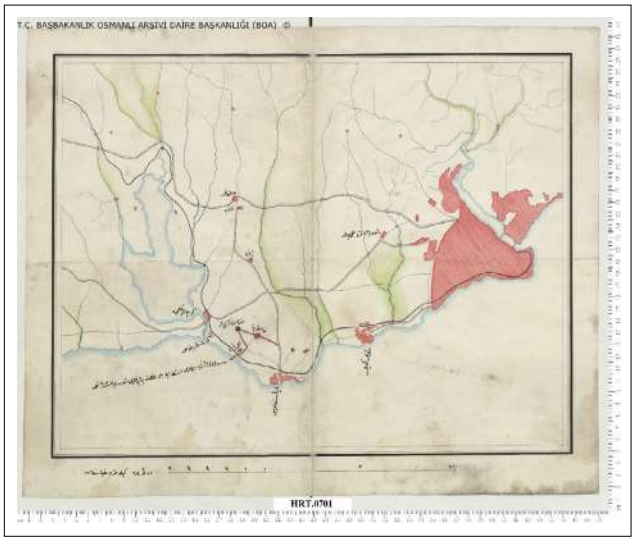


Figure 3. Map showing trains and highways on the the Rumeli (European) side of Istanbul (Ottoman Archive, 1923a).

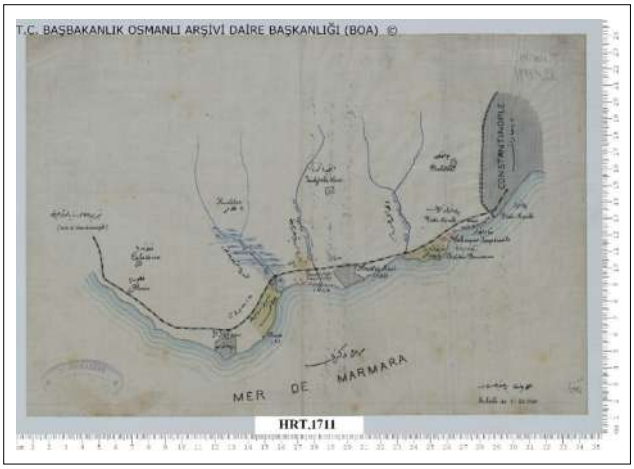


Figure 4. Istanbul, Yedikule-Florya Railway map, (Ottoman Arcihve, 1923b).

was also intended to increase state revenues by utilizing the rich resources in European territories (Engin, 1993).

Construction Process

In 1855, the Ottoman government made a call to European capital circles through the press, announcing that it wanted to build a railway between Istanbul and Belgrade and was waiting for applications from investors. The first response to this call came from the British parliamentarian Mr. Labro, who stated that a railway designed to connect the Black Sea, the Mediterranean, and the major cities of Rumeli to Istanbul would be very advantageous for the Ottoman Empire in commercial, financial, political, and military terms. Labro's proposal was accepted and a treaty was signed on 23 January 1857. However, the agreement was terminated because Labro could not raise the necessary capital and could not start operations. The Ottoman government signed contracts with two other companies, but both attempts were unsuccessful.

Towards the end of 1868, the Ottoman Empire began a new search. Meanwhile, Russia, which had emerged from the Crimean War, was preparing for a new war with the Ottoman Empire, and the Ottoman Empire wanted the Rumeli railways to be built as soon as possible in order to protect itself from a possible Russian attack. Unlike Russia, European states support the project. The Rumeli Railway would increase the defense power of the state and, at the same time, increase the economic advantages of the Ottoman Empire on the India - Europe route (anonymus,1875).

Austria was the biggest supporter of the Ottoman state in the construction of the Rumeli Railways. In 1866, after its defeat in Sadova against Prussia, it gave up hope in the West and started to look for its future in the Balkans and its conflicts with Russia, which had the same ambitions, intensified. Austria is now aligning itself with its old rival in the west and, with its back to the Germanic world, intended to take Serbia under its tutelage and from there to Thessaloniki. Rumeli railways will be an important tool in achieving this goal.

The last concession for the Rumeli Railways was granted to Baron Hirsch, a Brussels banker, on 17 April 1869 (Engin, 1993). The deal was brokered by Davut Pasha, but it turned into a process in which the state suffered great losses. The concession period of the line, which started in July 1876, is 99 years. Its route would start from Istanbul, pass through Edirne, Plovdiv, Dedeagac, Burgas, and Thessaloniki, and reach Sava. This line would later be connected with the Serbian lines. The total length of this line was 2,500 km, and the projected construction period was seven years. The completion time between Istanbul - Plovdiv and Edirne - Dedeagac was four years. The state undertook to pay a guarantee of Francs 14,000 per kilometre for the construction of the line.

Although the Yedikule-Küçükçekmece line had been completed, construction work had not yet started on the other parts of the Rumeli railways. In other words, only 15 km of railway could be built 21 months after the contract was signed on 17 April 1869, and 15 months after the concession edict dated 7 October 1869. Although the shortage of materials and technical staff due to the Franco-Prussian War also played a role in this failure, still very little work was done. Moreover, it does not seem logical that Yedikule would be the last station of the railway that would connect Istanbul to Europe. It is difficult to transport passengers and cargo from there to market places, and it also had no connections to a port. The most suitable place for the starting point is Sirkeci, but there were still doubts because the Sarayburnu area was inside the palace. For the railway to pass through there, many pavilions would have to be demolished, gardens would have to be disturbed, and the smoke from the trains would have to be tolerated. It was also considered strange for a foreign company to run a train through the palace. However, it also seemed necessary to extend the line to Sirkeci, and the construction company was in favor of extending the line to increase its revenue. If the starting point was Sirkeci, it would be possible to accelerate the construction of the railway in other neighborhoods because the connection of the railway with the Sirkeci pier would enable the railway material brought by ships from Europe to be brought to shore safely. From there, it would be possible to quickly reach Küçükçekmece and beyond (Engin, 1993). For this purpose, the company representative M. Autrey prepared a report on the route in December 1870 and submitted it to the Nafia Nezareti. According to Autrey's statement, the Sirkeci-Yedikule line would pass through the palace garden, between Yalıköşkü and the New Bridge. Buildings that the state wishes to preserve would be left untouched as far as possible. Bahçekapısı and the neighborhoods beyond it were not visited, leaving only the minimum area for the station. The route between Yedikule and Gulhane also passed through fire-damaged zones to avoid expropriation. It was deemed necessary for the company to keep the Daya Hatun Mosque, one of the three mosques in the main station area. Because the company wanted to employ many Muslims at the station, they thought that they would be able to perform their prayers in this mosque. Although the Medical School in the palace garden was located in the station area, it would not be evacuated for the time being and only a corner of it would be affected. It was also seen that the factory belonging to the shipyard in this area should be demolished. The route to be followed by the Yedikule-Sirkeci line was to be as follows: Narlıkapı-Yerli bostan-Langa Bostanları-Yenikapı-Kumkapı-Çatladıkapı-Balıkhane Kapısı. From there, one would enter the Palace garden. Some parts of the castle walls around Samatya and Yenikapı and Çatladıkapı were to be demolished. In the palace garden, the line would follow

the seaside, but some parts of the Marble Pavilion and two old buildings belonging to the Bâb-ı Seraskeri would have to be demolished (Engin, 1993).

The announcement that the railway would pass through the palace garden caused the public and some intellectuals of the era to react. While petitions of complaint written by the public can frequently be found in the Ottoman archives on the subject, the newspapers and humor magazines of the period also contain various articles and cartoons, examples of which are given in the following sections of the study. According to them, it was not proper to block the beauty of a unique place like Sarayburnu. This beauty should be embellished, not sacrificed, by building railway facilities there and they argued against filling the city with noise and smoke. If there was a necessity in terms of port, it was possible to bring the line from Langa and Sultanahmet Square to the vicinity of Bahçekapı with a tunnel or to extend it from Edirnekapı to Eyüp and from there to the vicinity of Ayvansaray, following the city walls. Another possibility was to build a harbor on Küçükçekmece Lake. In addition, the tram company also opposed the Sirkeci-Yedikule line, thinking that it would reduce its income (Engin, 1993). Approximately 1,000 buildings had to be demolished for the construction of the railway line through the garden of Topkapı Palace (Engin, 1993). Although there were those who opposed the extension of the line to Sirkeci on the grounds that it would be inappropriate for a foreign company to enter the palace garden, the environmental pollution it would create, and the impact on the revenues of the connected tram company, the line was put into service on 21 July 1872 due to the order of Sultan Abdülaziz (Engin, 1999). Two wooden sheds were built as passenger waiting rooms in Sirkeci. Proposals for the actual station building were presented by Baron Hirsch in 1872 and 1873. However, the decision to build the station building in Sirkeci was taken only on 11 February 1888. Sirkeci Station was built by architect A. Jasmund and opened on 3 November 1890. With the death of Grand Vizier Ali Pasha, a great supporter of the Rumeli Railways, it was decided that Baron Hirsch would complete the lines as he wished and the remaining lines would be built by the state (Table 1). The lines Hirsch is obliged to complete are the following:

Table 1. Rumeli Railway stages (Engin, 1993)

Istanbul – Edirne 319 km
Dedeagaç- Edirne 149 km
Edirne – Sarımbey 243 km
Selanik – Mitroviçe 361 km
Tırnova – Yanbolu 105 km
Banja Luka – Avusturya 102 km

Debates on Conservation of the Construction of the Rumeli Railway

Emre Madran comments on the conservation understanding of the period in the Ottoman Empire as follows: "In the Ottoman state, as of the end of the 18th century and the beginning of the 19th century, when the field of construction started to change, repair activities in the empire were not organized as a separate institution. The people and institutions involved in new construction activities and the financial and administrative considerations that applied to new construction also applied to repair activities. There was no general conservation awareness and practices. Only the objects used were naturally preserved. 'Usability,' 'ability to maintain its function,' and 'availability of financial resources for repair' were the main factors affecting repair decisions. The opposition between destruction and repair is interesting. The institution of 'foundation' was the most important factor in the formation, repair, maintenance, and continuity of buildings" (Madran, 2002).

The 19th century was a period in which the Ottoman Empire attempted to modernize in many areas. The reforms made while opening the economy to capitalist relations are a clear indication of the concern for westernization. With the Regulations on Asar-ı Atika, the first of which was put into effect in 1869, along with other regulations, a new legal basis began to emerge. Emre Madran noted that there was a use-oriented repair system before the Westernization period, but that many of the regulations that form the basis of today's zoning and conservation law began in the Tanzimat period. Between 1848 and 1917, along with the institution of waqfs (religious foundations) and new regulations in the fields of construction and repair, various legal regulations on antiquities and conservation were enacted. In the first half of the 19th century, there were various laws that indirectly concern the field of conservation or regulations aimed at improving the institution of the foundations. However, it was only in the second half of the 19th century that the legal basis for real protection was established and organized with a modern point of view of the period (Madran, 2002).

In the 19th century, the Ottoman understanding of conservation was mostly directed towards monumental buildings and archaeological artifacts (Madran, 2002). The growing interest in archaeology and history in Europe led to an increase in the number of excavations in the Ottoman Empire and the importance and development of museology, but archaeological excavations were only carried out by foreigners in Ottoman lands. The Asar-ı Atika Legislation is described as a defense of the state against the European plunder of cultural heritage. Although the Foundation system experienced problems, it continued to be effective in the preservation of monumental buildings. In the archival documents examined (Table 2), correspondence regarding the protection of some archaeological artifacts unearthed during the construction of the railway was identified (OA, MF.MKT. 1167/69,1329).

Table 2. Archival document From the Ministry of Education to the Ministry of Trade and Public Works about antiquities unearthed during the construction of the railway (Ottoman Archives, 1911).

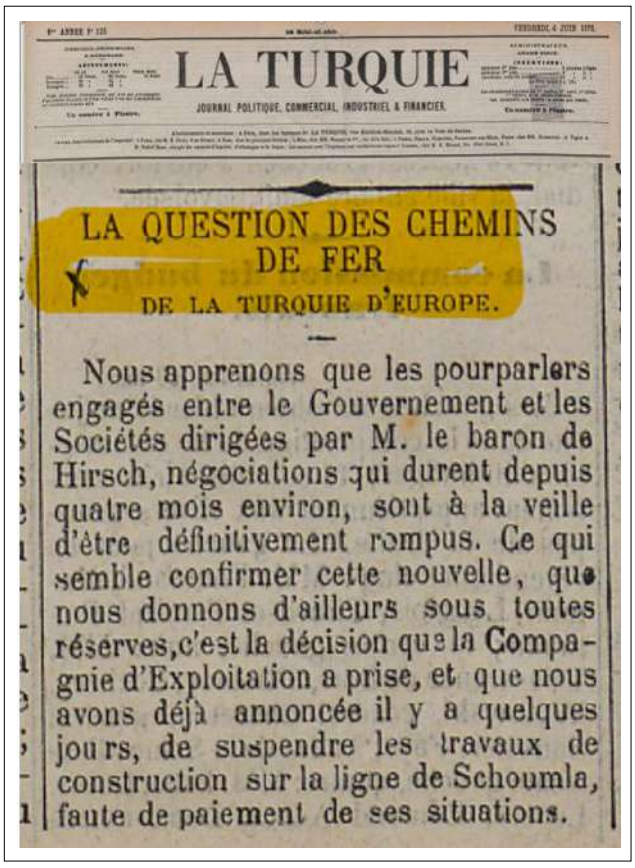
Fund Code	Location Number	Date	Document Summary
MF. MKT.	1167-69	H-05-3-1329	The construction of the double line, which was decided to be extended from Sirkeci to Ayastefanos, was started by the company, and since some capitals and other engraved or inscribed stones were found in the places where the line passes within the walls, it will appear in the commercial excavations and belong to the museum. The excavated historical artifacts should not be damaged and should be immediately taken under protection and reported to the museum.

As it can be understood from the document (Table 2), it was requested that the historical artifacts were not to be damaged and they were immediately taken under protection and reported to the museum. In this regard, a high-level correspondence was sent from the Ministry of Education to the Ministry of Trade and Public Works, and the railway company received an official warning. Although many documents survive regarding the conservation understanding of the period regarding the expropriation and demolition of coastal palaces other than the Sepetçiler Pavilion, the most striking example is the fact that no document has been found regarding the partial demolition of the Bukoleon Palace, which is a very important Byzantine structure, or the loss of the Byzantine Sea Walls and important city gates. The fact that there are only written documents regarding the transportation of the artifacts excavated raises questions about the fate of the excavated artifacts. The most striking example of the fact that the filling made with sleepers, which was detected after the cleaning carried out within the scope of the 2020-2021 Years Bukoleon Palace Museum and Restoration Implementation Work of the Istanbul Metropolitan Municipality made at Bukoleon Palace in 2020-2021, is the most striking example of filling made for the railway; many Byzantine structures, such as city gates, etc., remain under the filling.

During and after the Tanzimat period, the press became the most important national and international means of communicating the political, economic, social, and urban breakthroughs of the Ottoman State. The Ottoman Empire published some articles in newspapers about the railway construction as an important breakthrough in order to attract the public's perception in a positive direction, but humor magazines or independent publications of the period criticized the railway's passing through the city walls or the fact that the Ottoman economy, which already had limited funds, made such an attempt due to both the large-scale concessions granted to foreign investors and the unnecessary length of the railway since the expropriations made were covered from the treasury. There were various opinions and concerns about the construction process and extension of the railway line to Sirkeci and the opposition of the tramway company to the extension of the line, which thought that their income would decrease, in newspaper La Turquie (Figure 5 and Figure 6).

Launched in 1870, Teodor Kasab's humor magazines Diyojen and Çıngıraklı Tatar attracted much attention and had an impact on large communities. However, criticism against the government could not be prevented, and the humor press began to be censored by the state (Subaşı & Çaylı, 2017). Diyojen referred to the Rumeli Railway as a ferry/vapor in No. 15, August 3, 1872.

In Figure 7, the humour magazine Çıngıraklı Tatar satirised this situation in a caricature on April 30, 1873 (Oymak, 2013).



LA TURQUIE

JOURNAL POLITIQUE, COMMERCIAL, INDUSTRIEL & FINANCIER.

LA QUESTION DES CHEMINS DE FER

DE LA TURQUIE D'EUROPE.

Nous apprenons que les pourparlers engagés entre le Gouvernement et les Sociétés dirigées par M. le baron de Hirsch, négociations qui durent depuis quatre mois environ, sont à la veille d'être définitivement rompus. Ce qui semble confirmer cette nouvelle, que nous donnons d'ailleurs sous toutes réserves, c'est la décision que la Compagnie d'Exploitation a prise, et que nous avons déjà annoncée il y a quelques jours, de suspendre les travaux de construction sur la ligne de Schoumla, faute de paiement de ses situations.

Figure 5. La Turquie article dated 3 February 1871 (Anonymous, 1871).

5me Année 1871. Un numéro 1 piastre. Vendredi, 3 Février

LA TURQUIE

JOURNAL NATIONAL

LE CHEMIN DE FER DE ROUMÉLIE ET LA SOCIÉTÉ DES TRAMWAYS.

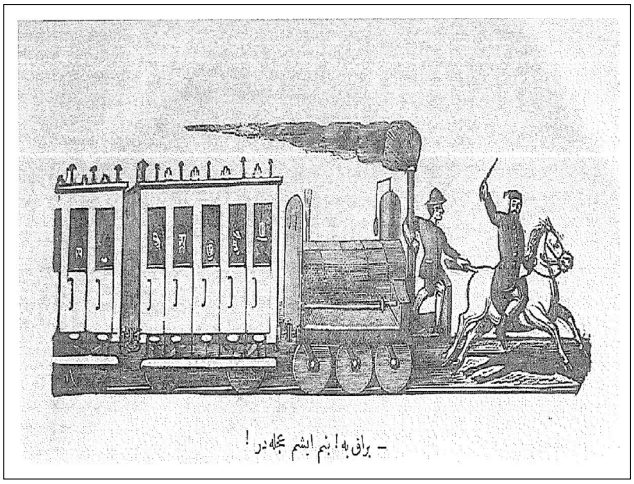
On s'entretient beaucoup depuis quelques jours du projet de prolongement du chemin de fer de Roumélie dans l'intérieur de la ville jusqu'à Bahtché-Capou, où l'on se propose d'établir la station principale, indépendamment de celle déjà établie à Narli-Capou, près de Yedi-Coulé.

Ce projet a donné lieu, nous assure-t-on, à une protestation de la part de la Société des Tramways dont le privilège serait atteint si ce prolongement venait à être exécuté.

Cette question intéresse au plus haut degré la population de notre ville. Aussi croyons nous remplir un devoir en l'examinant sous le double point de vue de l'intérêt public et des droits acquis à la Société des Tramways.

Ce dernier point est déjà irrévocablement résolu par une disposition de l'acte de concession portant que, *ni une compagnie, ni un particulier ne pourra établir un service régulier de*

Figure 6. La Turquie article dated 4 June 1875 (Anonymous, 1875).



– یاڤی به! بنم ایشم عجله در!

Figure 7. Çingirakli Tatar, 30 April, 1873 (Oymak, 2013) (The caption reads "Move, I'm in a hurry!).

The Effect of Rumeli Railway on Urban Space in Sirkeci Neighbourhood Through Archival Documents

The word "expropriation" means the taking of buildings, land, facilities, etc., from their owners for a price and making them public property. This was inevitable when the Rumeli railway was being built. The construction of the Sirkeci-Yedikule line required the demolition of many buildings along this route.

A commission was established under the chairmanship of Ethem Pasha, Minister of Nafia, for the expropriation works (Engin, 1993). Table 3 gives some examples of documents related to the Rumeli Railway expropriations identified as a result of the studies conducted in the Turkish Republic Presidency State Ottoman Archives (OA).

Documents taken from OA are given with their fund numbers. These documents have been selected to shed light on the study in general terms and show that the payments of the expropriation fees to be made for the construction of the Rumeli Railway (Table 3) were made from the State Treasury and that the execution was carried out by the Ministry of Public Works of the period. In addition, when the date intervals are examined, it is understood that some expropriation fees were made long after the construction of the railway. In this context, it can be interpreted that the Ottoman Empire, suffering from a shortage of funds, had some difficulties in paying these fees.

Another set of archival documents provides important information about the expropriations. The document states that the Ministry of Nafia and the construction company prepared a plan together on the line extending from

Table 3. Table with examples of documents related to railway expropriations from OA. (Ottoman Archives, 1873d; Ottoman Archives, 1892; Ottoman Archives, 1904)

Fund Code	Location Number	Date	Document Summary
A.}MKT.MHM.	456/64	H. 15.04.1290/ M. 12 June 1873	Notification to the Ministry of Nafia to discuss the payment by the Treasury of the cost of the real estate and lands purchased at Sirkeci Pier and Kumkapı for the Rumeli Railway line.
BEO	126/9393	H. 01.06.1310/ M. 21 December 1892	Payment of land compensation to individuals who owned real estate on the Rumeli Railway construction (Finance; 9393).
BEO	2384/178772	H. 24.05.1322/ M. 6 August 1904	Payment of Ovadis Arakliyan Efendi, a subject of the Austrian State, for the land expropriated for the Rumeli Railway at Sirkeci Pier (Finance; 177546).

Yedikule to Sirkeci, and that a commission was established by the Şehremaneti on R. June 1287 (M. June/July 1871) with a budget of 400,000 Ottoman liras provided by the Ministry of Finance, and that the expropriations of private and state properties coinciding with the railway line were carried out. It is also written in the document that the commission recorded the expropriations made in the books and marked them on the map, and the lands that did not coincide with the railway line were sold to their suitors after the expropriations were completed. It is understood that the records of expropriations were kept by a special commission established by the Şehremaneti, and that this commission determined the houses on the route where the line would pass and recorded them on the map. Some of the expropriations were found to be excessive when they did not correspond to the route of the line. As a result, some of them were sold to their suitors by the commission established. The rest were either exploited by the locals or used by the railway company, as it is understood from the documents (Ottoman Archives, 1889).

When the maps of Ekrem Ayverdi (1970) and Goad in the Sirkeci district are overlapped with the documents, the existence of the streets in the documents is clearly seen (OA, Evd. 4525). The expropriated buildings include a variety of buildings such as mansions, plots of land, fountains, and mosques. According to a document in the Ottoman Archives, Daye Hatun Mosque, Emir Mosque, and Elvan Mosque were also expropriated during the construction of the railway (Ottoman Archives, 1873c). In addition to these, the İncili Pavilion and Yalı Pavilion, important palace buildings, were also demolished. The Botanical Garden belonging to the Topkapı Palace in Gülhane was also moved from there.

Ottoman Monumental Buildings and Fountains Demolished/Expropriated in Sirkeci for the Construction of the Railway Through Archival Documents

The construction of the Rumeli Railway started in 1869, with the permission of Sultan Abdülaziz. During the construction of the railway line, Sirkeci and Yalıköşkü at the eastern end of the Golden Horn Walls; at the same time, all of the coastal palaces on the walls surrounding the Topkapı Palace from the sea direction were destroyed except for the Sepetçiler Pavilion (Semiz, 2014).

The Ekrem Hakkı Ayverdi map and the documents from OA corroborate each other. It is understood that monumental buildings such as the Yalı Pavilion factory, the Daye Hatun, Emir, and Elvan mosques, as well as the Botanical Garden of the Mekteb-i Tıbbiye in Hasbahçe located in the garden of the Topkapı Palace, were on the route of the expropriations to be made for the Rumeli Railway, and therefore, decisions were taken to move them to different locations. As can be seen from the dates of the documents, the expropriations were carried out in quick succession (Figure 8, Table 4).

Yalı Pavilion (Cebeci Pavilion) and Yalı Pavilion Factory

Yalı Pavilion was located in Sirkeci, in the Eminönü district, where the walls of Topkapı Palace reached the Golden Horn. Yalı Pavilion (also known as Cebeciler Köşkü) or Yalı Kasr-ı Hümayunu, which was built in 1592 in the last years of the reign of Murad II (1574-1595), replacing a pavilion

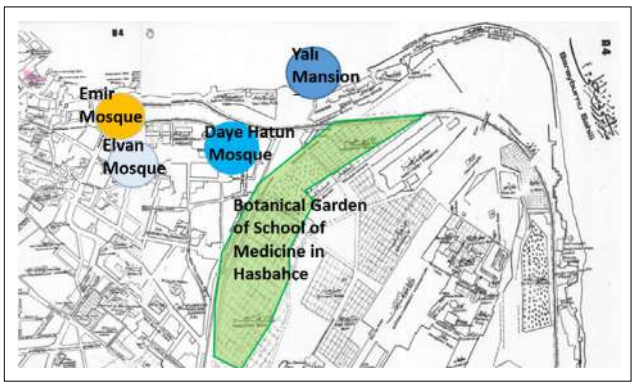


Figure 8. The main monumental buildings and Topkapı Palace Botanical Garden expropriated on Ekrem Hakkı Ayverdi's map.

Table 4. Archival documents of the main monumental buildings expropriated in Sirkeci. (Ottoman Archives, 1873a; Ottoman Archives, 1873b; Ottoman Archives, 1873c; Ottoman Archives, 1874a)

Fund Code	Location Number	Date	Document Summary
A.}MKT.MHM.	449-61	H. 10.1.1290/ M. 10 March 1873	Production is shifted to Zeytinburnu and Tersane-i Amire factories, and Yalıköşkü, the factory and the surrounding land are handed over to the Rumeli Railway Company.
A.}MKT.MHM.	451-55	H. 05.02.1290/ 4 April 1873	Evacuation of the Yalı Pavilion Factory, which was allocated for the Rumeli Railway.
A.}MKT.MHM.	456-38	H. 12.04.1290/ M. 9 June 1873	Daye Hatun, Emir and Elvan mosques were demolished during the construction of Sirkeci station of Rumeli Railway.
A.}MKT.MHM.	472-15	H. 18.11.1290/ M. 30 December 1873	Due to the overlap of the Botanical Garden of the School of Medicine in Hasbahçe with the Rumeli Railway line, the plants and trees in this garden were transferred to the botanical garden of Galata Palace.

first built by Beyazid II (1481-1512) and was the closest palace structure to the harbor, played an important role in the political history of the empire and the ceremonial life of the palace. Yalı Pavilion was one of the most picturesque pavilions on the shores of Sirkeci and Sarayburnu. In the drawings of Topkapı Palace by foreign artists, the porticoes are depicted with crowds watching the navy in the harbor in front of their very wide canopies and curtains. The pavilion was externally square with a lead-covered roof and a small dome in the center of the roof (Figure 9, Figure 10). There was a portico around the building resting on marble columns 3 meters apart. A large hall was entered through the portico.

There were palace houses around Yalı Pavilion and Sepetçiler Pavilion, which were very close to each other.

In the history of Tayyarzade Ata, it was recorded that in the 19th century, civil servants worked in this neighborhood and there was a department related to the construction and repairs of the palace.

In the first quarter of the 19th century, Bostancıbaşı Notebooks show that there were many large residences on the coast between Yalı Pavilion and the customs in Eminönü. Yalı Pavilion was demolished during the construction of the Rumeli Railway (Kuban, 1994).

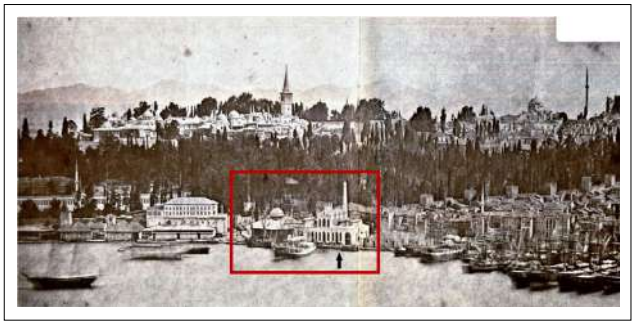


Figure 9. Yalı Pavilion (not yet demolished) and the Machinery Factory, photographed by James Robertson (1853-1856) (Eldem, 1979).

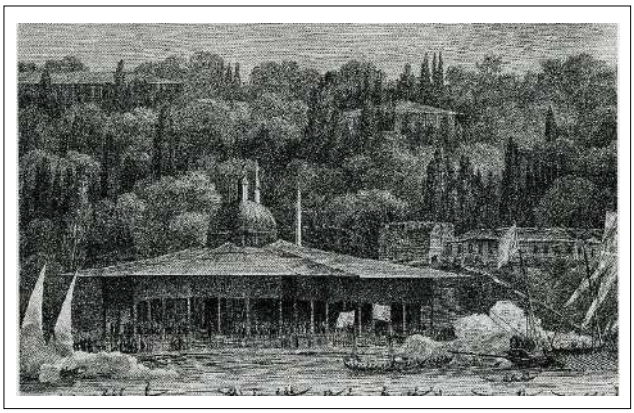


Figure 10. An engraving of Choiseul Gouffier depicting the Yalı Pavilion (Soyluer, 2017).

The Yalı Pavilion Iron Factory was established in 1850 to ease the burden of the iron and steel industry in Zeytinburnu as a product of the industrialization initiatives that intensified during the reign of Sultan Abdülmecid (Figure10). Due to the Crimean War, which broke out during the production activities in the factory, the factory was transformed into a repair workshop and a machine factory where steam engines were manufactured in order to carry out maintenance and repair operations of the ships belonging to the allied navy damaged during the war. When the Yalı Pavilion Iron Factory was converted into a machine factory, a state-owned iron factory was established in Galata in 1856 to fill the shortage in this field. The British Government put the factory up for sale at the end of the Crimean War, and the Ottoman Empire bought this strategically important factory. The machinery and parts of the steamships of the Ottoman navy began to be manufactured and repaired there. The factory compound was transferred to the Rumeli Railway and demolished in 1873 (Figure 11), (Soyluer, 2017).

Şevkiye Pavilion (Serdab Pavilion)

Serdab Pavilion was built between 1789-1791 by Sultan Selim III for his mother Mihrişah Valide Sultan, replacing the Şevkiye Quarry that was previously located there (Figure 12, Figure 13). The pavilion is also referred to as "Serdab Pavilion" and "Yeni Pavilion." The pavilion was destroyed

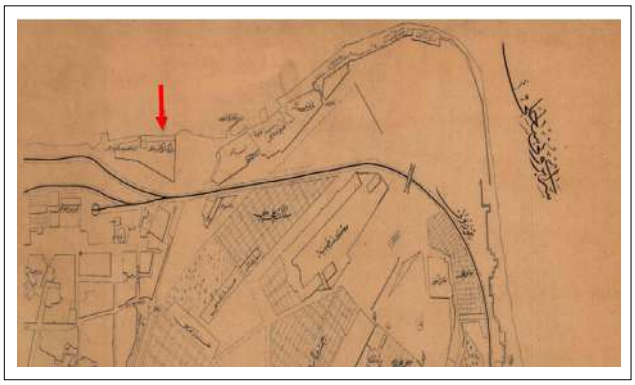


Figure 11. A map from 1875 showing the current state of the Yalı Pavilion Machinery Factory after the railway line passed through (Soyluer, 2017).

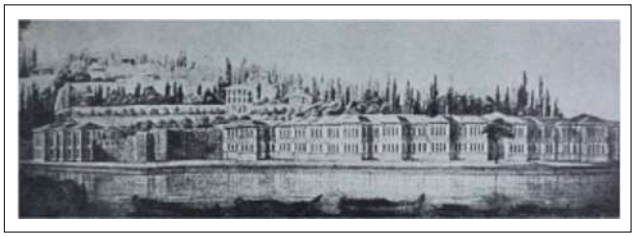


Figure 12. 18th-century view of Şevkiye Pavilion from the coast (Eldem, 1969).

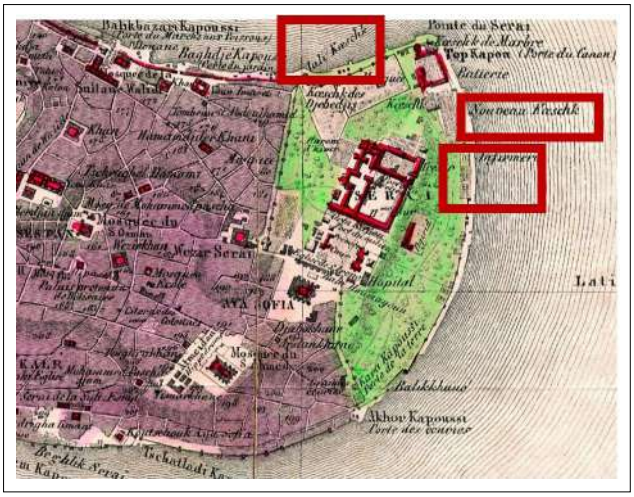


Figure 13. The pavilions on the coastline can be seen in the Kauffer et Joseph de Hammer 1836.

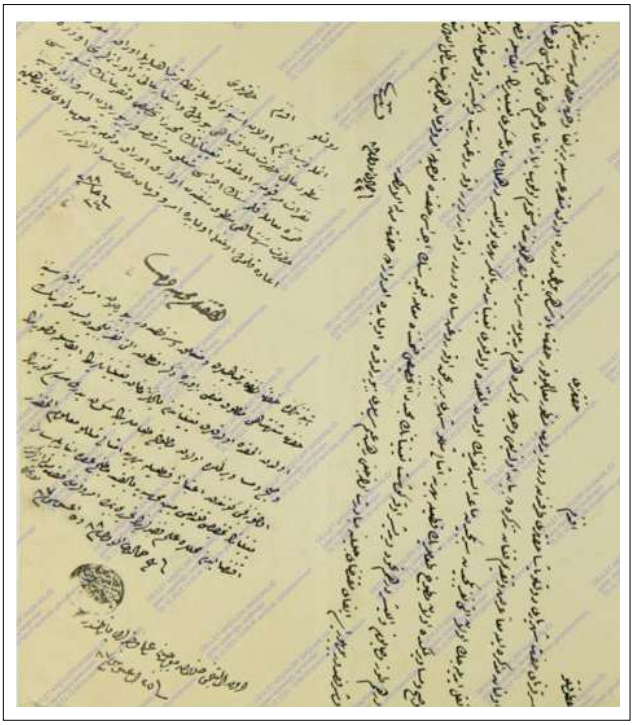


Figure 14. Ottoman document proving that Şevkiye Pavilion (Serdab Pavilion) was demolished for the Rumeli Railway (Ottoman Archives, 1871b).

during the construction of the railway line passing through the Palace grounds in 1871 (Tanman, 1994). Located next to the Topkapı Coastal Palace in Sarayburnu, Eminönü district of Istanbul, this pavilion was built by Valide Sultan, the mother of Sultan Selim III, between 1789-1791. This pavilion was named Şevkiye Pavilion because of the Şevkiye Quarry, which was previously located there. It was also known as Serdab Pavilion and Yeni Pavilion.

Şevkiye Pavilion was built on the walls of Marmara and consisted of a wooden-walled floor and a basement with masonry walls. It is believed that the pavilion was built in the form of a divanhane with an iwan, which is common in Ottoman civil architecture. The divanhane, which extends on the east-west axis, had an elliptical plan and was covered with a dome. It also had a rectangular iwan. It can be seen that this dome was hidden under the lead hipped roof of the pavilion. On the south side of the hall, behind a small gap, there was a room belonging to the sultan and a symmetrical room to the valide sultan. These two rooms were separated from the main hall by protruding forward from the façade. Small rooms were also placed between these parts of the pavilion, which has a plan type with three iwans. The basement floor had a marble floor, and it is learned from the notes of travelers that there was a pool with a fountain in the middle and fountains connected to it.

The pavilion was named Serdab, and people from the harem went there to cool off in the hot summer months (Eldem, 1969). It was demolished for the Rumeli Railway (Figure 14, Table 5).

İncili Pavilion

İncili Pavilion, one of the most important structures of the series of coastal pavilions, was located within the boundaries of Topkapı Palace (Figure 15, Figure 16). It was also known as Sinan Pasha Pavilion in historical texts. The chronicles of the period provide extensive information about the construction and opening of the pavilion. The

Table 5. The copy of the Ottoman document proving that the Şevkiye Pavilion (Serdab Pavilion) was demolished for the Rumeli Railway (Ottoman Archives, 1871a)

Fund Code	Location Number	Date	Document Summary
A.}HHİ	50-27	H-24-05-1288/ M.15 August 1871	Since the demolition of the Serdab Pavilion began due to the train passing through Topkapı Palace, the transfer and transfer of six guards assigned there to other pavilions, and the allocation of rations to them like their counterparts, since the other guards, except the sergeant, did not receive the rations they had received from the hand.

Figure 15. An engraving from the first half of the 19th century depicting the İncili Pavilion (Jouannin & Gaver, 1840).

Figure 16. The substructure of the İncili Köşk that survived to the present day.

pavilion, built by the architect Davud Aga, shows that the style of Mimar Sinan continued in Ottoman architecture (Figure 17). Semavi Eyice wrote about the demolition of the Pavilion, "...When it was planned to bring the Rumeli Railway to Sirkeci, Abdülaziz allowed the railway to pass right along the coast and through the garden of the palace. This permission led to the destruction of the Sinan Pasha Pavilion along with the pavilions and palaces on the coast..." (Eyice, 2000).

In addition to these buildings, the Emir Mosque, Daye Hatun Mosque, and Elvan Mosque in Sirkeci were expropriated, and the botanical garden of the School of Medicine in Hasbahçe was also moved (Figure 14). According to a document dated 12 June 1906 in the archive regarding the transfer of the plants and trees of the botanical garden of the School of Medicine in Hasbahçe (Ottoman Archives, 1874b) to the botanical garden of Galata Palace due to the overlap with the Rumeli railway line, it is understood that not all of the plants in the Topkapı Botanical garden were actually moved to the garden of Galatasaray Sultani.

طوپ قاپی سرایندہ :

ایجیلی کوشك

طوپ قاپی سرایینك سورلری اوزرندہ پایلان (ایجیلی کوشك) عجری اونجی عصرده پك معروفدی . بنائك معماری ، دورلك بویوك معمارلرندن داود آغالیدی. اوچنجی مراد ، آخور قاپی اسکله‌سی جوارنده « دریا سیری » ایچین وزیر اعظم سنان پاشادن برکوشك ایسته‌دی . سنان پاشا ، « سر معماران عالم داود آغا » یی چاغیردی . کوشکك انشاسی ایچین لزومی

سنان پاشانك یاپدیردیغی ایجیل کوشك

(زوالدن ، تورکیه)

اولان مالزمه‌یی کندی تدارك ایتدیردی . مصارفی کندی یاپدی . آز برزمانده کوشك اکمال ایدلدی (۹۹۹) . زمانك استادلری معرفتیله کوشکك داخلی و خارجی تزییناتی اتمامه چالیشدی . کوشکك ایچریسی کاشی کار ومقرنس حلکاری زراندود نقوش ایله تزیین اولوندی . « حریر قالیچه‌لر ودوخته نهالیلر وزراندود زوالیلر وجواهر ومروارید ایله مرصع و مجوهر طوپ آویزه‌لر و آینه‌لرله » کوزلر قاماشدیراجق بر حاله کتیریلدی . قبه‌سنه قوناں یالدیزلی علملر اوزاقدن کوزلری قاماشدیریوردی .

— ۱۱۹۷ —

اوچونجی مراد کوشکی حیرتله سیرایتدی :

— تولیدی ، شو قصر سرای عامره داخلنده یاپیلمش اولیدی ؟

دیدی . فی‌الحقیقه ، سرایك ایچنده بویله متفرق بنالر وکوشکلر واردی . تکمیل سرای پرومنتظم بریلان اوزرینه یاپیلمامشدی.

اوکون ، صدراعظمه اوچ ، قپودان پاشایه ایکی ، معمار داود آغا ایله شهرامینه وصدر اعظم کتخداسنه ، آغالره وسائره‌یه برر خلعت کیدیریلدی .

اوچونجی مرادك اوکنه ، کشاد وسمنده سرپیلمك ایچین آلتون وکوموش تپسیلر دولوسی آلتون وجیل آچه کتیریلدی .

Figure 17. Ottoman newspaper article on the history of the Incili Pavilion. Milli Mecmua. (1926).

Railway Construction and Byzantine Monumental Buildings in Sirkeci

Bukoleon Palace

Bukoleon Palace was a coastal palace right next to Ss. Sergius and Bacchus Church (now Küçük Ayasofya Mosque) in the Çatladıkapı region of the historical peninsula, between

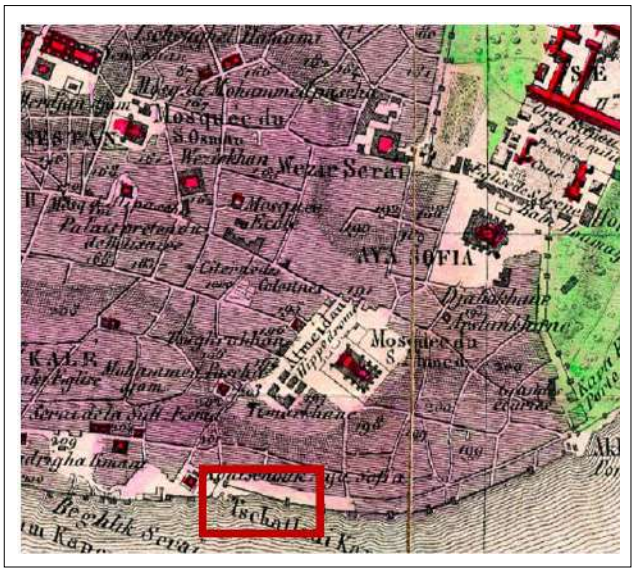


Figure 18. Bukoleon Palace on the coastline can be seen in (Kauffer et Joseph de Hammer, 1836).

Figure 19. Marmara Walls / Bukoleon Palace and the plan showing the intersection of the remains of the city walls and other structures extending to Çataltıkapı in the west with the railway (Mamboury & Wiegand, 1934).

Figure 20. The current situation of Bukoleon PalaceIstanbul Metropolitan Municipality, Directorate of Cultural Asset Projects Archive, "Bukoleon Palace Museum and Restoration Application Work for the Years 2020-2021" Work.

today's Kumkapı and Cankurtaran neighborhoods (Figure 18). The western part of the palace was destroyed during the construction of the railway (Figure 19).

A comprehensive excavation and cleaning work was carried out at Bukoleon Palace within the scope of the "2020-2021 Years Bukoleon Palace Museum and Restoration Implementation Work" of the Istanbul Metropolitan Municipality (Figure 20). In this study, the filling made for the Rumeli Railway was identified. It can be seen that the filling was supported by sleepers used in the railway (Figure 21). This is the most striking example of the fact that many Byzantine structures were under the embankment during the construction of the railway (Figure 22).

Effects of the Rumeli Railway on Land and Sea Walls

The construction of the Rumeli Railway caused serious losses to the Sea Walls. During the construction of the

Figure 21. The current situation of Bukoleon PalaceIstanbul Metropolitan Municipality, Directorate of Cultural Asset Projects Archive, "Bukoleon Palace Museum and Restoration Application Work for the Years 2020-2021" Work.

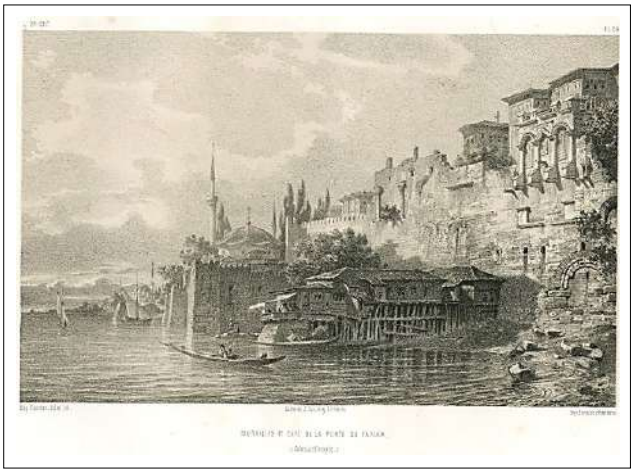


Figure 22. Bukoleon Palace (Eugene Flandin, 1853).

railway line, which runs parallel to the Marmara shore and ends in Sirkeci after passing through the outer garden of the Palace, the Marmara Walls in Yedikule, Samatya, Davutpaşa, Yenikapı, Kumkapı, Çatladıkapı, Sarayburnu sections, and around Sirkeci and Yalıköşkü at the eastern end of the Golden Horn Walls, experienced serious losses (Ahunbay, 1994).

Expropriations for Rumeli Railway in Sirkeci District Through Archival Documents

Sirkeci, one of the most important districts of the historical peninsula, is surrounded by Bahçekapı in the west, Sarayburnu in the east, and Cağaloğlu in the south. Historically, it has held great commercial and social importance, first because it is close to the port, and later, due to the construction of Sirkeci Train Station. This study aims to better understand the physical changes of the city together with the economic and social effects of the expropriations made for the railway. The physical transformation of the Sirkeci region as a result of the expropriations made with the arrival of the Rumeli Railway has been analyzed by overlapping the archival documents and the maps of the period.

In the Ottoman state, property within the walls (on the historical peninsula) was either state or foundation property. The only way to ensure the continuity of the lands and structures owned by transferring them from generation to generation was possible with the establishment of foundations. For this reason, all of the buildings in the historical peninsula were built under a foundation. In Ömer Lütfi Barkan and Ekrem Hakkı Ayverdi's book titled "Istanbul Vakıfları Tahrir Defteri 953:(1546)", it is stated in relation to foundations that "...The foundation system, which provided continuity and validity for centuries (until doomsday), was preferred by Grand Viziers, Pashas, and wealthy people who took part in the administration because it provided legal opportunities to family members (partly preventing state intervention). A foundation was a kind of public sharing and secret ownership. For this reason, there was not a single point or a single square meter of land in the historical peninsula that was excluded from the foundation system..." (Barkan & Ayverdi, 1970).

For this reason, in all of the expropriation documents examined, all properties such as mansions (houses) (called menzils in archival documents), mansions, bathhouses, shops, and lands belonged to a foundation and were either used by the owner of the property or were made available for rent. In this section, while keeping track of the disappeared and existing buildings, we will also examine how much money was spent on the expropriations, how much land was expropriated, and the situation of the inhabitants living there. The main source to be used to investigate funding is the documents in the Presidential Ottoman Archives. Before moving on to these documents, it would be useful to examine the terms used in the documents and their meanings.

Gedik was a concession granted in the Ottoman period for a specific matter. Rights and privileges were granted to craftsmen in particular to enable them to trade and practice their trades on their own (Ayverdi, İ., n.d.). It was the license to trade and practice art. The term gedikât, on the other hand, was coined by adding the plural suffix -at to the word gedik in Ottoman Turkish and means gediks. Another term that needs to be emphasized is menzil. The Arabic word menzil has various meanings, and there are many words derived from menzil. The word menzil, which is relevant to the study, means "mansion" (Pakalın, 1993). Another word that appears frequently in the documents is ferag, an Arabic word meaning “to give up” (Ayverdi, İ., n.d.). In the archival documents, it is used in the sense of “relinquishing ownership of places taken in return for a certain fee.” We will often see all these terms in examined archival documents for this study.

For a better understanding, it would be useful to clarify the financial power of the kuruş mentioned in the texts. As is well known, the purchasing power of the kuruş, which was introduced as the basic Ottoman currency of large-sized silver coins in the early 18th century, was greatly reduced after the rapid process of adulteration and inflation. From the first quarter of the 19th century onwards, the kuruş should be considered as a small currency used in daily exchanges. For example, in the second half of the 19th century, the price of 1 okka (1.283 kg) of bread varied between 1 and 2 kuruş in different regions (Ayverdi, İ., n.d.). In the 1870s, as silver became more abundant around the world and its value fell against gold, many European countries abandoned the bimetallic monetary system and adopted the gold standard. The Ottoman Empire also moved to abolish the bimetallic monetary system in 1879. After this date, the minting of silver piastres decreased drastically, but the use of silver piastres continued for payments to the state. For this reason, the late Ottoman monetary system can be characterized as a "lame mikyas" based on the gold lira and to some extent the silver kuruş. The currency based on the parity of 100 kuruş=1 lira was maintained in the Republican period. However, the purchasing power of the kuruş declined further due to rapid inflation, especially during World War I and II. Finally, in the hyperinflationary environment of the 1970s, the kuruş lost its status as a currency that could be used in daily transactions (Pamuk, 2002). In this case, to put it more simply, 1 Ottoman Lira is 100 Kuruş. Payments in currencies indicate that expropriations and rent payments were made cheaply. Because if we consider that 1 bread is 1 kuruş, it is meaningful that the rents are 9 kuruş in general and the state has paid a minimum of 450 kuruş and a maximum of 250,000 kuruş for expropriation.

Table 6. A selection from a document from OA, indicating street names, door numbers, foundations, and property type. (Ottoman Archives, 1887a).

Location	Rent	Cost
1. Sheikh Ebu El-Vefa Trustee Sofu Mehmet Efendi Foundation And Menzil Plot Number 29 In HiSar Street; SaliH Efendi Bin Osman (Osman Oglu Salih) From Financial Scribe (Clerk)	9 kuruş	35.000 kuruş
2. Coal Shop Numbered 7 On The Coal Shop Street From Harameyn Gedikat; Coal Shop Süleyman Aga Waivered his power of attorney.	12 kuruş	23.700 kuruş
3. Charcoal Shop At Number 12 On The Street Of The Evkaf GediKatindan Kömürcü; Abdülkerim Bin Mustafa Transfer	6 kuruş	10.200 kuruş
4. Barber shop number 9 on Çatladikapi Street from Harameyn gedikat;	3 kuruş	7.500 kuruş
5. A Barber Shop Numbered 13 In İskele Square From Harameyn Gedikati; From Hüseyin Aga And Hatice Hanim feragi.	6 kuruş	30.200 kuruş
6. harameyn gedikati, charcoal shop number 1 on kömürcü street; hüseyin aga feragi	6 kuruş	26.800 kuruş

Some document examples of Rumeli Railway expropriations identified as a result of the studies carried out in archival documents are included, and the tables are analyzed in line with the study (Table 6).

These documents concern the abandoned or dilapidated mosques and fountains from Sirkeci to Narlıkapı Pier. The most important detail that stands out is that these structures, which were destroyed after the fire, were demolished for the

Table 7. The Ledger of the list of mosques and charities left to the railway in Sirkeci District (Ottoman Archives, 1887b)

Document Summary: A book listing the mosques and charities abandoned for the Rumeli Railway, from Sirkeci Pier to Narlıkapı.

Location Information: 34181 -

File Attachment:

Document Date: H-9 -03-1305 M.1887

Located in the Elvan Neighborhood in Hoca Pasha:

Destroyed **(burnt)** Yusuf Pasha Fountain

Destroyed **(burnt)** Bostanci Başı Madrasah

Destroyed **(burnt)** Fountain from Sultan Suleiman Khan Foundation

Located in Cankurtaran neighborhood in Ahırkapı:

The Şadırvan Mosque and the masonry water treasury underneath it (cost 186 kuruş), which was present and intact, were demolished and given to the railway line.

The waterway of the fountain outside Ahırkapı: while the water of the fountain was flowing , while it was present and intact, was deteriorated.

Fountain in the vicinity of the Şadırvan Gate: While it was an existing and well-built building with running water, it was demolished and connected to the railway line.

Located in Akbıyık neighbourhood in Ahırkapı:

Wooden fevkani (elevated) Akbıyık School, a tekke (lodhe) under it, a coffin, a fountain, and its other furnishings (others) (price 181 kuruş):

While it existed and was in good condition, it was demolished and went to the railway line.

Located in the neighborhood of Kapı Ağsi Mahallesi:

The garden of Cıgalzade Foundation's trustee - meşruta household in Kapıagası neighbourhood (price 1308 kuruş)

Located in Ayasofya-i Sagir (Little Hagia Sophia) neighbourhood:

A masonry madrasah in the vicinity of the aforementioned mosque: while the madrasah was present and intact, eight of its rooms were demolished and the line was transferred to the railway.

The madrasa's laundry and coffin storage.

The mortuary school of the aforementioned mosque: While the school was existing and flourishing, it was completely demolished and the property was given to the railway line.

Rumeli Railway. After the Hocapaşa Fire, which caused the greatest damage in the region, it is thought that this was used as an advantage for railway expropriations. In addition, it is also known that the expropriation costs of those that were still standing but in a dilapidated and unusable condition were paid to the owners of the foundations (Table 7).

In the Hocapaşa Fire of 1865, 1007 buildings burned in the Sirkeci area. The boundaries of the Hocapaşa Fire coincide with the regions included in the expropriation documents (Figure 23). This raises the possibility that the buildings destroyed after the fire may have been expropriated under the pretext of the railway (Amicis, 1874, trans. B. Akyavaş, 1993).

Figure 23. A map showing the area impacted by the 1865 Hocapasa fire that took place in 1865 (Söğüt, 2015).

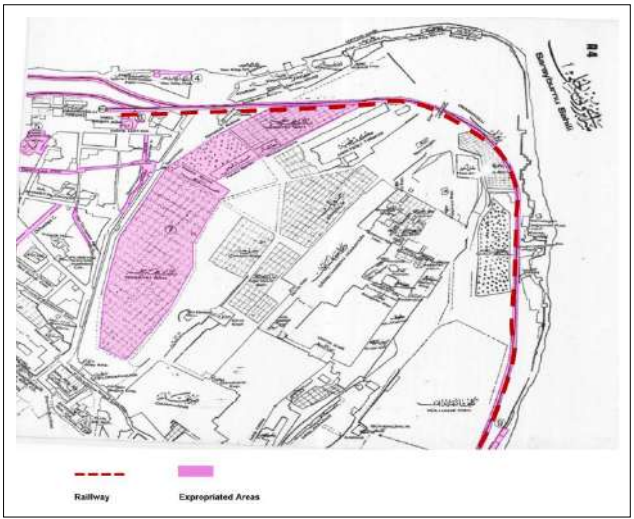


Figure 24. Marked streets and several monumental buildings that expropriated, identified from archival documents on the Ekrem Hakki.

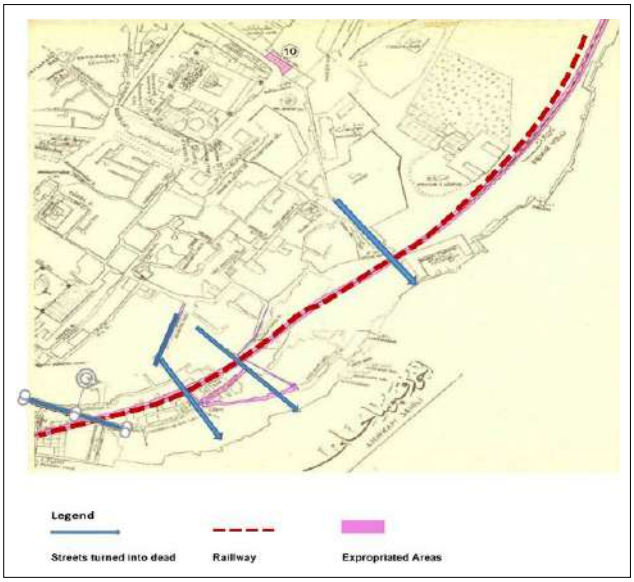


Figure 25. Streets turned into dead ends after the construction of the railway, identified by overlapping the Ekrem Hakki Ayverdi map and archival documents.

The list of streets where the expropriations were made, as a result of the overlapping of the Ekrem Hakkı Ayverdi map, a section of which is given in Figures 24-25, and archival documents, together with the plot numbers of the Ayverdi maps, is provided. As can be understood from this, dead-end streets were formed after the construction of the railway (Table 8, Table 9). These areas, which used to be avenues or busy streets, influenced the social life and demography of the neighborhood. The streets and avenues that cannot be identified on the Ayverdi map may have disappeared completely or their names may have changed. When we look at the expropriated buildings, they were demolished based on whether they were located on the route, without considering the function or the importance of the building. As it is known, neighborhoods developed around mosques during the Ottoman period. Based on this, the demolition of some mosques has led to the disruption of the perception and positioning of several neighborhoods.

In Table 10, we can clearly see the land and houses subject to expropriation, whose street, neighborhood, street number, and door number are determined from the documents; the most important detail of the document is that the property in question changed hands as a foundation and passed to a different foundation. This leads to the following questions: Was it intended that the properties, which were not demolished due to the construction of the railway, would gain value, and was it intended to be collected in one owner by certain individuals and foundations for the purpose of rent-seeking?

Table 8. The table of streets and several monumental buildings identified from archival documents on the Ekrem Hakki Ayverdi map.

District	Avenue - street	Ayverdi map no.
Sirkeci	Vezir iskelesi	B4
Sirkeci	Fabrika sokağı	A4
Sirkeci	Beşirağa cami	A4
Sirkeci	Darüsade ağasi sokak	A4
Sirkeci	Iskele sokak	B5
Sirkeci	Demir kapi yolu	A3-a4
Sirkeci	Izzet efendi sokak	B4
Sirkeci	Orhaniye	A4- b4
Sirkeci	Ismail ağa tekkesi	A3
Sirkeci	Demir kapi caddesi	A4
Sirkeci	Dolambaç(tulumbaci) sokak	B4
Sirkeci	Zone no. 1 vezir iskelesi	B4
Sirkeci	Zone no. 2 emircami-i şerif	B4
Sirkeci	Zone no. 3 vezir cami	B4
Sirkeci	Zone no. 4 yali köşk fabrikasi	A4
Sirkeci	Zone no. 5 elvan çelebi camii	A4
Sirkeci	Zone no. 6 daye hatun camii	A4
Sirkeci	Zone no. 7: school of medicine's botanical garden in hasbahçe	A4

Table 9. The new table of streets turned into dead ends after the construction of the railway, created by author from archival documents on the Ekrem Hakki Ayverdi map.

District	Avenue - street	Ayverdi map no.
Sirkeci	Bayram firin Avenue	A3
Sirkeci	Akbiyik Streer	A3
Sirkeci	Arabacilar Street	A3
Sirkeci	Mumcu Avenue	B3
Sirkeci	Toprak Avenue	B3
Sirkeci	Çatladi kapi Street	B3

The most exciting detail that emerges when the above table and the Goad Map dated 1904 (Figure 26) are analyzed and compared with the documents of the Presidency Ottoman Archives is that many of the buildings that appear to have been evaluated were not demolished. As mentioned in the previous table analysis, the idea that many of these condemnations were carried out for rent-seeking purposes is strengthened (Table 11).

CONCLUSION

In conclusion, it is evident that the construction of the Rumeli Railway within the scope of the study led to a major

Table 10. Records of the property belonging to foundations expropriated by the Rumeli Railway Line between Sirkeci-Narlıkapı (Ottoman Archives, 1887a)

District and Neighbourhood	Avenue and Street	Number Size	Real Estate Type	Old Foundation	New Foundation
1. Hevace Paşada Emir District	Aralık Zükağı	3	Field	Hacı Tevfik Efendi	Hacı İmam Meşruta Fatma Hatun
2. Hevace Paşada Emir District	Aralık Zükağı	3	Field	Hacı Tevfik Efendi	Hacı Zeyneb Hatun Medresesi
3. Hevace Paşada Emir District	Emir Cami Şerifi	1	Mosque	Mahur and Şekibe	Kilon Ali Paşa
4. Hevace Paşada Emir District	Emir Cami-i şerifi	3	Mosque	Müezzin Eyüb Efendi and wife	Kilon Ali Paşa
5. Hevace Paşada Emir District	Emir Cami-i şerifi	3	Mosque	Müezzin Eyüb efendi and children	Kilon Ali Paşa
6. Hevace Paşada Emir District	İskele and İzzeddin	15 and 6	House	Fodlacı İbrahim Ağa	Merzifoni Kara Mustafa Paşa
7. Hevace Paşada Emir District	Emir cami-i şerifi	5	Field	Fatıma Hanım	Hadice Hatun binti Ferhad
8. Hevace Paşada Emir District	Emir Cami-i şerifi	9	House	Hafız İsmail efendi	Hadice Hatun binti Ferhad
9. Hevace Paşada Emir District	Emir cami-i şerifi	2	Field	Abdi Rıfat and Yusuf Cemal	Hamdullah Paşa
10. Hevace Paşada Emir District	Emir cami-i şerifi	6	Field	Tebadan Mustafa Ağa	Defterdar Harir bey

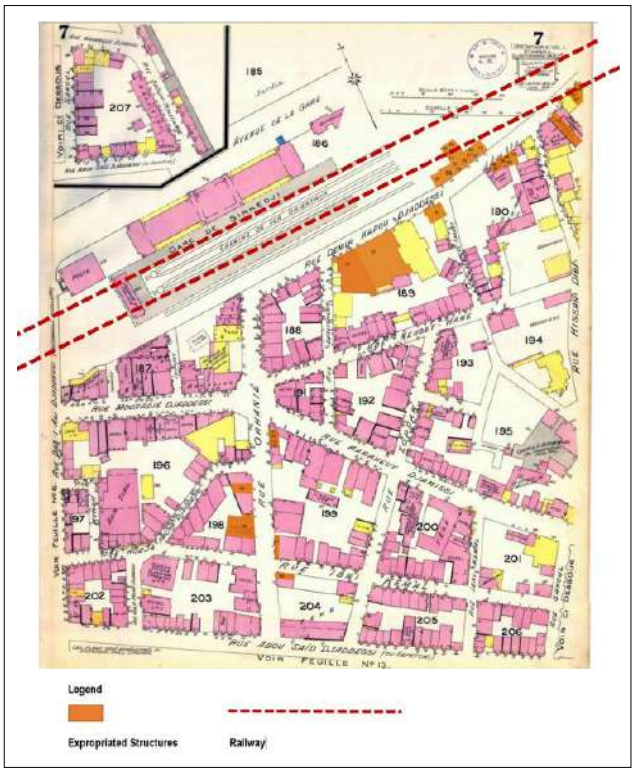


Figure 26. Overlay with the Goad map of 1914 showing the archival documents overlaid on the Goad map.

physical transformation within the city walls. The streets leading to the harbor gate before the expropriations were cut off due to the expropriations, sometimes becoming dead-end streets and sometimes disappearing altogether. The expropriations that started in 1871 and the subsequent efforts to distinguish the remaining properties continued until the end of the 1890s. Although it was known where the railway route would pass through, it is open to debate whether the issue of expropriation was abused for rent-seeking purposes because the right decisions were not taken about the properties to be expropriated. Additionally, the construction of the railway, which was a joint work of the private and public sectors, gives an idea about how the tendering processes carried out by the state worked.

- With the extension of the Rumeli Railway into the city walls, most of the streets that opened directly to the shore or the bottom of the city walls just a year ago were closed and became dead-end streets.
- The building islands were cut off by the railway, and the courtyards of the building islands, which had a contiguous order and continuity, were opened to the outside and became small squares or dead-end streets.
- The technical deficiencies in the construction of the railway led to serious infrastructure problems. Floods caused by rainfall destroyed the railway tracks, and wooden crossings were washed away by the current.
- The extension of the Rumeli Railway into the city walls caused controversy during the period regarding the protection of historical monuments. For the construction of the line, many buildings had to be demolished between Sirkeci and Yedikule. The objections of those whose houses were expropriated were not met by the state, but they were paid high expropriation fees despite very low rents.
- While the Ottoman Empire, which was trying to transform into a form of government that perceived the changing world and changing perspectives with modernization, published some articles in newspapers about the railway construction as an important breakthrough to attract the public's perception in a positive direction, humor magazines or independent publications of the period openly criticized the fact that the railway passed through the city walls or that the Ottoman economy, which was already in a bottleneck, made such an attempt due to both the large-scale concessions granted to foreign investors and the unnecessary length of the railway since the expropriations were covered from the treasury.
- Regarding the expropriation of property belonging to the foundations, a significant portion of the structures scanned and identified on the map are far from the railway and are present in the Goad maps with the same door numbers, meaning that these structures were not demolished even if they were expropriated. This raises the question of whether there was an attempt to remove the non-Muslim population from the region.
- There are some documents identified in the study, which clearly show that the maps prepared for the expropriations of the period were lost and that the buildings were not demolished even though the expropriation fee was paid. This is another indication that this great initiative of that period was improper.
- The expropriation costs of the property belonging to the foundations were paid from the state treasury. This situation dragged the Ottoman Empire, which was already experiencing an economic collapse, into an even greater economic crisis.
- It can be observed that newspapers and periodicals of the period published news in favor of the state both with and without istibdat (censorship). While the Ottoman Empire, which was trying to transform into a form of government that perceived the changing world and changing perspectives with modernization, made some news in the newspapers about the railway construction as an important breakthrough to attract the public's perception in a positive direction, in the humor magazines or independent publications of

Table 11. The new table created by author based on archival documents overlaid on the Goad map.

District	Avenue - Street	Goad Map No	Plot No	Door No
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	24
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	189	45-43-41
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	190	21
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	189	39
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	25-27
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	189	33
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	27
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	3
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	19
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	5
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	190	17
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	11
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	29
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	23
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	190	25
Sirkeci	Rue Demir Kapou Djaddessi (Demir Kapi Avenue)	7	-	31
Sirkeci	Rue Orhanie (Orhaniye)	7	198	9
Sirkeci	Rue Orhanie (Orhaniye)	7	198	15
Sirkeci	Rue Orhanie (Orhaniye)	7	198	7
Sirkeci	Rue Orhanie (Orhaniye)	7	204	4
Sirkeci	Rue Orhanie (Orhaniye)	7	199	6
Sirkeci	Rue Orhanie (Orhaniye)	7	199	20
Sirkeci	Rue Orhanie (Orhaniye)	7	199	20
Sirkeci	Rue Orhanie (Orhaniye)	7	199	22

the period, criticisms were clearly stated about the railway passing through the city walls or the Ottoman economy, which was already in a bottleneck, due to the large-scale concessions granted to foreign investors and the unnecessary length of the railway since the expropriations were covered from the treasury.

- Among the information and documents that shed light on the conservation understanding of the period, many documents have been found regarding the expropriation and demolition of coastal palaces, but no documents have been found regarding, for example, the fact that the Rumeli Railway half demolished the Bukoleon Palace, a very important Byzantine structure, or the losses incurred in the Byzantine Sea Walls and important city gates. A search of the documents of the Ottoman archive of the Prime Ministry reveals only some written documents on the transportation of the excavated artifacts, which raises questions about their fate.

NOTES

[1]This article is derived from Yıldız Technical University Graduate School of Natural and Applied Sciences, Department of Architecture, Surveying, and Restoration PhD Program, PhD dissertation entitled Evaluation of the Physical Change on the Historical Areas of the City in Istanbul from the Beginning of the 19th Century to the Beginning of the 20th Century with its Background and Effects, The Case of Rumeli Railway.

[2]This is the abbreviation in all original archival documents.

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Article

Spatial dimensions of literature: Ethnographic codes for the ''Prag'da Günler (Days in Prague)'' story by Nedim Gürsel

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ABSTRACT

The city, with its social, cultural, physical, and geographical features, can be represented narratively on the axis of interpretations and fictions of reality or imagination. The ethnographic codes of city narratives are physical, structural, and social. They represent the city in various ways and contribute to knowledge in architecture. The research question of this article is, 'Could architecture be reinterpreted through ethnographic narratives of the city?' This question points to a vibrant field of study that investigates the importance and originality of the article and the spatial dimensions of literature. The article addresses a more nuanced perspective on relationships between travel writing and ethnography from a literary approach to narrative analysis and architecture. The article analyses the architectural elements in a literary narrative through qualitative research. It aims to ethnographically examine the story of Prag'da Günler, which emphasizes a European city. Karen O'Reilly's ethnographic method is used for the ethnographic analysis of this story. The ethnographic approach also aims at a certain understanding and appreciation of the spatial dimensions of the literature in the case of Nedim Gürsel. As a result, seeing the city as a writing activity at the intersection of architecture and narrative makes the potential of narratives viable in the reproduction of the city.

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INTRODUCTION

Architecture comprises interdisciplinary relations and incorporates literary and theoretical genres in the expression of architecture, establishing a significant relationship with the narrative aspect of architecture. Architecture and literature are artistic fields that emerge, exist, and sustain with sociality. All realities that exist in the social environment are directly reflected in literary works and the field of architecture. However, both architecture and literature are related in their contexts as part of the social environment (Güner & Gökmen, 2020).

One of the intersections of architecture and literature is the combination of design and creation, in other words,

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the design process rather than the completed products. When looking at the history of architecture, it is possible to see examples such as how architecture and literature have been and continue to interact. For instance, architect and writer Matteo Pericoli (2018) brings together the author candidates in the writing program at Scuola Holden in Turin, Italy, and the architecture students at the Columbia University School of Art in New York, America. The program aims to bring new perspectives to the minds of the writer candidates of the architectural culture that designs around a 'void' (Hacıömeroğlu, 2017).

Even if most of them are fictional, texts that have witnessed history carry many things that have disappeared over time in their memory. Novels, diaries, travelogues, biographies, essays, official documents, letters, and literary descriptions serve as part of the narrative and archives prepared for recording and bringing non-existent cities, societies, and buildings to the history and culture of architecture. Even today, many cities, buildings, and societies that have been destroyed because of wars, natural disasters, diseases, and passing time can be seen in the book pages (Hacıömeroğlu, 2017).

To understand how literature is related to other disciplines, it is needed to analyze the language, literary works, and writers involved. Space plays a crucial role in the relationship between literature and society. The space also influences the emergence of a particular group of literary works. Alongside architecture, literary work is also associated with ethnography. Literary work can be presented as a product of ethnographic field studies, and ethnography can be an identity sign in expressing the quality and content of the literary work (Kükrer, 2020). Learning about societies from literary works through ethnography is remarkable because it reveals the interest in literature. In this context, ethnography can also make it possible to produce architectural knowledge about societies.

Discussions of the 'structural' fiction of literature and the 'narrative' power of architecture analyze different qualitative methods and provide the basis for similar studies (Aravot, 1995; Psarra, 2009; Chatman, 1978). Therefore, this article focuses on the relationship between architecture and narratology and draws attention to the potentials of architectural criticism.

The aim of this article, which seeks to answer the question, 'Could architecture be reinterpreted through ethnographic narratives of the city?', is to discover the ethnographic codes that refer to the city as a narrative in a story. This article explores ethnographic codes in Nedim Gürsel's story *Prag'da Günler* (Days in Prague), based on the author's ethnographical expression of his genuine urban experience. Thus, this article aims to bring an architectural perspective to ethnography by exploring ethnographical city codes for the evaluation of architecture in experience-based narratives.

The method of this study, which takes place at the intersection of literature and architecture, fills an important gap with the ethnographic perspective it offers. In spite of the studies that generally focus on the concepts of space and place in the common ground of architecture and literature disciplines, this gap is filled by proposing instrumental codes and themes for observing the city, experiencing the city, and individual experience. The method is based on Karen O'Reilly's (2005) ethnographic analysis steps (Formulating a research question or hypothesis, Sample selection, Definition of themes, Development of a protocol for coding, Coding, and analyzing the results). The 5-step ethnographic analysis is associated with the steps of this article research and the theoretical framework of the method is created. As a result, especially in the fourth step of the ethnographic analysis, 'Development of a protocol for coding', the research material is divided into pieces, selected into conceptual units specific to the passage, codes have been categorized into code categories, relationships between code-category and ethno-category have been established, and the findings have been interpreted.

Exploring the spatial dimensions of literature is closely related to ethnography. The codes that form the basis of ethnographic analysis are shaped by observing and experiencing the city, and each study is unique. In this study, which is based on Nedim Gürsel's story Prag'da Günler, the presence of ethnographic codes in his narrative is tried to be made visible. In this context, the realities (real meanings and values) offered by the Prague city experience are revealed in the narrative with the established method. At this point, it is necessary to take a closer look at the relationship between Narrative, City, and Ethnography.

Narrative, City, and Ethnography

The narrative is a fundamental way for people to make sense of the world or shape the world (Cobley, 2014). The narrative works to organize the data of life into recognizable patterns, perceived as a representation of place and space (Cobley, 2014). According to Baak (1983), the spaces in the narratives are culturally defined and, therefore, variable; they are mostly openly associated with behavioral attitudes and value judgments (Jahn, 2005).

In his book *Signs Taken for Wonders*, Moretti (1997) explains the relationship between narrative and city according to various authors, based on data from the city: Park et al., (1925) stated that what is known about the insights of city life is essentially indecent to story and novelists. Park et al., (1925) and Auerbach & Said (1974) address that the connection between city and literature is penetrated through depiction from literature to city, from city to literature. The information about the city can be embedded in the event itself. To inform about the visual features of the city's architecture, the text has to stop the flow of events, suspend the story for a while, and depict the places and

spaces. But literary depiction is never a copy of anything else. It is a way of establishing and conveying meaning, a means of classification (Moretti, 1997). Cities function as centers where information flows, and where it is used, produced, and distributed in every period of time, and that it brings about spatial transformations and stories (Kaymaz Koca, 2015). The city is a spatial presence; each component, value, and meaning are embodied in objects, houses, and things that can be depicted and sorted in various ways.

According to its nature, narrative text rests on two possible approaches: content analysis and semiotic analysis (O'Reilly, 2005). As claimed by Scholte (1987), semiotic examination of the narrative shifts ethnographic interest from focusing solely on narrative structure or rhetorical tools to the effects of language on ethnographic analysis and explanation.

In 1871, the anthropologist Tylor (1871) defined ethnography in his book *Primitive Culture* as a complex whole that, when discussed in a broad sense of culture or civilization, included knowledge, faith, art, moral values, law, traditions, and other competencies and habits acquired by man as a member of society. The concept of ethnography as a complex whole may help literary works by being aware of culture, reconstructing the foundations upon which the work was built, and making it possible to relive that feeling (Greenblatt, 1990).

Brettell (1986) draws attention to the textual reflection of experience by stating that descriptions in ethnographies and travelogues are a mixture of observation, interpretation, and tendencies. In this context, texts are shown as a sign of the strong link between ethnography and literature. Denzin (1998) states that a social theory is also a theory of writing, and a theory of writing is also a theory of interpretive (ethnographical) work. Based on this, it is possible to say that the interpretive role of writing, the narratives of users/writers who rewrite the city by experiencing it, contains interpretation and ethnographical value. While literature, in which writing is of primary importance, focuses on the city, space, and place as the environment in which the event takes place; the observations, comments, and tendencies of the writer show the connection between ethnography and literature.

Wiles (2020) offers three approaches to the relationship between literature and anthropology. The first refers to the use of literary texts as ethnographic material, the second refers to the view of literary writers as ethnographers, and the third refers to the anthropological examination of literary culture and production practices as a subject. When evaluated through the author and ethnographer, the distinction between narratology and ethnography is somewhat artificial because, in many ways, they are quite similar. Both tend to form a distinction, consciously marginalizing themselves towards the cultures they define and alienating themselves to make the familiar strange and the strange familiar. They both describe the results of their observations and their thoughts about what they observed. Ethnographers who are clearer than novelists and novelists often benefit from the traditions and customs of writers before them (Angelis, 2002).

The ethnographer and the writer have a complex relationship within an ethnographic narrative. Ethnographic novels are of two types, written by a stranger or written by a writer who is in the culture. The writer who writes from within a culture does not have to be consciously anthropological, but in this particular kind of narrative, the writer intuitively touches the story, character, theme, environment, and style of the culture the writer emerges from (Angelis, 2002).

Space is not limited by acceptances and criteria; it is a living and variable organism that continues its adventure since its existence and continues its movement with social, cultural, environmental, and many other orientations. Thus, architecture comes into contact with many sciences, from sociology to anthropology, from geography to philosophy (Ulubay & Önal, 2020). The tools needed to extract data and perform spatial analyses of the data can now be created based on platforms that allow researchers around the world to create new ways for research and even, in some cases, address it (Alves & Queiroz, 2015). According to Lewis (1985), the interdisciplinary study of literary texts as narrative is beneficial because literature often includes both objective descriptions of space and subjective accounts of space, as well as information about spatial patterns and processes (Alves & Queiroz, 2015). The place for reading novels can be done to expand the narrative as material for understanding the daily life of man and to evaluate the 'sense of place' that drives the narrative. On the other hand, there are also differences between the place defined by scientific knowledge and the place related to experience and meaning (Queiroz, 2007).

Although the rhetoric of writing varies, it is not the stories created by the informers that are intended to attract attention, but the events (Rosenwald & Ochberg, 1992). Language is seen as transparent and reflects fixed, singular meanings. There is not a single method or technique for analyzing the narrative (Riessman, 1993). For example, narrative connects spatial representation with storytelling. Storytelling is a way of mapping and directing the writer's viewpoint and its readers in an understandable action in space. The storyteller creates the narrative with decisions such as determining the space to be represented, selecting the elements to be included, and drawing the scale. The literary space is, after all, a real material, geographical place imagined and represented by language (Tally, 2013).

As a result of writers correlating places with specific facts and events, narratives reflect the various processes of places in a social environment. Experiencing the city, and the place by visiting and incorporating the original

qualities of the place into a fictional narrative, emerges as a different representation of the social characteristics of the place. In addition to the lack of identity and quality concerns, narratives can also contain ethnographic references to the city, and place experienced. Narratives shaped by the writer can be transformed into materials in which social, cultural, and spatial knowledge brought by the experience is processed. Thus, it is meaningful for architecture to use ethnographic codes in analyzing the narrative in this article.

The City in the Narratives of Nedim Gürsel

Nedim Gürsel is a writer who has had a dynamic relationship with the city throughout his life. The author moved away from his hometown with his family and relocated to a different provincial city. He attended Galatasaray High School as a boarder, which exposed him to urban life at a young age. Thus, his journey from one city to another began early on (Bal, 2021).

Nedim Gürsel was asked to be imprisoned for seven and a half years in 1970 because of his article on Gorki and Lenin in the journal *Halkın Dostları*. This situation obligated the author to go to France. When Nedim Gürsel returned to Turkey in 1979, he was exposed to accusations such as state security and obscenity regarding the book subjects after the 12 September 1980 coup. The exile imposed on the writer for these accusations separated him from his place of residence, Istanbul (Sivri & Kuşça, 2015).

Nedim Gürsel transfers different geographies, beliefs, cultures, and ways of life to his readers. Öztürk (2019) reminds us of Gürsel's phrase 'Cities have become a part of my subjectivity with their geography and history; they are not imaginary or invisible cities, as in Calvino's (2013) famous book; they are cities that have been seen and lived' and he emphasized that Gürsel's interest in cities is unlimited and endless. In addition, Gündüzalp (2019) claims that Gürsel had all the material that could be used for fiction removed from his life and had now become a literary language and a piece of art.

Bal (2019) states that in Gürsel's narratives, the city has ceased to be a backdrop and has become a predominant theme, sometimes as a main hero. According to Nedim Gürsel, city components are one of the features that make the city a livable place. In Gürsel's stories and novels, heroes travel the city as a city aficionado. In the narrative, they often benefit from city components and include the daily lives of the heroes. In these examples, which are dominated by depictions due to the influence of the writer's travel and essay writing, the social and economic reasons for the change of the city have not been adequately emphasized. The cities and city components that give their name to the stories and novels of Nedim Gürsel constitute an important significance in the book names.

Andaç (2014) stated in his book *Anonimleşen Edebiyat* that the life of Nedim Gürsel was shaped on a narrative and commented that there is a narrative in his discovery of the earth and his story of the journey. Gürsel develops his narrative on the axis of going to write more. The wealth of subjects and observations, a variety of spaces and places, the depth of emotion and thought, and the intensity of gaze and expression are the gains of these leaving. Spatial and textual journeys are the mains of his travels; he is aware that he is turning to writing when choosing to go.

Gürsel, a prolific writer, combined the concept of the city with his impressions of history, geography, art, and politics while he worked in the fictional field which included autobiographical elements (Bal, 2021). All the cities involved in his life have guided Gürsel's literary life. The city has not only been a place but also a character in his narratives. In his novels, the artistic structure of the city, the change in history, the components it contains, the traces it carries from social and political events, and the modernization efforts shown to keep up with economic change are frequently encountered.

Within the scope of this article, Gürsel's book *İzler ve Gölgeler* is discussed (Gürsel, 2005). The book is multi-layered and engaging between the 'travel narrative' and the essay. The author invites the reader to follow in the footsteps of writers, poets, and artists by using numerous contemporary narrative techniques such as review, memoir, diary, paste, intertextuality, and life-changing, objective storytelling in the work. The narrative is like a map because of the intertwined depiction of the cities in which the lives of the people in *İzler ve Gölgeler* are reflected in a realistic approach. Gürsel tries to inform the reader about many issues related to this city and its people and to convey what they see with a realistic approach with the objectivity of the historian. He uses preliminary information, images, historical events, and individuals. In the narratives of the journey, telling the reader about the unknown and informing takes place with the writer's flawless depiction technique. The description in the content of the narrative is more important than storytelling (Genç & Tilbe, 2008).

In his book *İzler ve Gölgeler*, Gürsel describes the reflections of unforgettable writers, thinkers, poets, and historical personalities who live in a certain time and city and integrate with those cities. He follows the traces of artists who dedicated their lives to the cities where they lived like a shadow in various urban places such as cafes, squares, and streets. The artists and cities described in the book are as follows: Baudelaire in Brussels, Caravaggio in Rome, Kafka and Arcimboldo in Prague, Pushkin and Dostoyevsky in Saint Petersburg, Gogol and Dostoyevsky in Ukraine, Ivo Andric in Bosnia, Ismail Kadare in Albania, Apollinaire in the Rhine, Borges in Buenos Aires, Louis Armstrong and Tennessee Williams in New Orleans, Matisse and Tahar ben

Jelloun in Tangier, Nazım Hikmet on the Caspian coast and Loti in Istanbul. In Nedim Gürsel's book *İzler ve Gölgeler*, which reveals the relationship between the city and the author in a unique way, 20 stories take place being: 'Büyük Ayna Oteli, Adını Kana Bulayan Ressam, Prag'da Günler, Basel'in Çanları, Deli Petro'nun Kenti: Sen Petersburg, Beyaz Geceler, Buğday ve Gökyüzü, Dalgın Bir Dalgıçkuşu, İvo Andriç'in Coğrafyasında, Radimlija'nın Taşları, Tiran'da Tango, Kederli Düşüncenin Dansı Tango, Buenos Aires ya da Sevgilisi Olmayan Gölge, Savaşın Yüzü, Irmak Kent ve Arzu Adında Bir Tramvay, Ak Memeler Karnavalı, Tanca'da Günler, Hazar Denizi'nin Kıyısında, Pierre Loti'nin Evinde, Pierre Loti İstanbul'da.' Among these stories, *Prag'da Günler* is dealt with as research material to be analysed as part of this article. The reason for choosing the story "Prag'da Günler" from the book is that, compared to the other stories in the book, it has more data addressing the formation of urban imagery in the mind and is more focused on experiencing a city.

MATERIAL AND METHODS

This article is research on the discovery of architecture in narratives through experiences of the city. In this scope, to question the data from the field, it is observed that the selection of research material is an example of travel writing based on city experiences.

According to Hymes (1973), ethnography and literature must surely be seen as indispensable to each other, mutually contributing to what is at the base of the same enterprise of cultural interpretation. From early in the twentieth century up to the present, as Pratt (1986) has shown, the mix of personal 'narration' and cultural 'description' established in narratives continues to shape the presentational strategies of ethnographies. According to Brettell (1986), the form of the account itself—a guidebook, an itinerary for those on the grand tour, a journal, a narrative, or a series of letters to a real or fictional person back home—is an important consideration in any attempt to evaluate the observations it contains. Considering the relationship between narratology and ethnography in Nedim Gürsel's stories, the close connection with reality is associated with ethnography. In this context, Nedim Gürsel's book *İzler ve Gölgeler*, where he usually builds his stories on the cities he visits and lives, has been selected as research material. The story of Prag'da Günler, which tells the story of a European city with an emphasis on the powerful city, is found suitable for ethnographic analysis. This story, with its multi-layered structure of experience and evaluation of the city, is covered in five chapters: 'First Day: Yağmurun Sesi (The Sound of Rain), Second Day: Cinin Anlattıkları (What Jinn Tells), Third Day: Sokaklarda (On the Streets), Fourth Day: Kafka'nın Dünyasında (In Kafka's World), and Fifth Day: Paul Leppin'in Prag'ı (Paul Leppin's Prague).'

The method of the study is based on O'Reilly's (2005) ethnographic analysis method, which tries to define themes before coding them. In general, studies that use qualitative coding, category, and themes are often used instead of each other. In this article, the theme will be used to express a wider scope before coding, while the category will be used as a step in the coding process. From this point of view, it can be said that place, space, and cultural codes are present in the narrative experience. Therefore, this article focuses on the relationship between the city and ethnography, while the author does not explore his text as ethnography.

According to Ezzy (2013), data collection, analysis, and writing are integrally linked in ethnographic research (O'Reilly, 2005). In ethnographic analysis, two types of data from the text are mentioned: content and semiotic (O'Reilly, 2005). Content analysis has a variety of definitions and applications. Semiotic analysis refers to analyzing the text in terms of both the meanings they express and the meanings they evoke. Content analysis is more popular in culture, media, communication, literary studies, and politics rather than in sociology and anthropology (O'Reilly, 2005). For this study, ethnographic analysis is close to content analysis of its species to focus on its basic and initial meanings, not semiotic analysis, which focuses on the side meanings and connotations of words and concepts. Content analysis has the potential to provide more ethnographically realistic objective data by dealing with the codes and categories of semiotic analysis while dealing with what shows and what is shown. In her book, O'Reilly (2005) states that Altheide (1996) derives the term ethnographic content analysis, which is more alternate and repetitive but more implicit in the coding process, rather than traditional content analysis. Therefore, content analysis is preferred as a more useful method to determine which codes are available for the themes of cities, places, and cultures. Because the method of this study focuses on the production of codes according to themes for the analysis of information from the field. The experience-based structure of the *Prag'da Günler* story provides an example of ethnographic content analysis that reveals codes from the field with its ethnographic quality. The following ethnographic analysis stages of Karen O'Reilly (2005) are followed as a theoretical method:

- Formulating a research question or hypothesis
- Sample selection
- Definition of themes
- Development of a protocol for coding
- Coding and analyzing the results

O'Reilly's (2005) ethnographic analysis steps are used as a preliminary for the development of the method that made coding possible for this article in Figure 1.

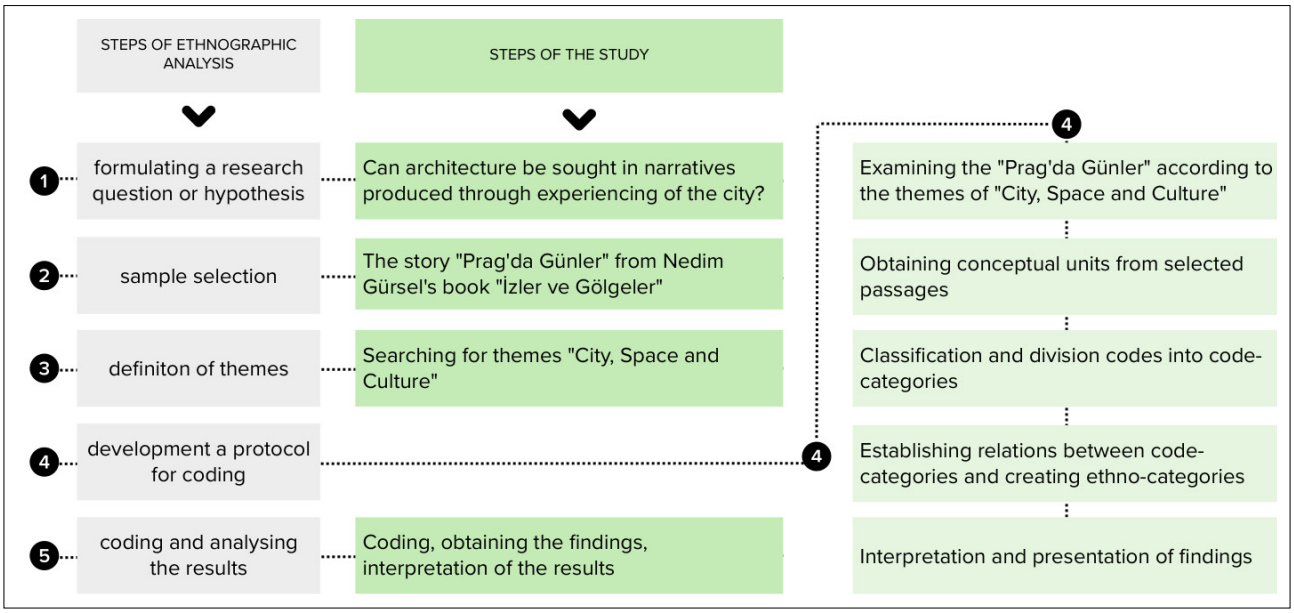


Figure 1. Steps of the ethnographic analysis and study approach.

The story of *Prag'da Günler* is analyzed according to the ethnographic analysis steps in Figure 1, and the architectural knowledge of the city is revealed textually. The steps for developing a protocol for coding are taken from O'Reilly (2005); to make sense of the data, the researcher uses a combination of inductive and deductive reasoning processes, constantly moving between the concrete data set and abstract concepts, and again between definitions and interpretations (Corbin & Strauss, 2008).

While in the development of the protocol for coding, context or environment, situations and definitions, perspectives, ways of thinking about people and objects, processes, activities, events, strategies, relationships, and social structure, and the narrative flow are usually centered. In this study, the themes of 'city, space, culture,' which are especially significant for architecture, abide. These themes looked for in the text are the common themes of both ethnography and architecture. The steps in the creation of the protocol for coding in ethnographic are as follows:

- Examining *Prag'da Günler* according to the themes of 'City, Space and Culture': All five chapters of the 29-page story are read multiple times and passages expressing, defining, describing, and evoking the city, space, and culture are concluded in each section.
- Obtaining conceptual units from selected passages: In the selected passages, concepts, words, or phrases that form the themes are drawn and removed. With this simplification, the conceptual units are generated.
- Classification and division of conceptual units into code-categories: Based on themes of city, space, and culture, conceptual units consisting of ideas, connotations, descriptions, qualities, or buildings are collected and classified and large information units containing many conceptual units are produced.
- Establishing relations between code-categories and creating ethno-categories that depend on themes: Ethno-categories are created by combining code-categories that are related to each other. This stage is the abstraction or simplification to find the basic pattern or finding that arises by answering research questions.
- Interpretation and presentation of findings: The resulting ethno-categories are put together following the themes and presented systematically.

In this context, the protocol for the coding process is conducted following the themes shaped by the discipline of architecture. Accordingly, the findings and interpretations provide a new perspective on architecture.

Protocol for Coding in Ethnographic Analysis: The *Prag'da Günler* Story

The ethnographic analysis of city codes allows us to explore the architectural projection of a city in the narrative. In this study, which followed the ethnographic analysis method, the themes to be encoded are determined as 'City, Space, and Culture' by examining Nedim Gürsel's story Prag'da Günler. In determining these themes, concepts that are effective and common on the axis of architecture and literary disciplines have been selected. The themes (city, space, culture) chosen for narrative research within the discipline of architecture are among the common research topics of both disciplines. Themes have the potential to be shaped according to the narratives' own axis and context (Bal, 2021). At the same time, in ethnography, the analysis

of themes are areas that can be specialized with contextually appropriate content for cultural portraits. In this context, the themes taken as the basis for this study are the themes that stand out in the representation of experience in Gürsel's story Prag'da Günler.

The ethnographic analysis of the *Prag'da Günler* story is shown in the following steps according to the protocol for the coding part in Figure 1. Color codes are created for ease of reading and for tracking the inferences of the story. The color yellow indicates the expressions with intense spatial code connotations, and the color green indicates the expressions with more cultural connotations for Figure 1 and 2.

Examining the Story *Prag'da Günler* According to the Themes of 'City, Space, and Culture'

Following the themes intended to be investigated, passages having 'city, space, and culture' are detected in the story. The following figure is an example of a reading to obtain units of analysis from the story (Figure 2).

Obtaining Conceptual Units from Selected Passages

The passages detected after the examination are collected in the left column of Figure 3. Examples of passages in the figure include references from all five chapters of the *Prag'da Günler* story. Conceptual units suitable for themes from passages are boldly stated. A list of the conceptual units derived from the selected passages appears in the right column next to the book paper. The coding in the below image is redefined through conceptual units on the *Prag'da Günler* story based on themes which are city, space, and culture.

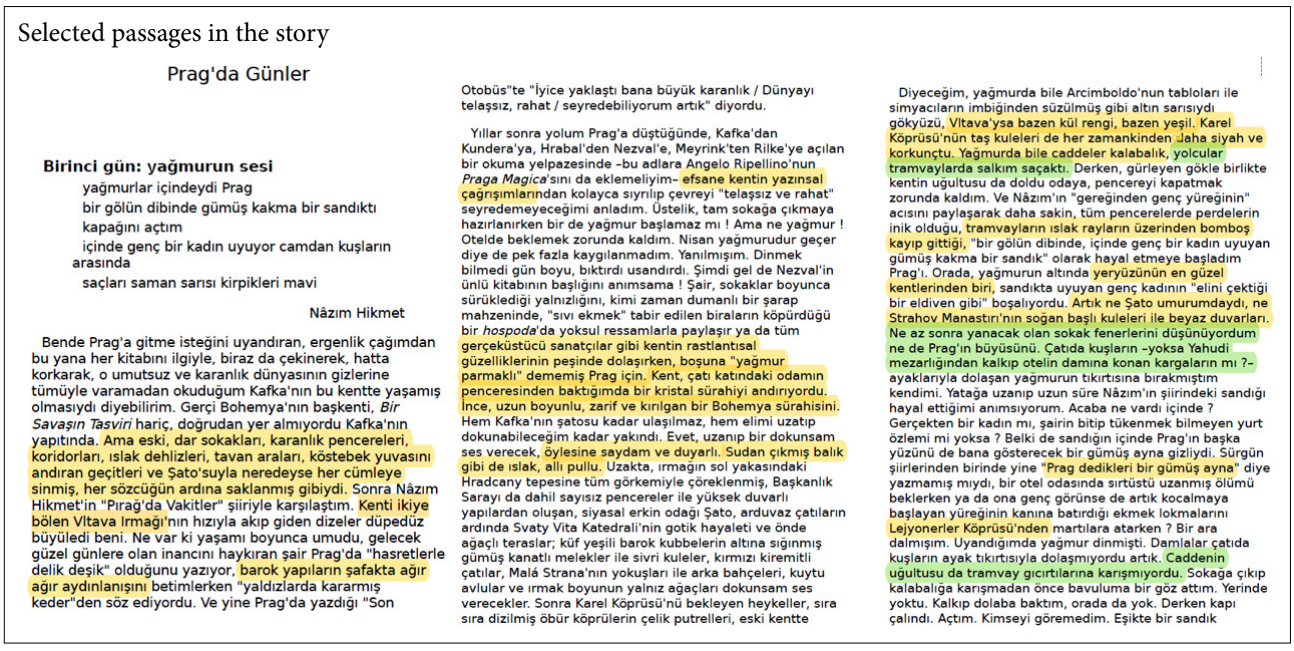
Classification and Division of Conceptual Units into Code-Categories

The conceptual units are determined in the story. Conceptual units are merged and classified, and code-categories are created. In the next step, code-categories are classified, and then ethno-categories are created. For this story, after deep reading, these categories are determined with the architectural view. In the concept cluster formed by conceptual units, concepts that show architectural, urban, and cultural similarities are brought together and categorized. These categories have formed the categories that are uniquely produced and have high potential within the scope of the study. For example, different types of buildings such as bridges and castles form a group, while characteristics such as the changing of the city, being scary, and mysterious come together to form another group. In this context, the conceptual units and code-categories are shown in Table 1.

Establishing Relation between Code-Categories and Creating Ethno-Categories

In this step, code-categories are classified, and fewer ethno-categories are created (Table 2). The creation of large pieces from small parts has made it easier to relate to the theme. When code-categories relate closely to each other, they are included in the same classification, resulting in a few ethno-categories. The small number of ethno-categories makes it easier to interpret and extract meanings from the data.

When creating ethno-categories, it is important to establish a relationship between the city, space, and culture themes determined at the beginning of the study, code-categories, and ethno-categories. Code-categories and ethno-categories


Selected passages in the story

Prag'da Günler

Birinci gün: yağmurun sesi

yağmurlar içindeydi Prag
bir gölün dibinde gümüş kakma bir sandıktı
kapağını açtım
içinde genç bir kadın uyuyor camdan kuşların arasında
saçları saman sarısı kirpikleri mavi

Nâzım Hikmet

Bende Prag'a gitme isteğini uyandıran, ergenlik çağımdan bu yana her kitabını ilgiyle, biraz da çekinerek, hatta korkarak, o umutsuz ve karanlık dünyasının gizlerine tümüyle varamadan okuduğum Kafka'nın bu kentte yaşamış olmasıydı diyebilirim. Gerçi Bohemya'nın başkenti, *Bir Savaşın Tasviri* hariç, doğrudan yer almıyordu Kafka'nın yapıtında. Ama eski, dar sokakları, karanlık pencereleri, koridorları, ıslak dehlizleri, tavan araları, köstebek yuvasını andıran geçitleri ve Şato'suyla neredeyse her cümleye sinmiş, her sözcüğün ardına saklanmış gibiydi. Sonra Nâzım Hikmet'in "Prag'da Vakitler" şiiriyle karşılaştım. Kenti ikiye bölen Vltava Irmağı'nın hızıyla akıp giden dizeler düpedüz büyüledi beni. Ne var ki yaşamı boyunca umudu, gelecek güzel günlere olan inancını haykıran şair Prag'da "hasretlerle delik deşik" olduğunu yazıyor, barok yapıların şafakta ağır ağır aydınlanışını betimlerken "yaldızlarda kararmış keder"den söz ediyordu. Ve yine Prag'da yazdığı "Son Otobüs"te "İyice yaklaştı bana büyük karanlık / Dünyayı telaşsız, rahat / seyredebiliyorum artık" diyordu.

Yıllar sonra yolum Prag'a düştüğünde, Kafka'dan Kundera'ya, Hrabal'den Nezval'e, Meyrink'ten Rilke'ye açılan bir okuma yelpazesinde –bu adlara Angelo Ripellino'nun *Praga Magica*'sını da eklemeliyim– efsane kentin yazınsal çağrışımlarından kolayca sıyrılıp çevreyi "telaşsız ve rahat" seyredemeyeceğimi anladım. Üstelik, tam sokağa çıkmaya hazırlanırken bir de yağmur başlamaz mı ! Ama ne yağmur ! Otelde beklemek zorunda kaldım. Nisan yağmurudur geçer diye de pek fazla kaygılanmadım. Yanılmışım. Dinmek bilmedi gün boyu, biktırdı usandırdı. Şimdi gel de Nezval'in ünlü kitabının başlığını anımsama ! Şair, sokaklar boyunca sürüklediği yalnızlığını, kimi zaman dumanlı bir şarap mahzeninde, "sıvı ekmek" tabir edilen biraların köpürdüğü bir *hospoda*'da yoksul ressamlarla paylaşır ya da tüm gerçeküstücü sanatçılar gibi kentin rastlantısal güzelliklerinin peşinde dolaşırken, boşuna "yağmur parmaklı" dememiş Prag için. Kent, çatı katındaki odamın penceresinden baktığımda bir kristal sürahiyi andırıyordu. İnce, uzun boyunlu, zarif ve kırılgan bir Bohemya sürahisini. Hem Kafka'nın şatosu kadar ulaşılmaz, hem elimi uzatıp dokunabileceğim kadar yakındı. Evet, uzanıp bir dokunsam ses verecek, öylesine saydam ve duyarlı. Sudan çıkmış balık gibi de ıslak, allı pullu. Uzakta, ırmağın sol yakasındaki Hradcany tepesine tüm görkemiyle çöreklenmiş, Başkanlık Sarayı da dahil sayısız pencereler ile yüksek duvarlı yapılardan oluşan, siyasal erkin odağı Şato, arduvaz çatıların ardında Svaty Vita Katedrali'nin gotik hayaleti ve önde ağaçlı teraslar; küf yeşili barok kubbelerin altına sığınmış gümüş kanatlı melekler ile sivri kuleler, kırmızı kiremitli çatılar, Malá Strana'nın yokuşları ile arka bahçeleri, kuytu avlular ve ırmak boyunun yalnız ağaçları dokunsam ses verecekler. Sonra Karel Köprüsü'nü bekleyen heykeller, sıra sıra dizilmiş öbür köprülerin çelik putrelleri, eski kentte Diyeceğim, yağmurda bile Arcimboldo'nun tabloları ile simyacıların imbiğinden süzülmüş gibi altın sarısıydı gökyüzü, Vltava'ysa bazen kül rengi, bazen yeşil. Karel Köprüsü'nün taş kuleleri de her zamankinden daha siyah ve korkunçtu. Yağmurda bile caddeler kalabalık, yolcular tramvaylarda salkım saçaktı. Derken, gürleyen gökle birlikte kentin uğultusu da doldu odaya, pencereyi kapatmak zorunda kaldım. Ve Nâzım'ın "gereğinden genç yüreğinin" acısını paylaşarak daha sakin, tüm pencerelerde perdelerin inik olduğu, tramvayların ıslak rayların üzerinden boşboş kayıp gittiği, "bir gölün dibinde, içinde genç bir kadın uyuyan gümüş kakma bir sandık" olarak hayal etmeye başladım Prag'ı. Orada, yağmurun altında yeryüzünün en güzel kentlerinden biri, sandıkta uyuyan genç kadının "elini çektiği bir eldiven gibi" boşalıyordu. Artık ne Şato umurumdaydı, ne Strahov Manastırı'nın soğan başlı kuleleri ile beyaz duvarları. Ne az sonra yanacak olan sokak fenerlerini düşünüyordum ne de Prag'ın büyüsünü. Çatıda kuşların –yoksa Yahudi mezarlığından kalkıp otelin damına konan kargaların mı ?– ayaklarıyla dolaşan yağmurun tıkırtısına bırakmıştım kendimi. Yatağa uzanıp uzun süre Nâzım'ın şiirindeki sandığı hayal ettiğimi anımsıyorum. Acaba ne vardı içinde ? Gerçekten bir kadın mı, şairin bitip tükenmek bilmeyen yurt özlemi mi yoksa ? Belki de sandığın içinde Prag'ın başka yüzünü de bana gösterecek bir gümüş ayna gizliydi. Sürgün şiirlerinden birinde yine "Prag dedikleri bir gümüş ayna" diye yazmamış mıydı, bir otel odasında sırtüstü uzanmış ölümü beklerken ya da ona genç görünse de artık kocalmaya başlayan yüreğinin kanına batırdığı ekmek lokmalarını Lejyonerler Köprüsü'nden martılara atarken ? Bir ara dalmışım. Uyandığımda yağmur dinmişti. Damlalar çatıda kuşların ayak tıkırtısıyla dolaşmıyordu artık. Caddenin uğultusu da tramvay gıcırtılarına karışmıyordu. Sokağa çıkıp kalabalığa karışmadan önce bavuluma bir göz attım. Yerinde yoktu. Kalkıp dolaba baktım, orada da yok. Derken kapı çalındı. Açtım. Kimseyi göremedim. Eşikte bir sandık

Figure 2. Examining the story Prag'da Günler.

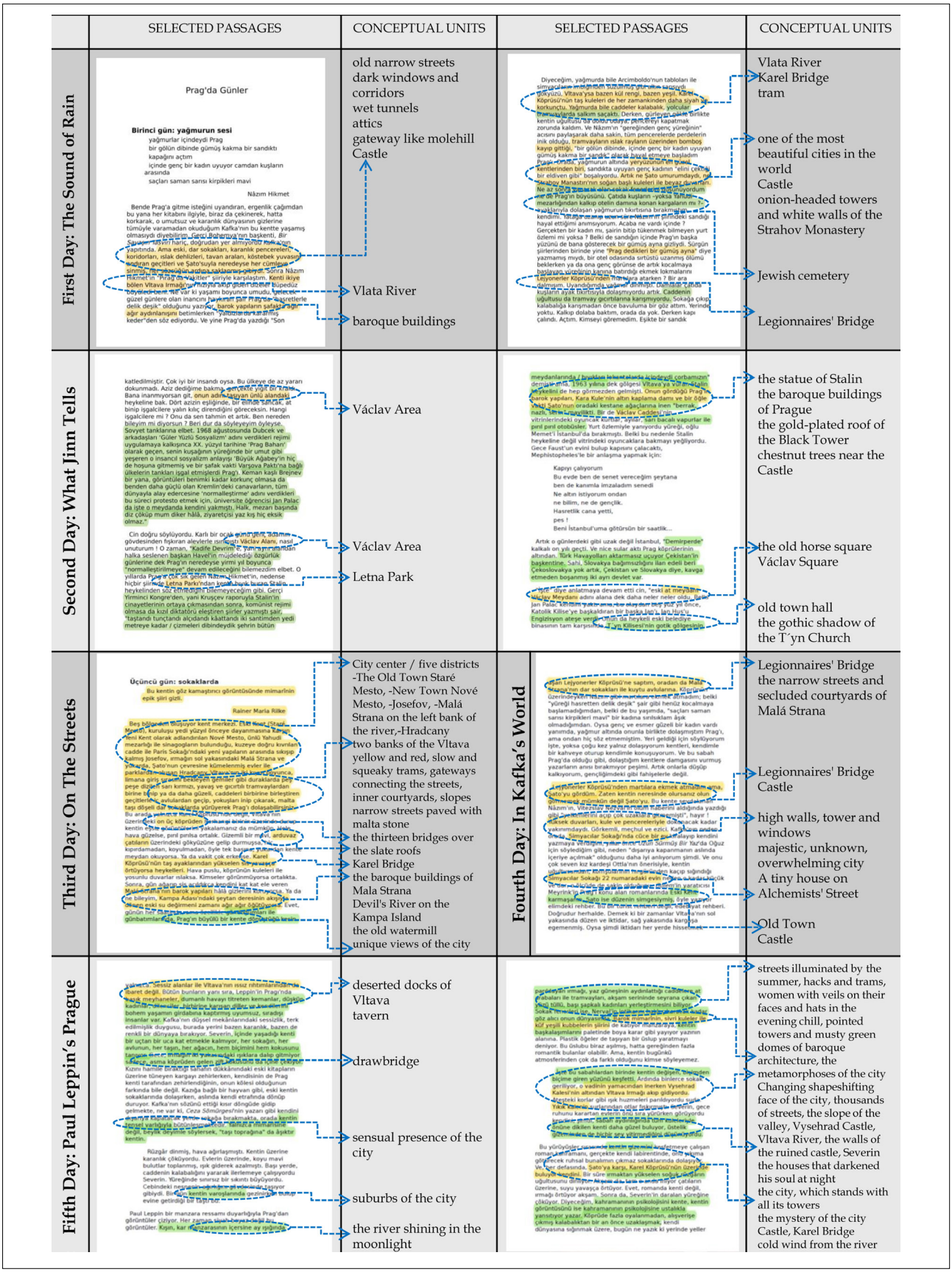


Figure 3. Selecting conceptual units from selected passages.

Table 1. Production of code-categories from conceptual units

Conceptual Units	Code-Categories	Conceptual Units	Code-Categories
dark windows and corridors attics onion-headed towers and white walls of the Strahov Monastery the gold-plated roof of the Black Tower inner courtyards the slate roofs pointed towers and musty green domes of baroque architecture the walls of the ruined castle high walls, tower and windows wide steps stairs of St. Jan hill	Part of the building	wet tunnels gateway like molehill gateways connecting the streets the thirteen bridges over the Vltava the towers of Malá Strana Castle onion-headed towers and white walls of the Strahov Monastery T´yn Church Karel Bridge Legionnaires' Bridge, which crosses the island archway Vysehrad Castle tiny house The old watermill drawbridge	Building type
old narrow streets narrow streets paved with malta stone the narrow streets and secluded courtyards of Malá Strana Thousands of streets Saxons Street narrow Prokopska Street Alchemists' Street Bretislavova Street Nerudova Street slopes	Avenue/street/courtyard	Václav Area the old horse square Václav Square The five districts of city center: The Old Town (Staré Mesto); Nové Mesto, which is called the New Town even though it was founded seven centuries ago; Josefov, tucked away between the street that curves to the north where the famous Jewish cemetery, synagogues are located and new buildings on Paris Street; Malá Strana on the left bank of the river; Hradcany, consisting of houses and parks clustered around the Castle Great Monastery Square Letna Park egg marketJewish cemetery Deserted docks of Vltava tavern	Open public space
the statue of Stalin the statues on the bridge	Artwork	Severin	Artist
yellow and red, slow and squeaky trams the tram stop in Malá Strana hacks and trams	Vehicle / area	the baroque buildings of Prague old town hall the metamorphoses of the city suburbs of the city	History
one of the most beautiful cities in the World the river shining in the moonlight streets illuminated by the summer changing, shapeshifting face of the city the city which stands with all its towers the houses that darkened his soul at night unique views of the city the city which is majestic, unknown, overwhelming cold wind from the river sensual presence of the city women with veils on their faces and hats in the evening chill	Description	chestnut trees near the Castle two banks of the Vltava the left bank of the Vltava St. Jan hill the left bank of the Vltava the slope of the valley Vltava River Kampa Island Devil's River	Natural texture

are created specifically for this article. They originate from the relationships between codes and categories in narratology. Code-categories indicate smaller units of larger conceptual units. According to the methodology of this study, all categories are also steps of the methodology. Code-categories consist of concepts and concept groups that are prominent in the story under study. Categories with ethnographic value are called ethno-categories.

Interpretation and Presentation of Findings

The interpretation of the findings includes an abstraction that goes beyond codes to the broader meaning of data and extracting meanings from data (Creswell, 2013). *Prag'da Günler* is a story that emerged after the writer experienced Prague. Using the author's experiences as material, the data from the city was included in the story, which added an ethnographic quality to it. The architectural themes looked for in the story are determined by city, space, and culture. These themes appeared as a result of coding in which they are included as conceptual units in the text.

The interpretation and presentation of the findings are based on Table 2. In this scope, 10 code-categories have been determined. The code-categories listed on the left and ethno-categories on the right are related to the topics shown

Table 2. Relationship between code-categories and ethno-categories in the Prag'da Günler story

Code-Categories	Ethno-Categories
Part of building	ARCHITECTURAL
Building type	ARCHITECTURAL
Avenue/street/courtyard	ARCHITECTURAL
Open public space	ARCHITECTURAL / GEOGRAPHICAL
Artwork	ARCHITECTURAL
Artist	LITERARY
Vehicle / area	GEOGRAPHICAL
Description	LITERARY
History	LITERARY
Natural texture	GEOGRAPHICAL

in Figure 4. Axes originating from different code-categories and following the same themes and ethno-categories are the same color. For example, since both parts of the building and building type code-categories reach an architectural ethno-category through space, they are shown with the same color as the axis. However, when open public space has branched out and also gone to the city, it is expressed in a different color axis. These themes are the intersection of the code-category and ethno-category.

The code-categories that are part of the building, building type, avenue/street/courtyard, open public space, and artwork are classified in the 'architectural' ethno-category. The vehicle/area, open public space, and natural texture code-categories came together in the 'geographical' ethno-category. The artist, description, and history code-categories constituted the 'literary' ethno-category. The open public spaces code-category is classified in both the architectural and geographical ethno-categories. The ethno-categories are classified by the themes of 'city, space, and culture' determined at the beginning of the study. An ethno-category can be included in multiple thematic analyses.

Two of the five axes leading to the 'architectural' ethno-category are directly associated with the theme of 'space', while two are associated with the theme of 'city', and one is seen only as linked to the theme of 'culture'. The avenue/street/courtyard and the open public space have become architectural ethno-categories through both themes of city and space. Two of the four axes leading to the 'geographical' ethno-category are related to the theme of 'city', one is related to the theme of 'space', and the other one is with the theme of 'culture'. The 'literary' ethno-category is associated with the theme of 'culture'.

The deduction made from the diagram suggests that the architectural ethno-category exhibits the strongest connection with themes, followed by the geographical ethno-category. While these two ethno-categories connect with three themes, the literary ethno-category only connects with culture. In this context, it can be said that in the relationship between literature and architecture, architectural and geographical ethno-categories have more ethnographic content than the literary ethno-category.

In the story Prag'da Günler, the code-categories "part of building, building type, avenue/street/courtyard, open public space" are associated with the theme of space because they define a void and determine the private-public nature of the experience. Each of the code-categories refers to the space and the suggestion of the void that constitutes it. The code-categories "avenue/street/courtyard, open public space, vehicle/area, natural texture" are directly associated with the theme of city as they emphasize the multifaceted identities of the city such as structural, natural, social, etc. The code-categories "artwork, artist, vehicle/area, description, history" are associated with cultural background as story-writing environments that reflect the

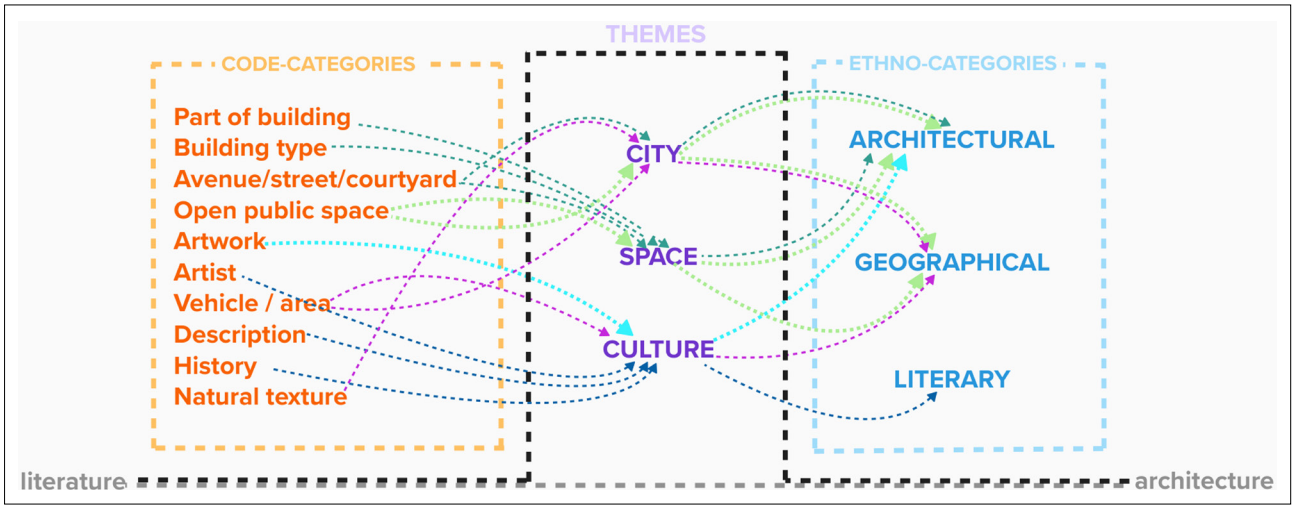


Figure 4. Diagram for the relationship between code-categories and ethno-categories based on themes.

unique spirit of the city. For this reason, they are associated with culture, which will serve all kinds of cultural interests in the past-future interface.

The fluid relationship between categories and themes is expressed with a dashed line. This is because these relationships aim to make readers intend to think about and establish new relationships. Nevertheless, if this relationship is evaluated in the story Prag'da Günler, which is selected within the scope of the study, it is observed that the relationships between themes and categories are not constant according to the narrative language of the story. The relationship between literature and architecture may vary according to the author's language, experience, and even the perception profile of the reader. Each code, which is perceived and imagined by the reader with the linguistic perspective presented by the author, is collected in the context of themes and categorized into ethno-categories. In the case of this story, the author's experience of the city of Prague is collected under three ethnographic categories. Accordingly, the architectural and geographical ethno-categories communicate with all themes in some way as they constitute the space of the story. The literary ethno-category stands out with the theme of culture, pointing to the essence of ethnography. Because the literal aspect of the story is strengthened by the author with cultural sub-readings. The author seems to have expressed the ethnographic values that come from the codes related to the urban experience and that relate to the meta-themes through ethno-categories.

CONCLUSION

Narratives as travel writing constitute a source of data for defining and exploring urban identity. Travel writing is an ethnographic narrative because it refers to places, spaces, and events. Urban places in the narrative are architectural references that are very important in creating the narrative identity of a particular city in literature.

The *Prag'da Günler* story, which is based on city experiences, is more constructed through descriptions, definitions, and explanations rather than events. In the story, Prague is a hero who stands out within the narrative and has shaped the identity of the narrative. Experiencing Prague provides the writer with information about both the current situation and the history of the city. With the reflection of this information, the narrative has become an expression of the visible and known face of the city. Urban events, such as urban places, are very important in defining Prague's identity in the narrative.

Nedim Gürsel's story Prag'da Günler, which is revealed based on experience, is subjected to a re-reading through ethnographic content analysis. Codes, code-categories, ethno-categories, and themes obtained in the reading based on the steps of the ethnographic analysis method reveal that the story is an ethnographic fiction.

The codes examined in the story are the form of transfer of information collected by the ethnographic analysis method. Although these codes and categories have a subjective direction, they constitute the ethnographic aspect of the narrative that comes from the field as part of social life and culture. The code-categories that emerge for the Prague impression in this story are part of the building, building type, avenue/street/courtyard, open public spaces, artwork, artist, vehicle/area, description, history, and natural texture. The ethnographic narrative makes it possible to define Prague through these categories.

To elaborate on the relationships between code-categories, themes, and ethno-categories: code-categories, which are formed by concepts and conceptual units in the story, are connected to ethno-categories through themes from the story. There are no sharp boundaries between code-categories and ethno-categories, but they are connected to each other through themes. Themes (city, space, culture) act as both a transitional element and a bridge between literature at one end and architecture at the other. In the story Prag'da Günler, it can be clearly observed that the knowledge gained by the author through his experience of the city is more in contact with the themes of architectural and geographical ethno-categories. The code-categories shaped around the urban experience are clustered in architectural and geographical ethno-categories through the themes. This shows that the experience is not only an architectural but also a geographical undertaking. In addition, the code-categories artist, description, and history are connected to the literary ethno-category through the theme culture. In other words, it can be said that the literary ethno-category is less visible in the story, and among the concepts and conceptual units that characterize the city and make up the code-categories, those related to the theme of culture are closer to the literary ethno-category.

While architectural and geographical ethno-categories are related to all themes, the literary ethno-category is related to the theme of culture in this story. Although all ethno-categories express the atmosphere of the city holistically, the fact that the architectural ethno-category is more connected with themes shows that architecture is an important tool in generating ethnographic data from the city. The fact that the literary ethno-category is only related to the theme of culture can be explained by the fact that expressions based on experience in the narrative are more physical. Ethnographic analysis of the narrative provides a contextual and semiotic preliminary for ethnographic research. Ethnography, which is a holistic and deep analysis, is an effective method of producing knowledge by considering architecture and literature together.

The conclusion to be drawn from this is that it is an illusion

to think that only literary ethno-categories can be found only in literature. For it is necessary to look for architecture in literature and to imagine that architectural-geographical categories can also exist in literature. At least in the context of this article, the potential for thinking in spatial dimensions has been demonstrated.

As a result, this article is an example of how the existence of rich narratives is made visible through ethnographic analysis of the story Prag'da Günler. Code-categories, ethno-categories, and themes make visible the connection between narratology and architecture. Steps of ethnographic analysis in the text become a way to think about the relationship between architecture in a literary text; these stages create the route for analysis. In conclusion, it is possible that the conceptual levels of ethnographic analysis in the evaluation of literary data (narratives and discourses) in architecture are diverse. The ethnographic analysis can indeed yield valuable insights, acknowledging limitations, and reflecting potential benefits.

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Article

Places of memory and place attachment: A study at the neighborhood scale in Istanbul

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ABSTRACT

Places of memory are often locations where individuals connect with their own life stories. In this respect, places of memory can strengthen people's attachment to place. However, due to various reasons, some places of memory are lost as a result of rapid and wide-ranging transformations in the city, leading to interruptions in the continuity of memory. Beginning with the question, "Do rapid and wide-ranging changes in the city affect individuals' places of memory and place attachment?", this study examines the changes experienced in Istanbul through existing and lost places of memory at the neighborhood scale.Three field studies were conducted in the Kuzguncuk Neighborhood, Küçükyalı District, and Postane Neighborhood, located on the Anatolian side of Istanbul, each with distinct physical and demographic structures related to the sea. A total of 150 respondents, fifty from each area, answered survey questions. Data were analyzed using the SPSS program. The effects of changes triggered by land fill in coastal areas of Istanbul over time have also been observed in the residents' places of memory. The most mentioned places of memory include coastal and sea-related areas, parks and gardens, religious buildings, shopping buildings, educational buildings, transportation buildings, cafes and restaurants, cultural buildings, and accommodation buildings. Significant relationships emerged between place attachment values and variables such as duration of residence, educational status, and employment status, varying across different areas. However, no significant relationship was found between place attachment values and age or gender across the three areas. Among the three areas, the conservation zone of Kuzguncuk experienced the least change and showed the highest place attachment values.

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INTRODUCTION

Places of memory, where memory is preserved and transmitted, provide physical and social continuity alongside the meaning and attachment they have for people. The rapid change in today's life is also reflected in cities. This change, involving demolition and reconstruction processes, causes many places that are important for the common urban memory and have direct or indirect relations with the events stored in it to be lost, thus interrupting the continuity of the urban memory.

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With regard to urban change, Rapoport (2004) notes that the result of a forced, comprehensive, and rapid change that is unwanted by the public can be disruptive and destructive. Slower changes, which can be called creative adaptation, work better. Some innovations are rejected, while others are adapted and incorporated into the cultural system.

- Do rapid and widespread changes in the city affect individuals' places of memory and place attachment?
- What factors influence individuals' place attachment?
- Are individuals' places of memory they have experienced?

The study, initiated with these questions, aims to reveal the effects of urban changes on places of memory at the neighborhood scale and on residents' place attachment, as well as to examine the factors influencing places of memory and place attachment. To investigate the effects of rapid and profound changes in the city on its residents, the study focuses on changes caused by landfill projects along the coast of Istanbul. According to the study by Uzun & Akyuz (2019), Tuzla and Maltepe are the two districts with the largest coastal landfill areas on the Anatolian side of Istanbul. These two districts together account for 50% of the coastal landfill areas on the Anatolian side. With a landfill area width of 600 meters, the most significant change in the coastline on the Anatolian side has occurred in Maltepe (Uzun & Akyuz, 2019). In light of this data, the study was conducted in neighborhoods located along the coast in the districts of Maltepe and Tuzla, which have the most extensive landfill areas on the Anatolian side. In contrast to Küçükyalı and Postane neighborhoods, which have been subjected to extensive changes, a third area was considered as a control area, and Kuzguncuk neighborhood, a more preserved neighborhood, was selected. In the research, many studies available on memory and place attachment in the fields of environmental psychology, sociology, and architecture were analyzed; however, here memory spaces are discussed from an architectural perspective. Lefebvre (2014), in his work The Production of Space that enables us to perceive space as a means of social production, explains space with three interconnected and interactive concepts: spatial practice, representations of space, and spaces of representation. While creating the study, Lefebvre's (2014) Spatial Triad model, which distinguishes the spaces as perceived, designed, and experienced, was utilized, based on the assumption that the places where people live, know their stories, and can find an intersection with their own life stories are included in the collective memory.

Theoretical Background

In this study, which aims to question the change in the city through places of memory, Pierre Nora's perspective on places of memory is in the background. Henri Lefebvre's concept of experienced space was also used while analyzing the data obtained from the three field studies. Rapoport's view of creative adaptation was also taken into account while analyzing the changes experienced in terms of workspaces. While some innovations are rejected, others are adapted and incorporated into the cultural system (Rapoport, 2004). The changes in the specified neighborhoods have been analyzed in terms of places of memory and place attachment values of the surveyed groups.

Memory and Memory Types

Psychological literature defines memory as a multi-stage process for retaining acquired information, encompassing specific pieces of information or past experiences that can be recalled. Psychological studies highlight a three-layered structure of memory, consisting of sensory memory, short-term memory, and long-term memory. Sensory memory captures stimuli briefly until attention is directed, and those stimuli requiring attention move to short-term memory, which has a limited capacity. Repeated information in short-term memory is transferred to long-term memory (Buttler & Mcmanus, 1998). Long-term memory is divided into episodic memory and semantic memory, distinguished by the terms "remembering" and "knowing." Autobiographical memory, a substructure of episodic memory, involves recalling events from one's life and self. It interacts with and provides information to semantic memory (Gülgöz, 2023).

Memory has been explored across disciplines, with philosopher Bergson (2015) identifying motor mechanisms (habit-based memory) and independent recollections (remembering past events). Social anthropologist Connerton (2019) defines individual, cognitive, and habitual memory. Individual memory, according to Egyptologist Assmann (2018), is shaped by details extracted from social elements. The concept of collective memory recognizes memory as not solely an individual characteristic but collectively determined. Halbwachs (2018) asserts that individual memory requires social reference points, reconstructing the past based on present experiences. Social frameworks, such as family and social classes, contribute to forming individual and collective memory. Collective memory, though subject to change, persists in various spatial elements, from monumental structures to ordinary street names (Basa, 2015). Halbwachs (2018) emphasizes that the strength and duration of collective memory derive from group cohesion, acknowledging individual perspectives within the collective memory.

Places of Memory

According to Nora (2006), places of memory are important meeting places with historical, ethnographic, psychological, political, and eternal dimensions. Places of memory in a city where memory is preserved and transmitted provide physical and social continuity with the meaning and attachment they have for people. Place provides the

conditions for the preservation of our memories, the formation, and representation of common thought. With social place, communities can form their own identities, and in the absence of social place, a community lacks the basis to form its identity. Memory always exists together with perception, movement, and space (Özaloğlu, 2017). According to Nora (2006), just as history is connected to events, memory is connected to places. He said that the main reason for the existence of the places of memory is to stop time, to prevent forgetting, to determine the status of objects, to immortalize death, to make the intangible tangible. The sense of continuity is rooted in space (Nora, 2006).

Public spaces with historical testimonies are places where collective urban memory is more concentrated, depending on the strength and fluidity of their transmission. Spaces where social bonds can be established can form points of resistance in front of urban transformations (Basa, 2015). Lefebvre's (2014) Spatial Triad model mentioned earlier enables us to perceive space as a means of social production, by explaining it with three interconnected and interactive concepts: spatial practice, representations of space, and spaces of representation. Spatial practice creates a society's own space. It tightly combines everyday reality and urban reality within the perceived space. We can discover the spatial practice of a society by deciphering space. Modern spatial practice can be defined by the everyday life of a low-income tenant living in the city. Representations of space, that is, conceived space, is the space of scientific artists who identify what is experienced and perceived with what is designed. Spaces of representation, the space lived through the images and symbols that accompany the space, that is, the spaces of the inhabitants, the spaces of the users, are the spaces that are dominated and exposed (Lefebvre, 2014).

Table 1 summarizes Lefebvre's (2014) approach to the production of space. In the study, Lefebvre's process of perceiving, designing and experiencing space as a social production was utilized. It is accepted that the places where people live, know their stories, and can catch an intersection with their own life stories are included in the collective memory. The question of whether the places of memory in the collective memory are the places that people experience was sought to be answered. In terms of places of memory, the situation of experiencing the space was investigated.

Table 1. Henri Lefebvre Spatial Triad

Spatial Triad		
Perceived Space	Physical Space	Spatial Practice
Conceived Space	Mental Space	Representations of Space
Lived Space	Social Space	Spaces of Representation

Place Attachment

Place attachment can be explained as individuals establishing an emotional relationship with a place and feeling a connection to it. In the field studies conducted, it is seen that people establish bonds with the houses and the neighborhoods they live in, with the places they visit for recreational purposes, landscapes, forests, lakes, wild nature, or summerhouses (Lewicka, 2010). Studies in the field of social sciences have yielded different findings reflecting the relationship between the changing dimensions of place and place attachment. Research shows that the concept of place attachment does not only describe the emotional relationship established with places but how the concept of place attachment differs according to changing scales of place should be taken into account (Göregenli, 2018).

In a study conducted by Göregenli (1997) to determine the elements of place attachment and place identity, she asked open-ended questions to young people and asked them to write an essay about their "favorite place." By analyzing the texts obtained through content analysis, 20 factors determining young people's attachment to place were identified. These factors are listed as characteristics of place, activities, togetherness, expressing ideas, relaxation, pleasure-pleasure, dialectical attributions towards place, personalization, remembering the past, attributions towards self, secrecy, privacy, escape from social pressures, belonging, control, self-identification, freedom of expression, anonymity, security, rootedness-permanence, habit-familiarity-knowing, intellectual needs, acceptance-gaining respect.

Lewicka (2010), creating a version of the place attachment scale used in her studies, utilized a list consisting of 12 positive and 12 negative items in a survey. Participants made choices from the place attachment scale in terms of the apartment building, flat/detached building, neighborhood, and city they live in. The score achieved is the difference between the number of positive and negative items selected. The resulting number is between -12 (extremely negative feelings about place) and +12 (extremely positive feelings). The place attachment scale used by Lewicka (2010) in Table 2 was used in the field studies.

RESEARCH METHODOLOGY AND CASE STUDY

In a review of the literature, studies in the fields of environmental psychology, sociology, and architecture were examined. In the case studies, demographic information of the participants, places of memory in their neighborhoods, their experiences of these, and their attachment to their neighborhoods were investigated. A version of the place attachment scale used in Maria Lewicka's studies was utilized as a place attachment scale. Survey participants were also asked about their place of birth, length of residence in their neighborhoods and also in Istanbul, and where they felt they were from. Data obtained from the field studies are compared.

Table 2. Items of the place attachment scale used by Lewicka (2010)

I like this place.	I don't like this place.
I defend it when somebody criticizes it.	I agree with its critics.
I miss it when I am not here.	I leave this place with pleasure.
I have influence over its affairs.	I don't want to be involved in its affairs
I belong here.	I don't belong here.
It is a part of myself	I feel uprooted here.
I want to be involved in what is going on here.	I have no influence over its affairs.
I am proud of this place.	I am ashamed of this place.
I feel secure here.	I feel at risk here.
I am rooted here.	I feel foreign here.
I know this place very well.	I don't know much about this place.
I would not like to move out from here.	I would like to move out.

The case study was conducted in Küçükyalı and Postane neighborhoods, which had undergone extensive changes, and as a control group, in the preserved area of Kuzguncuk, unlike these two areas. Demographic information of participants, existing and lost places of memory in their neighborhoods, and their place attachment to their neighborhoods were investigated. A survey was conducted with a total of 150 participants, 50 from each area—Küçükyalı district, Kuzguncuk neighborhood, and Postane neighborhood. Individuals over the age of 18 residing in the areas were reached out to, while those not residing in the areas and minors were not included in the sample. Additionally, face-to-face interviews were conducted with 7 individuals regarding their living areas.

Participants were asked 14 questions, including demographic questions, to gather information about their sense of belonging. To learn about their sense of belonging, information such as their birthplaces, duration of residence in their neighborhoods and in Istanbul, and how they identify themselves geographically were collected. The average place attachment values obtained for the three neighborhoods were compared to each other and to the changes they had undergone. The relationship between participants' sense of belonging and their attachment values was examined. Following methods from existing literature, Hidalgo & Hernandez (2001) and Lewicka (2010), whether there was a significant relationship between attachment values and participants' gender, age, duration of residence, employment status, and educational status was investigated. To achieve this, the obtained values from the survey were first examined for normal distribution using SPSS software. Since the data did not show a normal distribution, Spearman Brown analysis was conducted using the SPSS program.

Existing places of memory in the three areas were grouped according to their functions. Changes in the areas through lost places of memory were analyzed. Istanbul has 39 districts, twenty-five on the European side and 14 on the Anatolian side. The field studies were conducted in Maltepe, Üsküdar, and Tuzla districts on the Anatolian side. The selected areas are the coastal areas of these districts. Figure 1 shows the districts of Istanbul and case study areas.

Küçükyalı in Maltepe District

Maltepe is located on the Marmara Sea coast of Istanbul. The part of the coastal road within the borders of Maltepe District was filled in 1980 and 2013. Küçükyalı neighborhood is one of the areas most affected by the landfill on the Marmara Sea.

The images in Figure 2 show the changes that occurred on the Küçükyalı coast over a period of 47 years. The relationship of Küçükyalı residents with the sea has changed due to the landfills and the coastal road built on them. In the case studies, the researchers asked questions to the participants to learn about both existing and lost places of memory.

As seen in Table 3, in 144 responses received from fifty people, 44 different places were named. 20.8% of the responses were grouped as responses related to the sea and coast. Sixteen percent of the respondents answered

Figure 1. Map of Istanbul districts.

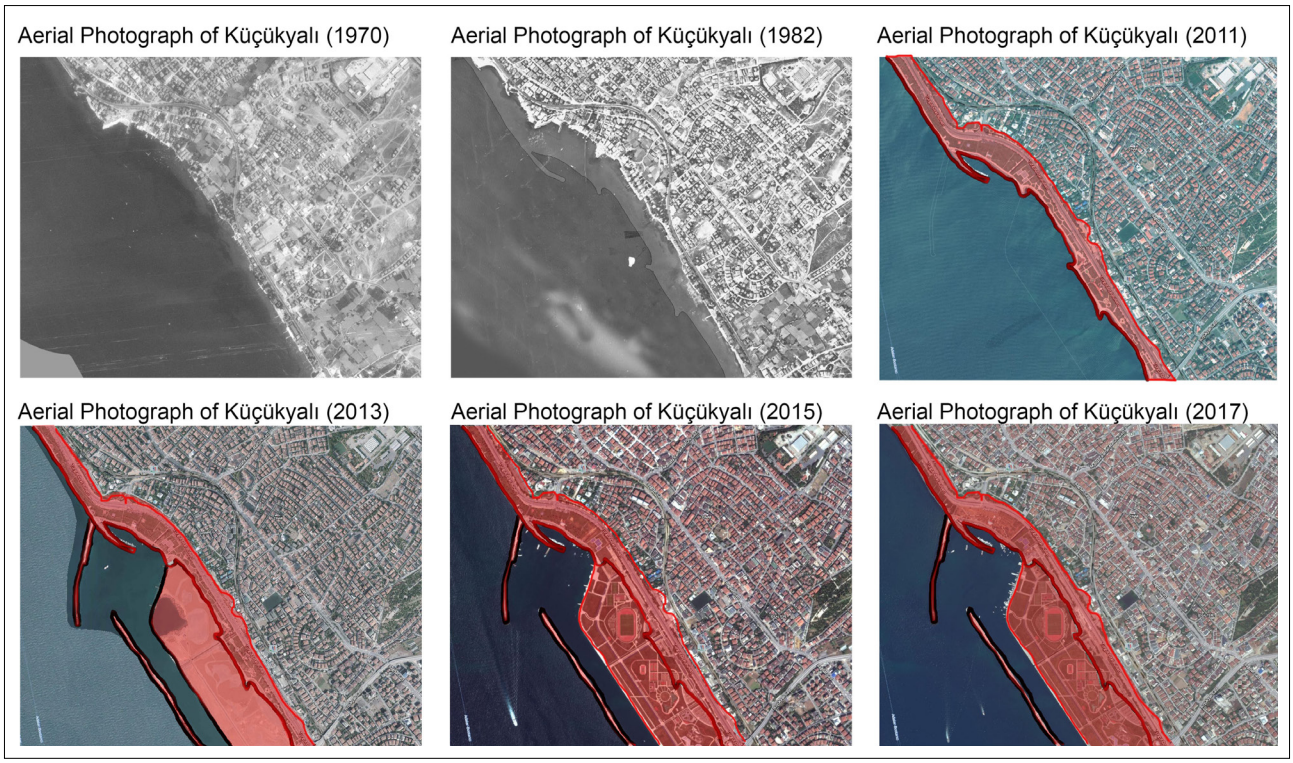

Figure 2. The change in Küçükyalı coastal in 47 years. (Coastal fill areas were marked in red). (İstanbul Büyükşehir Belediyesi, 2022).

this question as "Archaeopark" or "The Cave." Küçükyalı Archaeopark is located in the Çınar neighborhood of Küçükyalı, in an area hidden among the dense building texture. The archaeological site, which includes the Satyros Monastery, built in the Byzantine period between 866-877 AD, is exhibited in its natural environment. No detailed study had been carried out in the area until the 2000s. The local people were not informed about this cultural heritage. The site remained idle. It was named "The Cave" by the residents of the neighborhood and continued to exist as an area where children played. In the early 2000s, detailed archaeological excavations and research were carried out. Küçükyalı Archeopark was mentioned by residents over the age of 40 as a place where they used to play when they were children. The excavation house and visitor center established in the area aim to inform and involve the local community in the process. Figures 3 and 4 show the current state of the excavation site. The local people, who have lived in Küçükyalı for years and have experienced the site, have

Figure 3. The current state of the excavation site of Satyros Monastery.

Figure 4. The excavation site of Satyros Monastery and the minaret of the mosque on the adjacent parcel and the excavation house/visitor center on the opposite side.

Table 3. Percentages of existing places of memory in Küçükyalı

Existing places of memory	Percentage %
Coast	17.4%
Archaeopark/The Cave	16.0%
50th Anniversary Park	5.6%
Hilltown Mall	4.9%
My School	4.9%
Adnan Kahveci Park	4.2%
Railway station	4.2%
Bazaar	3.5%
Mosque	2.8%
Tunnel	2.8%
Center of Küçükyalı	2.8%
Patisserie / Bakery	2.8%
Çamlık	2.1%
Fish Market	1.4%
Healthcare Center	1.4%
Atatürk Park	1.4%
İdealtepe	1.4%
Kılavuz Çayırı Street	1.4%
Nida park	1.4%
Park	1.4%
Altıntepe	0.7%
Bağdat Street	0.7%
Old Turkish Bath	0.7%
Old railway crossing	0.7%
Old beaches	0.7%
Neighborhood	0.7%
Marmaray	0.7%
Metro	0.7%
Migros	0.7%
Mopaş Market	0.7%
Soccer field	0.7%
White House	0.7%
63 Bus stop	0.7%
Passages	0.7%
Church	0.7%
Street Market	0.7%
Seascape	0.7%
Sani Malaz Park	0.7%
Starbucks	0.7%
Single storey houses with garden	0.7%
Old Police Station	0.7%
Temple of Virgins	0.7%
Çınar Neighbourhood	0.7%
Turk Telekom	0.7%

been trying to follow the process of the site, which they have called "The Cave" since their childhood.

In response to the question "When you think of Küçükyalı, which 3 buildings or places that are currently in Küçükyalı come to mind?", approximately 5% of the respondents mentioned the schools they attended. In addition, 5% of the participants, who have been living in Küçükyalı for an average of 18 years, wrote the name of the shopping center that was built 4 years ago. The reflection of the change in the neighborhood on places of memory was also observed.

The analysis of Table 4 shows that 30 different answers were given to the question asked. Among the places that have been lost due to the landfill on the beach and the coastal road built on it, Çamlık Beach, Lido Beach, and Yalı Park

Table 4. Percentages of lost places of memory in Küçükyalı

Lost places of memory	Percentage %
Çamlık Beach/ Cafe	10.2%
Lido Beach	8.5%
Old Beaches	6.8%
Yalı Park	3.4%
Beach	1.7%
63 Movie Theater	6.8%
İpek Movie Theater	5.1%
Summer movie theater	3.4%
İhya Movie Theater	1.7%
Highways Housing / Directorate	8.5%
Single storey houses with garden	8.5%
Old Turkish Bath	3.4%
Ulusoy	3.4%
Is Bankası Apartments	1.7%
Old Railway crossing	1.7%
Köşk Apartment	1.7%
Küçükyalı Bazaar	1.7%
Küçükyalı Center Primary School	1.7%
Cafe AgitBey	1.7%
Warehouse of Efes Pilsen	1.7%
Old mosque by the coast	1.7%
Children's park on the beach	1.7%
Grocery	1.7%
Trees	1.7%
Covered bazaar next to the medical center	1.7%
Soccer field	1.7%
The vacant lot where we used to play ball on Akalın Street	1.7%
Old İgdaş	1.7%
Old Kızılay	1.7%
Yeşilçam Cafe	1.7%

Figure 5. Küçükyalı coastal land fill road Çamlık locality. (With red hidden lines for old coast line).

are mentioned by 23.8% of the participants. Figure 5 shows the coastal landfill road near the old Çamlık Beach area.

A total of 17% of the responses mentioned the 63 Movie Theater, İhya Movie Theater, İpek Movie Theater and summer movie theaters that used to exist in Küçükyalı.

Participants also emphasized the change in the construction in the neighborhood. 8.5% of the participants mentioned the single-storey houses with gardens that used to exist in the neighborhood. These garden houses have been transformed into 3-4 storey apartment buildings with the change. In addition, 8.5% of the respondents mentioned the old Directorate of Highways and its lodgings. A multi-storey bazaar-office-residential complex is being built on the site of the former Highways Lodgings.

Kuzguncuk in Üsküdar District

Üsküdar is one of the most important and oldest settlements on the eastern shore of the Bosphorus. Kuzguncuk is a neighborhood of Üsküdar and a historical and natural protected area. When aerial photographs of Kuzguncuk are analyzed, the results of the area being a protected area can be seen. There is no major change that can be detected in the aerial photographs of 1970 and 2020 in Figure 6. Looking at the Pervititch map in Figure 6, it is understood that the area is well preserved.

In the examination of Kuzguncuk, it is observed that the changes are related to the function of the buildings. Functional changes in recent years can be summarized as the transformation of existing buildings into cafes and restaurants.

When we look at the responses to the question in Table 5, 38 different places or locations were named in 148 responses received from fifty people. 23.7% of the responses were grouped as being related to the sea.

14.2% of the responses were for the Church, 13.5% were for the Bostan, 6.8% were for the Pier, 6.1% were for İsmet Baba Restaurant, 5.4% were for Çınaraltı, and 5.4% were for the Mosque. Kuzguncuk Bostan, shown in Figure 7, is an area where the people of Kuzguncuk can plant crops in the areas allocated to them, sit outdoors, and socialize. Public events are also organized here at certain times of the year.

Çınaraltı in Figure 8 is an important area for the locals, with a fountain on one side and Çınaraltı Café and İsmet Baba Restaurant on the other side, where you can breathe the Bosphorus air and watch the Bosphorus view. When the answers to the question listed in Table 6 are examined, 22 different answers are observed.

A total of 25% mentioned the names of small shopkeepers or craftsmen who are no longer operational in the neighborhood. Analysis of the responses shows that the shoe repair shop, tailor, haberdashery, bakery, and grocery store were mentioned. Those shops that closed down were mostly converted into cafes. Figures 9 and 10 show how it has become difficult to walk on Kuzguncuk sidewalks as cafes put tables and chairs on the sidewalks.

Since this neighborhood is a protected area, the physical changes of the buildings are under control. The changes experienced in recent years have been in the form of renovations at the building scale and functional changes.

Postane Neighborhood in Tuzla District

Tuzla District is located on the eastern border of Istanbul,

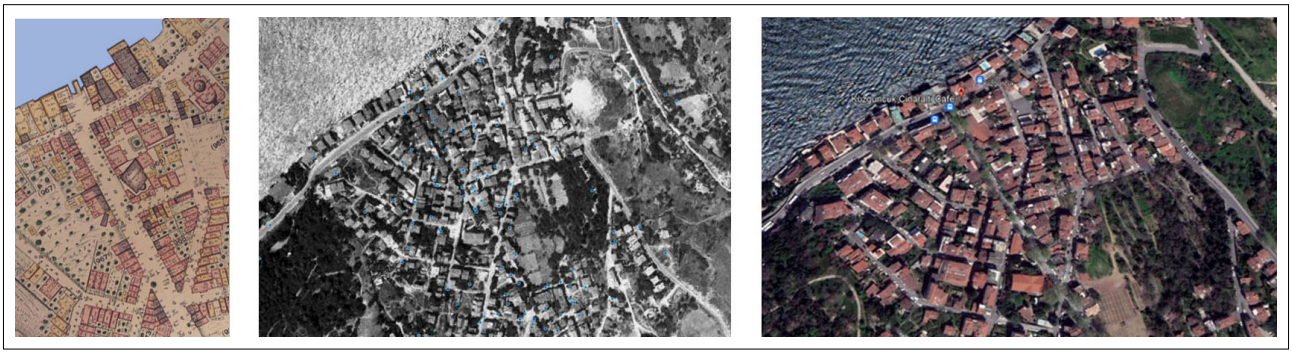

Figure 6. Kuzguncuk pervititch map, 1932 & Kuzguncuk aerial photographs from 1970 and 2020. (Pervititch, 1932).

Table 5. Percentages of existing places of memory in Kuzguncuk

Existing places of memory	Percentage %
Church	14.2%
Bostan (Urban Garden)	13.5%
Pier	6.8%
İsmet Baba Restaurant	6.1%
Çınaraltı	5.4 %
Mosque	5.4 %
Bakery	4.7%
Synagogue	4.7%
Icadiye Street	4.1%
Kuzguncuk Primary school	3.4%
Waterside Mansions	2.7%
Dilim Patisserie	2.7%
Fethi Pasa Grove	2.7%
Coast	2.0%
Nakkastepe	2.0%
Nail Bookshop	2.0%
Old wooden houses	1.4%
Mosque and Church side by side	1.4%
Dere boyu	0.7%
Cafes	2.0 %
Butcher Shop	0.7%
Old PTT (Bureau of Turkish National Post)	0.7%
Sand depot	0.7%
Beşevler	0.7%
Marko Paşa Mansion	0.7%
My home	0.7%
Bosphorus	0.7%
Toys shop	0.7%
The house across from famous chef Refika's shop	0.7%
Greek Church Bell Tower	0.7%
İnebolu Bazaar	0.7%
Simitçi Tahir Street	0.7%
Simotas Apartment	0.7%
Places of worship	0.7%
Soccer field	0.7%
Üryanizade Street	0.7%
Çarşı Street	0.7%
Summer movie theater	0.7%

on the Marmara Sea coast. Tuzla District has a 13 km-long coastline, and Postane Neighborhood is located here. The images in Figure 11 show the change in the Postane coastline over a period of fifty-one years. The relationship of the residents of Postane with the sea has changed due to the landfills.

Figure 7. Kuzguncuk Bostan.

Figure 8. Çınaraltı.

Figure 9. Shows the tables and chairs placed on the sidewalks by the buildings that have turned into cafes in Kuzguncuk.

Analysis of data in Table 7 shows that 48 different places or locations were mentioned in 148 responses received

Figure 10. Shows the tables and chairs placed on the sidewalks by the buildings that have turned into cafes in Kuzguncuk.

from fifty people.

26.4% of the responses are related to the beach and the coast, 9.5% to Ayazma, and 9.5% to Kalekapı.

Ayazma is an area in the Postane neighborhood that was declared a protected area in 1999. It is an area with centuries-old plane trees where neighborhood residents used to have picnics. When the area faced the threat of housing development, the locals laid claims against it. Kalekapı is also an area where archaeological findings from the late Neolithic period have been unearthed.

As seen in Table 8, in 81 responses received from fifty people, 41 different places or place names were mentioned. When the responses are analyzed, Ayazma, Ayazma Tea Garden, and Ayazma Wedding Hall were encountered. Ayazma was also given as an answer to the question of the existing places of memory. Though the area called Ayazma continues to exist, it has undergone changes over the years. For this reason,

Table 6. Percentages of lost places of memory in Kuzguncuk

Lost places of memory	Percentage %
Small shopkeepers	25%
Summer movie theater	9.5%
Old Turkish bath	7.4%
Post office	4%
Military Recruitment Office Building	3.4%
Bostan (Urban Garden)	2.7%
Old houses	2.7%
Police Station	2%
Sand depot	2%
Old coffehouses	2%
Tield Mansion	1.4%
Fountain	1.4%
Ruined waterside mansion	1.4%
Bim Market	0.7%
Gazhane	0.7%
Nersesyan Yermonyan School	0.7%
Wood storage	0.7%
Bazaar	0.7%
Banks	0.7%
Passage on the seaside road	0.7%
Soccer field	0.7%
Pier	0.7%

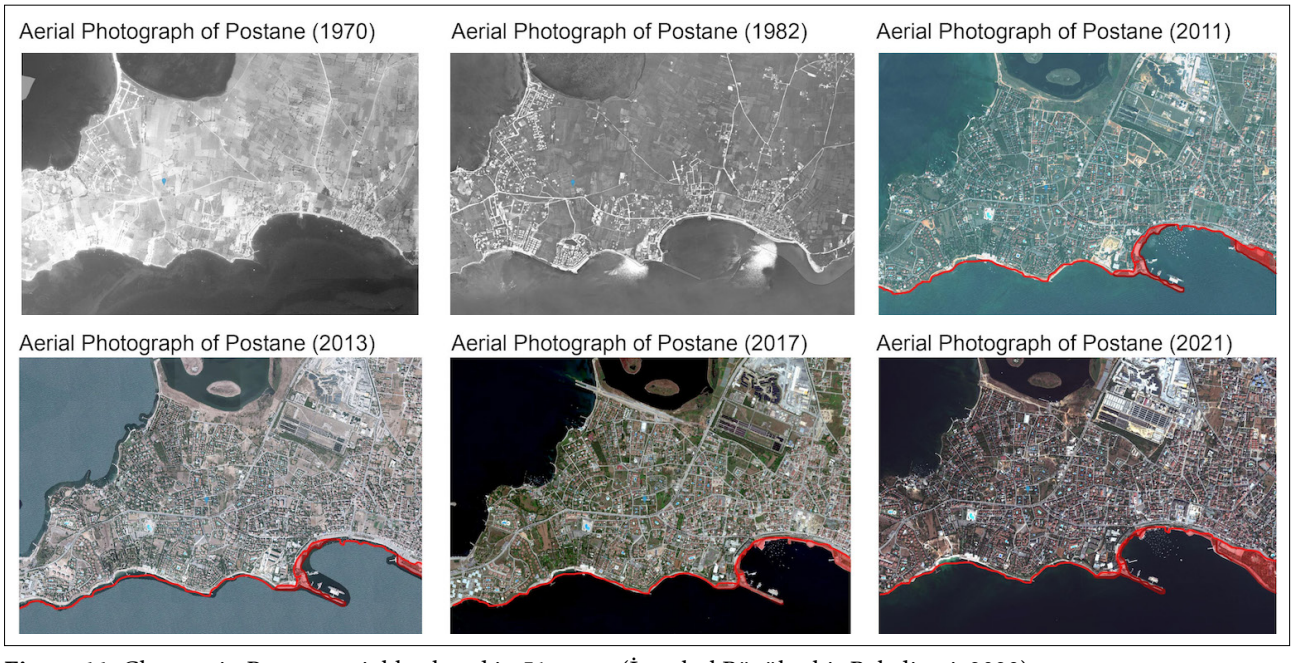

Figure 11. Changes in Postane neighborhood in 51 years. (İstanbul Büyükşehir Belediyesi, 2023)

Table 7. Percentages of existing places of memory in the Postane

Existing places of memory	Percentage %
Mercan	12.2%
Coast	10.8%
Kalekapı	9.5%
Ayazma	9.5%
Fountains	4.7%
Tuzla Port	4.7%
ITU (Istanbul Technical University has a campus there)	4.1%
Rumeli Culture Association	3.4%
Old houses	2.7%
Piri Reis University	2.0%
Haunted mansion/ Garden's of Selami	2.0%
Sultan 1. Ahmet Mosque	2.0%
Arsenal	2.0%
Manastır	2.0%
Sandy Pier	2.0%
Koy içi	1.4%
Tuzla High Scholl	1.4%
Çağrı Bey Primary Scholl	1.4%
Old Turkish Bath	1.4%
Naval Academy	1.4%
Armenian orphanage	1.4%
Farmer's Coffehouse	0.7%
40 Pafta	0.7%
3 Meşeler Area	0.7%
Akbank	0.7%
Atatürk Primary School	0.7%
Çolaklar Fish Restaurant	0.7%
Fish Lake	0.7%
Station	0.7%
Bostan (Urban Garden)	0.7%
By Tahsin Cafe	0.7%
Esentepe	0.7%
Lake	0.7%
Hakan ice cream shop	0.7%
Army Camp	0.7%
Kuyulu Street	0.7%
Marina	0.7%
Organic bazaar	0.7%
Health Center	0.7%
Seaside cafes	0.7%
Sigorta Apartments	0.7%
Tuzla Municipality Social Facility	0.7%
Tuzla bazaar	0.7%
Tuzla Primary Scholl	0.7%
Cafe	0.7%
Tuzla Cemetery	0.7%
Thermal Baths	0.7%
Tuzla Coast	0.7%

Table 8. Percentages of lost places of memory in the Postane

Lost places of memory	Percentage %
Ayazma	6.2%
Ayazma Tea Garden	4.9%
Ayazma Wedding Hall	1.2%
Water Tower/Tank	11.1%
The Burning House/ Selami's garden on the coast	7.4 %
Sand pier	6.2 %
Fountain at Kalekapı	4.9 %
Tuzla Tea Garden	4.9 %
Summer movie theater	3.7%
Kalekapı	2.5%
Farmer's Coffehouse	2.5%
Okra fields	2.5%
Fish Bazaar	2.5%
Adil Restaurant	2.5%
Armenian orphanage	2.5%
Farmlands	2.5%
Fountain	2.5%
Ab-ı Hayat Fountain	1.2 %
Old wooden houses	1.2%
Gardens	1.2%
Vegetable gardens	1.2%
Churches	1.2%
Red wall	1.2%
Cafe of Kubalı	1.2%
Old Tuzla Bazaar	1.2%
Mağfel	1.2%
Manastır Tea Garden	1.2%
Manastır Church	1.2%
Mercan Houses	1.2%
Mezarlık Cape	1.2%
Museum	1.2%
Pide Restaurant	1.2%
Seaside Tea Garden	1.2%
Değirmenaltı	1.2%
Beach	1.2%
Ido Lake	1.2%
Changing restaurants along the coast	1.2%
The venues on the beach	1.2%
Historic Greek Houses	1.2%
Police station	1.2%
Karantina (a building served as a quarantine pace in Ottoman times)	1.2%

Ayazma, Ayazma Tea Garden, and Ayazma Wedding Hall were mentioned by 12.3% of the respondents in total. The Tuzla Rumeli Culture Association, seen in Figure 12, was built in place of the old Ayazma Tea Garden in the neighborhood. In the garden of the Association, ancient plane trees and Byzantine ruins have been preserved and continue to serve

Figure 12. Tuzla Rumeli Culture Association.

the public as a tea garden. The fact that Ayazma is listed as a place of existing memory and as a place of lost memory shows that although the old texture has been lost, memory has been transferred to the present day to some extent.

11.1% of the responses were "Water Tower" or "Water Tank." In research conducted on the internet, it was observed that the residents wrote their memories of the water tower/tank where they waited in line for water.

Another frequently mentioned issue, albeit expressed in different ways, is the pink house and its garden on the seaside before the beach filling. It is called by various names such as "The Pink House," "The Burning Pink House," "The Haunted House," "Pastor's House," and "Selami's Garden" by the locals. 7.4% of the respondents said that the abandoned house, the ownership of which was transferred to the municipality, suffered a fire in 2016.

Figure 13. Shows the change in the Postane coast due to the landfill area and the newly built housing estate.

Figure 14. Shows the change in the Postane coast due to the landfill area and the newly built housing estate.

Figure 13 shows the "City and Population Exchange Museum" built by the municipality in place of the burnt building. Figure 14 shows the housing estate built on the site.

RESULTS AND DISCUSSION

In this study on places of memory and place attachment in the city of Istanbul, a survey was conducted with the residents of Küçükyalı, Kuzguncuk, and Postane. A total of 150 people, fifty people in each of the three areas, responded to the survey questions.

Table 9 presents the demographic information, duration of residence, where they feel they are from, and place attachment values of the participants in the three field studies. 52% of the survey participants living in Küçükyalı stated that they are from Istanbul, while 6% stated that they are from Küçükyalı. Among the survey participants living in Kuzguncuk, 24% stated that they are from Istanbul, and 54% stated that they are from Kuzguncuk. A different response was encountered in Postane. Of the survey participants living in Postane, 28% stated that they are from Istanbul, and 58% said that they are from Tuzla. Belonging to Tuzla District, where Postane is located, emerged with a big difference in the responses. In terms of place attachment values, Kuzguncuk's place attachment value is 6.24; Postane's place attachment value is 5.47; and Küçükyalı's place attachment value is 4.13. The results obtained in terms of place attachment values, changes in the regions, and lost places of memory are consistent with the research hypothesis. In all three areas, there are similarities related to the functions of places of memory. The functions of the places of memory were grouped regardless of the rate of mention in Table 10. An analysis of the functions of places of memory in the three areas revealed similarities. The most frequently mentioned places of memory included

Table 9. Demographic information, duration of residence, where people feel themselves are from and place attachment values of the respondents in the three areas

	Küçükyalı	Kuzguncuk	Postane
Gender %			
Woman	62	38	52
Man	38	62	48
Age			
Average	49	59	46
Standard Deviation	15.962	11.401	10.428
Educational Level (%)			
Primary School	6	10	2
Secondary School	2	12	4
High School	32	36	40
Associate/Bachelor's degree	52	32	38
Postgraduates	8	10	16
Employment Status (%)			
Employee	46	46	64
Unemployed	26	6	20
Retired	28	48	16
Place of birth (%)			
İstanbul	60	18	44
Maltepe/Üsküdar/Tuzla	0	18	24
Küçükyalı/Kuzguncuk/Postane	0	10	2
Duration of residence (year)			
İstanbul	42	50.8	41.5
Küçükyalı/Kuzguncuk/Postane	28.64	43.02	30.44
Where they feel themselves are from (%)			
İstanbul	52	24	28
Maltepe/Üsküdar/Tuzla	0	0	58
Küçükyalı/Kuzguncuk/Postane	6	54	0
Place attachment value	4.13	6.24	5.47

coastal and sea-related areas, parks and gardens, religious buildings, shopping buildings, educational buildings, transportation facilities, cafes and restaurants, cultural buildings, and accommodation facilities.

In Table 11, the rates of the responses to the question "Could you please mark in the columns how often you visit or use the places of memory?" are presented for the three regions.

When the 421 responses given in Table 11 are analysed, it is revealed that 33.6% of the participants experience places of memory very frequently, 23.9% frequently, 22.8% infrequently, and 8.5% very infrequently. Only 8% of the participants indicated that they do not experience any places of memory. When we look at the places of memory that are not experienced, it is seen that these places are religious buildings in the neighborhood. The research is based on Lefebvre's Spatial Triad process of perceiving, conceived, and experiencing, which enables us to perceive space as a social production, and on the assumption that the places where people live, know their stories, and can catch an intersection with their own life stories are included in the collective memory. The results of the field studies conducted in Küçükyalı, Kuzguncuk, and Postane are in line with this assumption. The gender, age, education level, duration of residence, employment status, and place attachment values of the survey participants in the three areas were primarily examined in the SPSS programme to see whether they were normally distributed. Since the data did not show normal distribution, Spearman Brown analysis was performed.

The correlation analysis for Küçükyalı is shown in Table 12. A significant correlation was found between the values of place attachment and the duration of residence in Küçükyalı.

Table 10. The functions of the places of memory were grouped

Coastal and Sea related spaces
Beach
Adil Restaurant
Ido Lake
Karantina
Mezarlık cape
Changing restaurants along the coast
The venues on the coast
Old Beaches
Seaside Tea garden
Lido Beach
Fish Lake
Lake
Marina
Coast
Seaside cafes
Tuzla Coast
Bakireler Tapınağı
Seascape
Bosphorus
Yalı Park

Shopping Buildings
Passages
Patisserie / Bakery
Dilim Patisseric
İnebolu Bazaar
Butcher Shop
Toys shop
Migros
Mopaş Market
Bim Market
Bazaar
Small shopkeepers
Grocery
Fish Bazaar
Küçükyalı Bazaar
Tuzla bazaar
Hilltown Mall
Hakan ice cream shop
Organic Bazaar
Fish Market

Street, Street, District Names
3 Meşeler Arca
40 Pafta
Ayazma
Esentepe
Koyici
Kuyulu Street
Mercan
Altıntepe
İdealtepe
Kılavuz Çayırı Street
Center of Küçükyalı
Neighborhood
Bağdat Street
Beşevler
Çarsı Street
Dere boyu
Icadiye Street
Nakkastepe
Simitçi Tahir Street
Üryanizade Street
Çınar Neighbourhood
Kalekapı
Değirmenaltı

Old Turkish Baths / Spas
Thermal Baths

Fountains
Abi Hayat Fountain
Fountain at Kalekapı

Educational Buildings
Atatürk Primary School
Çağrı Bey Primary Scholl
Piri Reis University
My School
Kuzguncuk Primary school
Naval Academy
ITU
Tuzla Primary Scholl
Tuzla High Scholl
Küçükyalı Center Primary School
Nersesyan Yermonyan School

Transportation Buildings
Sand Pier
Old railway crossing
63 Bus stop
Marmaray
Metro
Railway station
Tunnel
Pier
Ulusoy

Accommodation Buildings
Old wooden houses
Marko Pasa Mansion
Haunted mansion
White House
Armenian orphanage
Sigorta Apartments
Simotas Apartment
Single storey houses&garden
Waterside Mansions
Tuzla Port
Nida park
My home
Mercan Houses
Köşk Apartment
Tield Mansion
A house burning on the coast
Is Bankası Apartments
Highways Housing / Directorate

Parks and Gardens,Soccer Fields
Bostan
Gardens
Garden of Selami
50th Anniversary Park
Adnan Kahveci Park
Atatürk Park
Soccer field
Park
Sani Malaz Park
Fethi Pasa Grove
Okra fields
Farmlands
Trees

Water Tower/ Depot / Warehouses
Sand depot
Warehouse of Efes Pilsen
Water Tower/Tank
Wood storage

Cafes,Restaurants,O. Cof. Houses
Ayazma Tea Garden
Ayazma Wedding Hall
Cafe
Farmer's Coffehouse
Çolaklar Fish Restaurant
By Tahsin Cafe
Çamlık Café
Çınaraltı Café
Starbucks
İsmet Baba Restaron
Cafe of Kubalı
Manastır Tea Garden
Cafe AgitBey
Old coffehouses
Tuzla Tea Garden
Yeşilçam Cafe
Pide restaurant

Health Buildings
Healthcare Center
Old Kızılay

Movie theater / Cultural Buildings
Archaeopark
Rumeli Culture Association
Tuzla Municipality Social Facility
Nail Bookshop
Summer movie theater
Muscum
63 Movie Theater
İhya Movie Theater
İpek Movie Theater

Religious Buildings
Churches
Old mosque by the coast
Sultan 1. Ahmet Mosque
Mosque
Mosque and Church side by side
Places of worship
Greek Church Bell Tower
Synagogue
Manastır Church

Police Station, Post Of., Bank B.
Old İgdaş
Post office
Police Station
Military Recruitment Office Building
Banks
Old PTT
Old Police Station
Turk Telekom

Table 11. Ratios of the responses to the question "Could you please mark in the columns the frequency of your presence in or use of the existing places of memory for the three regions?"

	Frequency	Percent
Valid		
very frequently	146	33.6
frequently	104	23.9
infrequently	99	22.8
very infrequently	37	8.5
none	35	8.0
Total	421	96.8
Missing		
System	14	3.2
Total	435	100.0

Table 12. Correlation analysis for Küçükyalı

	Place attachment	Duration of residence
Place attachment		
Correlation Coefficient	1	.346*
Sig. (2-tailed)	.	0.02
N	45	45
Duration of residence		
Correlation Coefficient	.346*	1
Sig. (2-tailed)	0.02	.
N	45	45

Table 13. Correlation analysis for Kuzguncuk.

	Education level	Place attachment
Education level		
Correlation Coefficient	1	.306*
Sig. (2-tailed)	.	0.033
N	49	49
Place attachment		
Correlation Coefficient	.306*	1
Sig. (2-tailed)	0.033	.
N	49	49

Table 13 shows that there is a significant relationship between place attachment values and educational level in Kuzguncuk.

The correlation analysis for the Postane is shown in Table 14. In the Postane, there is a significant relationship between place attachment values and employment status. In all three areas, there is no significant relationship with place attachment values depending on age or gender. When examining the place attachment values across the three study areas, the relationships between place attachment and participants' gender, age, duration of residence, educational status, and employment status were assessed. In each area, significant relationships were observed between place attachment values and duration of residence, educational status, and employment status. Similar to Lewicka's (2010) study, the positive impact of duration of residence on place attachment was measured. Contrary to the findings of Hidalgo & Hernandez (2001), there was no significant relationship or difference between place attachment values and age or gender in any of the three areas.

Table 14. Correlation analysis for Postane.

	Place attachment	Employment status
Place attachment		
Correlation Coefficient	1	-.398**
Sig. (2-tailed)	.	0.005
N	48	48
Employment status		
Correlation Coefficient	-.398**	1
Sig. (2-tailed)	0.005	.
N	48	48

CONCLUSION

In this study, it is posited that addressing the issues of places of memory and place attachment together at the neighborhood scale in different regions will contribute to the body of research on memory and place attachment. In regions undergoing profound and extensive changes, the loss of places of memory for inhabitants can lead to a diminished sense of place attachment. In contrast, in protected areas with minimal change, the continuity of places of memory is maintained, resulting in higher place attachment among residents. Numerous variables can influence people's attachment to their neighborhoods, making the identification of these variables a complex issue. The study identified the effects of residence duration, educational status, and employment status on place attachment. However, no significant relationship or difference was found concerning age and gender.

When examining the functions of places of memory, similarities have been identified; however, the most significant commonality of these spaces is that they are places experienced by individuals and connected to their personal life stories.

This study aims to take a step towards preserving places of memory and strengthening residents' place attachment, thereby ensuring the continuity of urban memory. In subsequent studies, the creation of memory maps for neighborhoods could facilitate research on memory

transmission at the neighborhood scale. Additionally, to determine individuals' levels of attachment to places of memory, face-to-face interviews with a limited number of participants could be conducted, applying a place attachment scale specifically for places of memory.

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Article

A systematic approach to sound and spatial experience studies: Detection of the key concepts and themes

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ABSTRACT

The research examines studies about the process of spatial experience and highlights aural interactions. In this sense, the goal is to assess and describe the expanding corpus of literature in the field of sound and spatial experience and to provide a framework for further investigation.
Key concepts and themes that emerge at the intersection of space, sound, and experience are examined through a comprehensive review. Bibliometric research techniques are applied with a methodological framework in accordance with the process of detecting themes. Web of Science database was used as the raw data source, and scientific mapping and analysis of the obtained data was performed using VOSviewer. PRISMA guidelines were utilized for the study's document selection, and reporting processes.
Systematic scanning and selection processes resulted in the collection of 416 documents. The procedure of detecting themes led to the identification of 13 major themes and 136 key concepts that emerged. Essentially, it was discovered that the "soundscape" was the most significant concept and theme in the field of study. Furthermore, assessments and inferences were conducted on all other key concepts and themes. The major components of the field, concentrated areas, and potential development areas have been discovered through the analysis of conceptual relationship networks.
The findings will provide future researchers an opportunity to comprehend how the research field has developed, as well as a chance to learn more about new potential fields of study and enhance their research.

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INTRODUCTION

How do we experience our environment? This question has long been one of the most important ones in environmental studies. To address this and raise concerns about the mechanisms underlying spatial experience, the senses were organized in a hierarchy, with vision generally recognized as the superior sense (Clouten, 1973; Hutmacher, 2019; Levin, 1993; Posner et al., 1976; Spence, 2020). The "eye-centric paradigm" manifests the superiority ascribed to vision in architectural culture. This method, which peaked with modernist philosophy, aimed to design the space in the logic of machine aesthetics based on a utilitarian system, ignoring the physical and psychological connections of humans with the space (Bille & Sørensen, 2018; Pallasmaa, 2005; Rybczynski, 2001; Williams, 1980).

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However, the users experience the space in an interactive and responsive way with their entire body rather than developing a one-dimensional relationship with it based on the mind's vision. This interaction results from the user's relationship with the environment via all sense mechanisms (Merleau-Ponty, 1968; Pallasmaa, 2005; Puderbaugh, 1967). Especially the aural features of space play a vital role in the experiential identity since they go far beyond serving as a simple, neutral background (Sheridan & Van Lengen, 2003).

Similar questions have always existed in concepts about the experience of space, and the role of sound in the processes of spatial experience has long garnered attention. Pythagoras is credited with using the concepts of harmonic music in his spatial reasoning as early as the fifth century BC (Long, 2006; Pallasmaa, 2017). These concepts are supported at this time period by ancient structures like Greek amphitheaters and whispering galleries (Sheridan & Van Lengen, 2003). In the Middle Ages, the stern and echoing interiors of monasteries and cathedrals expressed notions about approaches to auditory experience (Rasmussen, 1964). The Renaissance brought about more systematic ideas about how geometry affects how sound travels across space, and later on, this system became apparent in concert halls (Forsyth, 1985). With Sabine's acoustic theory, this interaction was conceptually named for the first time in 1895, and it thereafter started to emerge in the literature (Sabine, 1906; Sheridan & Van Lengen, 2003). With the exception of the Philips Pavilion, this strategy did not receive much support within the eye-centric paradigm of the modernist era (Xenakis & Kanach, 2008). Since the advent of acoustic science, the literature has started to reflect a greater variety of methods. The term "soundscape," initially introduced by Southworth in 1967 and then systematized by Schafer, is described as the acoustic environment that humans experience in context (Kang et al., 2016; Schafer, 1994; Southworth, 1967). The International Standardization Organization (ISO) standardized this concept in 2014, and it is still referenced in the literature today (ISO, 2014). Another modern conceptual concept is called "Aural Architecture," which came into being after the 2000s and is defined as architecture that expresses the characteristics of a place that can be experienced by hearing (Blesser & Salter, 2007).

It is observed that there are few research studies in the field that comprehensively and methodically review this literature. Zhang & Kang (2007) conducted a non-systematic literature review focusing on the concept of soundscape in urban open spaces and systematized the factors affecting it. Brown (2011) provided a quick overview of the methodologies as well as an explanation of the fundamental terms and concepts related to soundscape and soundscape planning. Fowler (2013) questioned the concepts related to sound and aurality within architecture and sound design approaches, briefly introduced some prominent approaches in the literature, and evaluated them mutually in the context of installations. Again, Fowler (2015) discussed the interaction of space and sound studies and architectural design processes and compared the leading theories in the literature. The argument made in the paper is that by integrating these methodologies into the architectural design processes, the experience potential of the space will grow. A review by Bild et al. (2016) examined several perspectives on user interaction and the auditory environment in public spaces using a non-systematic literature review methodology. Aletta et al. (2016) analyzed the soundscape descriptors in the literature and offered a conceptual framework for creating predictive models. Ma et al. (2018) reviewed studies that used a systematic approach to evaluate the human perceptual dimensions of sound. They identified perceptual dimensions that are included in the studies and referred to the general judgment of a person. Erfanian et al. (2019) examined the physio-psychological measurement parameters used in soundscape studies with a systematic review. It revealed the trends of the parameters used in the studies. In a systematic review of soundscape prediction model techniques, Lionello et al. (2020) compared various modeling approaches and conducted content analysis on 22 publications. Li & Lau (2020) carried out a systematic literature review to investigate the impacts of audio-visual interaction on soundscape evaluation, design, and noise control. They analyzed and categorized the publications in the field for their study, which resulted in a paper that can be used as a manual for other studies. A systematic literature analysis by Yang & Jeon (2020) analyzed the effects of building envelope elements in the urban acoustic environment and drew conclusions about building envelope design strategies. With a systematic review, Engel et al. (2021) identified the usage of psychoacoustic parameters in soundscape studies from the previous ten years as well as broader trends in the area. Pellegatti et al. (2023) carried out a systematic literature review on the connection between ventilation system-related noises and students' acoustic comfort by concentrating on the indoor soundscape of classrooms. Kang (2023) reviewed and highlighted the most recent advancements and discoveries in the field of soundscape with all of its different facets.

The majority of the research under consideration had a basic methodology and worked under constrained parameters. Few current studies apply bibliometric techniques in a systematic way. However, none of these studies examined the field as a whole, identified the key concepts in the field and the thematic areas they developed, or documented the current condition of the field from this perspective at the time of the study. Therefore, a systematic literature review that considers all approaches emerging at the intersection of space-experience-sound will provide valuable potential for the field. To achieve this, the study uses bibliometric analysis techniques to conduct a systematic and comprehensive review of the literature that is forming at the nexus of sound, space, and experience. The field's emerging con-

cepts and themes they generate are recognized, and their potential for further research is evaluated. Finding conceptual linkages within the field allows us to deduce probable development areas and areas of concentration. The study's evaluation procedures made it possible to pinpoint key concepts and themes within the context of sound and spatial experience, identify current trends, and identify new, pertinent research areas for future studies.

MATERIALS AND METHODS

Research Questions

The study is shaped in line with two main research questions:

- What key concepts emerge in sound and space experience studies and the thematic areas created by these concepts?
- Which themes have studies focused on over time in relation to sound and spatial experience? What is the distribution of these themes in the literature? Which concepts and themes are newer and more open to research?

The primary research question aims to investigate the place of sound and auditory in the user's spatial experience processes, and especially to explore the concepts and themes emerging in this field. The second question aims to evaluate the key concepts and themes that emerge, explore their distribution in the literature and relations between them, and thus derive implications for the future provision of the study field.

Methodological Structure: Detection of Themes

The term bibliometrics was first used by Pritchard (1969) and is defined as the science that aims to quantitatively evaluate academic outcomes developed in a field. It discusses several quantitative techniques for analyzing and evaluating texts and information, particularly those stored in large bibliographic data sets. In recent years, bibliometric research methods have also been widely used in the disciplines of architecture and built environment research (Bild et al., 2016; Engel et al., 2021; Erfanian et al., 2019; Ganbat et al., 2018; H. Li & Lau, 2020; X. Li et al., 2017; Y. Li et al., 2018; Lionello et al., 2020; Xue et al., 2018; Zhao et al., 2018).

A structured approach based on the bibliometric techniques was developed to address the study's research goals. First, in order to identify the concepts and themes that address the processes of sound and spatial experience, a system based on the "process of detecting themes" proposed by Cobo et al. (2011a) was planned. The study proposed a five-step process in order to detect and visualize the conceptual particular themes or general thematic areas in a research field. Thus, it allows us to quantify the importance of themes and thematic areas within a field of study, and their contribution to the field:

1. Collection of raw data: The process of obtaining raw data sets by scanning in databases.
2. Selection of the type of item to analyze: The process of descoping raw data based on filters such as journals, articles, authors, descriptive terms, or words and obtaining an appropriate dataset.
3. Extraction of relevant information from the raw data: At this stage, the co-occurrence frequencies of keywords according to the research field are extracted from the corpus of documents by counting the number of documents in which the two keywords occur together.
4. Calculation of similarities between items based on the extracted information: Based on the data obtained in the third stage, the similarities between the items are calculated based on the co-occurrence frequencies of the keywords (association strength (Coulter et al., 1998; Van Eck & Waltman, 2007).
5. Use of a clustering algorithm to detect the themes. It is based on a process of clustering to locate subgroups of keywords that are strongly linked to each other with several clustering algorithms.

Database

In bibliometric studies, bibliographic sources such as Web of Science (WOS), Scopus, Google Scholar, Microsoft Academic, PubMed, and Dimensions are used (Chen, 2017; Moral-Muñoz et al., 2020). Among these databases, WOS covers different formats such as full-text articles, reviews, editorials, chronologies, abstracts, papers (journal and book-based), and technical articles. In terms of temporal scope, it contains over 90 million records from 1900 to the present. With these aspects, it is widely accepted as a high-quality digital database (Ding & Yang, 2022; Moral-Muñoz et al., 2020). In addition, the WOS Core Collection database is considered the most authoritative data source as it contains the most respected and influential journals (Pouris & Pouris, 2011; Song et al., 2016; Zhao et al., 2018). These factors led to the selection of WOS as the study's bibliometric database.

SMA Software

SMA is used to perform the third (co-occurrence frequencies of keywords), fourth (calculation of similarities), and fifth steps (clustering process) in the method of detecting themes. In order to select the appropriate tool for the study, papers that compare and contrast SMA software were examined (Cobo et al., 2011b; Gutiérrez-Salcedo et al., 2018; Markscheffel & Schröter, 2021; Moral-Munoz et al., 2019; Moral-Muñoz et al., 2020; Pan et al., 2018). Although there isn't a consensus among the studies, each one has explained the benefits and drawbacks of SMA tools and stated that picking the best software based on the analysis techniques to be used and, in some cases, combining more

than one software will produce advantageous results. The prevalence of use was also analyzed by Pan et al. (2018), who found that VOSviewer software was most commonly used despite finding an upward trend in the use of all the software they looked at. The VOSviewer software is used in the study with its ability to work with common databases (Moral-Muñoz et al., 2020), to create successful visualization outputs (Markscheffel & Schröter, 2021; Moral-Muñoz et al., 2020), and to use the association strength (Van Eck & Waltman, 2007; 2010) similarity criteria in accordance with the method of detecting themes and to be suitable for clustering algorithms.

The results of the methodological analysis are also reported in accordance with PRISMA guidelines (Liberati et al. 2009) (Figure 1).

RESULTS

Search Strategy and Selection Criteria

Keywords for searches were chosen in accordance with the study's objectives and research questions in order to get relevant data from the database. The words "sound," "space," and "experience" were entered into the WOS Core Collection database [(((ALL=(sound)) AND ALL=(space)) AND ALL=(experience))]. At this stage, limitations such as year range or document type were not applied in order to keep the scope wide. As a result of this search, raw data was collected by accessing 2274 records.

First, 2206 records were collected after the results were filtered as English-language materials. The first screening of these documents was made according to their relevance to the research area. Since the keywords used in the search have synonyms in space sciences, health sciences, computer sciences, physics, mathematics, mechanics, etc., documents that are unrelated to the research topic have been eliminated. Then, all records were examined according to their titles, keywords, and abstracts, and incompatible records were eliminated. These stages led to the elimination of 1782 studies that had no relation to the scope. In particular, studies in multidisciplinary fields such as acoustics were examined, and records unsuitable for the study were excluded. Following a full-text evaluation of 424 records, 8 papers and book chapters also included in article versions were dropped from the data set. In the end, 416 studies were acquired for the systematic review process (Figure 2).

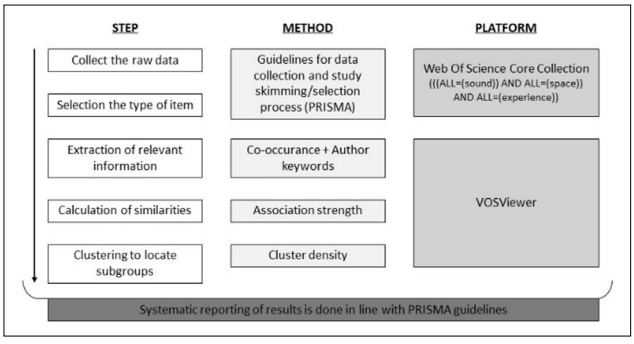

Figure 1. Summary of methodological structure.

Descriptive Analysis

The "process of extraction of relevant information from the raw data" was started with 416 records. First, information on document types and distribution by years was gathered using the WOS system's capabilities in order to define the dataset's current state.

The 416 records' document types revealed that they were made up of 350 articles, 40 proceedings, 14 book chapters, and 12 review articles. The study's coverage of a variety of document types offers an expanded perspective.

When the number of documents changes over time is analyzed, it can be shown that the documents published from 1991 to the present are covered in the scope (Figure 3). It can be said that the number of documents in the study field has increased rapidly, especially since the 2000s. Similarly, it is understood that the number of citations has increased significantly. The statistics indicate that there is increasing interest in the field. Additionally, it can be inferred from Figure 3 that the majority of the documents examined are recent studies.

Thematic Analysis

Data on 416 documents were downloaded from the WOS database in "plain text file" format and with the scope of "full record and cited references." The text file was imported into VOSviewer to conduct next-stage analyses. As stated in the third step of the process of detecting themes, in order to analyze the frequency of co-occurrence of keywords, the file was subjected to Co-occurrence - Author Keywords analysis, and the process was run according to the frequency of co-occurrence of the two words. It was found that there were singular-plural and synonymous words among the occurring words (e.g., sound and sounds; sound-art and sound art; urban park and urban parks; bird sound and bird song, etc.). When these words were matched with a "thesaurus" file and the same procedure was repeated, it was determined that 136 out of a total of 1126 keywords exceeded the threshold. Each of these resulting keywords is considered as a concept for the field of study.

These terms were then normalized using the association strength criteria (Van Eck & Waltman, 2007), as explained in the fourth phase of the process. As a result, keyword relationship networks were created, and a total of 482 connections between 136 keywords emerged. Some keywords may occur in multiple documents, in which case there is a stronger link between them than one. This indicates that the association strength of the two keywords is higher.

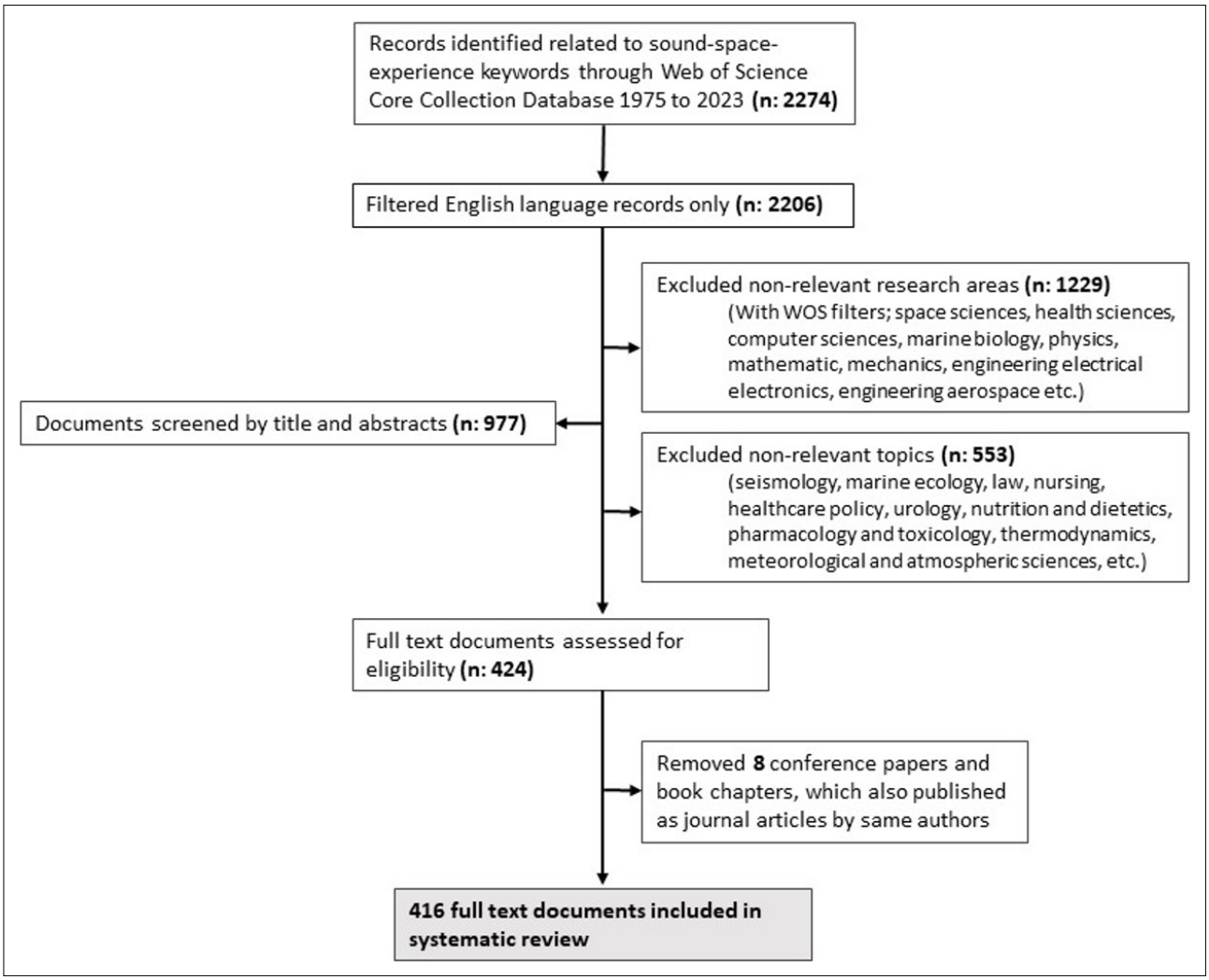

Figure 2. PRISMA Flow diagram for the paper search and skimming/selection process, December 2023.

When evaluated in this way, the total link strength within the network turns out to be 570.

In accordance with the clustering process, which is the last step of the process of detecting themes, the process was run with the clustering algorithm of the VOSviewer (Waltman et al., 2010) and 13 clusters were obtained.

The data obtained as a result of the processes run in the VOSviewer software are presented digitally with an interactive system where graphics and texts are processed together. In order to present this data in text and make mutual assessments, the interactive data has been transferred and presented in a table form by the author. The occurring keywords, clusters, their occurrences (Occ.), total link strength (TLS), and average publication years (APY) are shown in Figure 4.

According to Callon et al. (1991), keyword clusters and their interconnections are obtained using co-word analysis. These resulting clusters are considered themes. Each thematic network is tagged using the name of the most important keyword (by occurrence value) in the associated theme. For example, the keyword "blindness," which has the highest occurrence and TLS value in cluster 1, stands out as the most important item in the cluster and gives its name to the cluster. Therefore, the themes that emerged within the database are blindness, virtual reality, sound perception, urban space, perception, soundscape, noise, public space, music, listening, sound art, inequality, and sound. In order to make comparisons between these themes, the total occurrence, TLS, and APY data of each cluster were also calculated.

The Network Visualization Map (NVM) presents the resulting keywords and the connections between them in detail (Figure 5). The elements depicted as circles and labels on the NVM represent keywords. The size of the circle increases with a keyword's frequency of occurrence. Connections between keywords are expressed as links. The line thickness of the link between two keywords increases as the association strength between them becomes stronger. Since the system is operated with the co-occurrence anal-

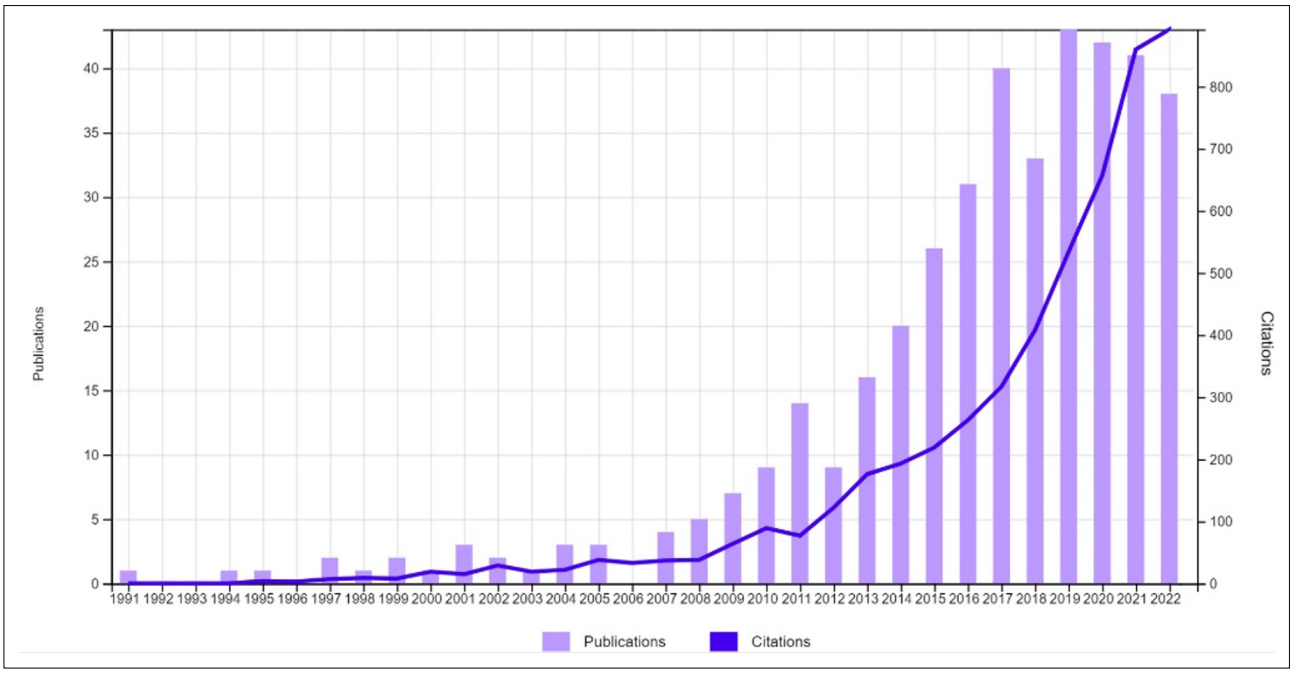

Figure 3. Times cited and publications over time graph.

ysis type, the association strength and therefore the link thickness increases as the number of publications in which the two keywords occur together increases. In the NVM, keywords in the same cluster are represented by circles of the same color (Van Eck & Waltman, 2023). The color legend of the clusters was created by the author and added to the graph (Figure 5).

When the NVM is examined, it can be seen that the keyword "soundscape" is the most dominant element in the research field in terms of both occurrence and TLS. As seen in Figure 4, the keyword soundscape occurred 52 times and TLS is 97. Similarly, the most common words after the keyword “soundscape” (Occ: 52, TLS: 97) with occurrence and TLS; “sound” (Occ: 27, TLS: 55), “public space” (Occ: 11, TLS: 29), “urban design” (Occ: 11, TLS: 26), and “noise” (Occ: 10, TLS: 26) continue as follows. The occurrence of the words following these five most common keywords does not change in direct proportion to the TLS. For example, the sixth most common keyword according to occurrence is "urban space" (Occ: 10, TLS: 19); according to the TLS, the sixth strongest keyword is “music” (Occ: 9, TLS: 23). Therefore, it is seen that each keyword emerges within a different network of relationships (Figure 5).

Connection relationships between items can be seen from the NVM graph. For example, the items most frequently linked to the keyword "soundscape" are: “urban park” (Link Strength: 5), “public space” (LS: 5), “sound” (LS: 4), “acoustic environment” (LS: 4), and “noise” (LS: 4). The links between an item and its associated items and a different item and its associated items create attraction and repulsion layouts within the graph. It is seen that keywords and clusters more closely related to each other are intertwined, and keywords with weak connections are located in distant parts. For example, the keyword "inequality" and its surrounding keywords are only associated with a single connection to "soundscape," and are located far outside the chart as they do not associate with other items. On the contrary, the keywords "soundscape" and "public space" are very close to each other due to their strong connections (Figure 5).

The NVM graph can also be used to gather details about clusters and their connections. As exemplified, since the level of connection between the "inequality" (Cluster 12) and "soundscape" (Cluster 6) clusters is weak, the clusters are located at distant points; due to the intense relationship between the "soundscape" (Cluster 6) cluster and the "public space" (Cluster 8) cluster, the clusters are intertwined. Through mutual assessments using NVM and Figure 4, comparisons between the number of items and the occurrence of clusters can also be conducted. For example, although it has the highest number of items, the occurrence of the items in the "blindness" (Cluster 1) is lower than the "soundscape" (Cluster 6) and "virtual reality" (Cluster 2) clusters. When the TLS is examined, the "blindness" (Cluster 1) comes after the "soundscape" (Cluster 6), "virtual reality" (Cluster 2), and "perception" (Cluster 5) clusters, despite the highest number of items. Due to this feature, the more peripheral location of the "blindness" (Cluster 1) is understood in the graph (Figure 5).

The Cluster Density Visualization Map (CDVM), which displays the cluster density and inter-cluster interactions, is shown in Figure 6.

Cluster 1 (20 item)			
keyword	**Occ**	**TLS**	**APY**
auditory cortex	2	4	2015,00
auditory localization	2	3	2017,00
auditory perception	5	9	2015,80
auditory system	2	5	2000,50
binaural	3	8	2015,00
blindness	7	14	2015,29
body representation	2	2	2018,50
deafness	2	2	2017,00
hearing	2	4	2011,50
perceptual dimensions	2	3	2018,00
perceptual learning	2	5	2015,00
peripersonal space	2	4	2015,00
plasticity	4	10	2008,00
psychoacoustics	2	3	2019,50
sound localization	3	8	2007,67
space perception	2	4	2008,00
spatial cognition	2	5	2016,00
spatial hearing	5	12	2016,00
tool-use	2	4	2015,00
visually impaired	5	9	2017,00
Blindness	**58**	**118**	**2014,04**

Cluster 2 (19 item)			
keyword	**Occ**	**TLS**	**APY**
acoustic comfort	5	8	2021,40
acoustic environment	5	14	2019,00
archaeoacoustics	2	3	2016,50
architectural acoustics	3	4	2012,33
auralization	4	6	2019,00
church acoustics	2	3	2016,50
cultural heritage	2	3	2018,50
emotion	7	12	2018,43
gesture	3	5	2016,00
heritage acoustics	2	1	2021,00
multisensory	4	5	2016,50
parametric design	2	1	2012,00
resonance	2	2	2021,00
room acoustics	3	4	2019,67
spatial audio	2	3	2017,00
speech intelligibility	3	6	2020,67
subjective evaluation	3	3	2020,33
virtual acoustics	2	5	2016,50
virtual reality	9	19	2019,11
Virtual reality	**65**	**107**	**2017,97**

Cluster 3 (15 item)			
keyword	**Occ**	**TLS**	**APY**
acoustic design	2	5	2012,00
auditory semantics	2	2	2011,50
ethnography	3	5	2022,00
experience	4	11	2017,25
grounded theory	2	2	2021,00
health	3	11	2019,67
improvisation	2	4	2019,00
indoor soundscape	4	8	2019,50
long-term care	2	6	2019,00
multimodal integration	2	1	2019,50
phenomenology	2	4	2019,50
silence	5	4	2017,20
sound perception	5	12	2018,00
sound quality	4	7	2013,75
well-being	3	7	2017,00
Sound perception	**45**	**89**	**2017,72**

Cluster 4 (13 item)			
keyword	**Occ**	**TLS**	**APY**
attention	4	8	2017,5
attunement	2	6	2019,5
audio-visual interaction	2	4	2019,5
everyday life	2	6	2014,5
heritage	2	4	2020,5
landscape	4	10	2017,5
landscape architecture	2	6	2018
memory	6	9	2016,67
place	4	6	2017,75
sensory experience	4	9	2019,75
sonic experience	3	9	2019,67
tranquillity	2	5	2017,5
urban space	10	19	2018,1
Urban space	**47**	**101**	**2018,19**

Cluster 5 (13 item)			
keyword	**Occ**	**TLS**	**APY**
affect	6	17	2015,83
color	2	4	2014
ecology	2	5	2016,5
embodiment	4	10	2015
perception	9	20	2019,11
performance	4	11	2015,5
politics	2	5	2017
semiotics	2	4	2017
sound-space	2	6	2022
space	7	18	2017
synesthesia	4	10	2017,75
touch	2	3	2019
voice	3	9	2015
Perception	**49**	**122**	**2016,98**

Cluster 6 (12 item)			
keyword	**Occ**	**TLS**	**APY**
acoustic experience	2	1	2021,5
bird sounds	2	6	2021,5
eeg	2	3	2021,5
green space	3	2	2018,33
nature	2	2	2018
noise annoyance	3	4	2019
soundscape	52	97	2018,19
soundscape assessment	4	6	2018,75
soundwalk	4	10	2017,5
traffic noise	5	13	2021,6
urban park	10	16	2018,8
urban soundscape	5	7	2019,6
Soundscape	**94**	**167**	**2019,52**

Cluster 7 (9 item)			
keyword	**Occ**	**TLS**	**APY**
built environment	2	7	2022
covid-19	4	13	2020,75
cycling	2	7	2022
mobility	3	7	2013
noise	10	26	2017,3
noise perception	2	8	2019,5
post-occupancy evaluation	2	2	2022,5
residential satisfaction	2	2	2023
survey	2	8	2013
Noise	**29**	**80**	**2019,23**

Cluster 8 (9 item)			
keyword	**Occ**	**TLS**	**APY**
ambisonics	2	5	2020
atmosphere	2	4	2019
pocket park	3	12	2020
public space	11	29	2019,09
quality of the urban public experience	2	9	2020
restoration	2	6	2020,5
soundscape design	5	21	2017,6
urban design	11	26	2018,18
urban sound planning	3	12	2017,33
Public space	**41**	**124**	**2019,08**

Cluster 9 (9 item)			
keyword	**Occ**	**TLS**	**APY**
accessibility	2	2	2020
architecture	8	18	2015,25
art	2	4	2015,5
city	3	8	2019,33
culture	2	5	2019
music	9	23	2018,78
sonic environment	4	7	2020,5
sound preference	2	5	2013,5
technology	3	7	2018
Music	**35**	**79**	**2017,76**

Cluster 10 (6 item)			
keyword	**Occ**	**TLS**	**APY**
aesthetics	4	5	2018,25
anthropology	2	6	2017
aural architecture	3	12	2018
jerusalem	2	4	2013,5
listening	7	11	2015,57
sound studies	5	16	2015
Listening	**23**	**54**	**2016,22**

Cluster 11 (5 item)			
keyword	**Occ**	**TLS**	**APY**
acoustics	2	7	2015,5
design	2	9	2018
field recording	3	2	2016,33
museums	2	5	2021,5
sound art	6	12	2015
Sound art	**15**	**35**	**2017,27**

Cluster 12 (3 item)			
keyword	**Occ**	**TLS**	**APY**
inequality	2	2	2019,5
noise pollution	2	1	2019,5
sensory ethnography	2	2	2020,5
Inequality	**6**	**5**	**2019,83**

Cluster 13 (3 item)			
keyword	**Occ**	**TLS**	**APY**
bells	2	1	2014,5
sense of place	3	3	2019,67
sound	27	55	2017,63
Sound	**32**	**59**	**2017,27**

Figure 4. Detailed List of Items and Clusters (prepared by the author).

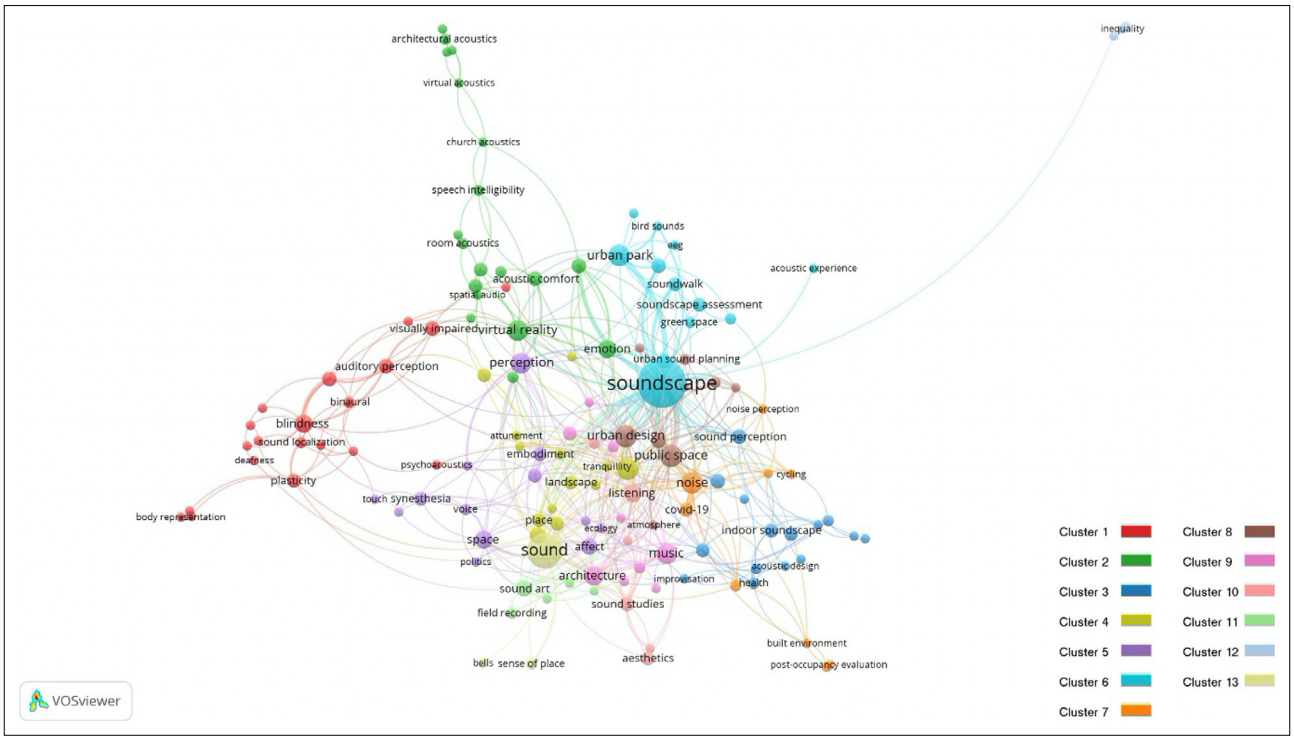

Figure 5. Network visualization map (NVM).

The "soundscape" component and the dominance of Cluster 6 can be seen clearly in the CDVM, similar to the NVM (Figure 5). As mentioned in the inferences from NVM, the location of the "blindness" (Cluster 1) at the periphery can be seen. The "virtual reality" (Cluster 2) has a weak relationship with other clusters, as can also be shown. It is evident that the "inequality" (Cluster 12) is situated entirely independently. The "urban space" (Cluster 4), "noise" (Cluster 7), "public space" (Cluster 8), "music" (Cluster 9), and "listening" (Cluster 10) clusters are in a very thick association, particularly in the center of the graph, and these clusters are mixed with one another in most of the network. On the basis of this, it can be claimed that the fields of study found inside these clusters are also interconnected.

The last presented graph is the Overlay Visualization Map (OVM) (Figure 7). OVM is a version of the NVM colored according to the average publication years (APY) of items. Similar to NVM, this map also includes keywords represented by circles with occurrence value-based sizing and links with association strength-based sizing. In contrast, there is no coloring for the clusters on this map. Each keyword is colored on the map according to the APY of the publications where it appears in the database. The legend displays this color distribution (Van Eck & Waltman, 2023) (Figure 7).

Inferences regarding the concepts' recentness can be drawn with the help of OVM. A keyword, for instance, is considered less current in the field if it has a low occurrence value and an older APY. A keyword that has a high occurrence value and a recent APY, however, is considered to be quite contemporary. Additionally, a keyword with a low occurrence value and a recent APY is likely an idea that is still being researched in the field and could be a potential field for expansion.

According to OVM, the keywords retrieved through systematic analysis have, on average, been in the database since 2000 and some of the elements are still effective today. The APY value for publications containing the keyword "soundscape" is 2018.19, for instance. This result demonstrates that the keyword "soundscape" is often used in the database and has recently grown in importance as a field of study. Another example of the inferences is the "auditory system"'s occurrence value is 2, the TLS value is 5, and the APY is 2000.50. These results indicate that this keyword was only used in the database's initial years and wasn't used subsequently. As a result, the keyword has a low level of currentness. Conversely, the keyword “traffic noise” has an occurrence value of 5, a TLS value of 13, and an APY value of 2021.60. These findings indicate that "traffic noise" is a more recent concept than "auditory system" and represents a potential field for database progress. Within OVM, similar to the keyword “traffic noise”; “cycling” (Occ: 2, TLS: 7, APY: 2022), “EEG” (Occ: 2, TLS: 3, APY: 2021.50), and “museums” (Occ: 2, TLS: 5, APY: 2021.50) keywords can be considered as current and potential areas of progress (Figure 7).

The OVM graph does not directly provide information

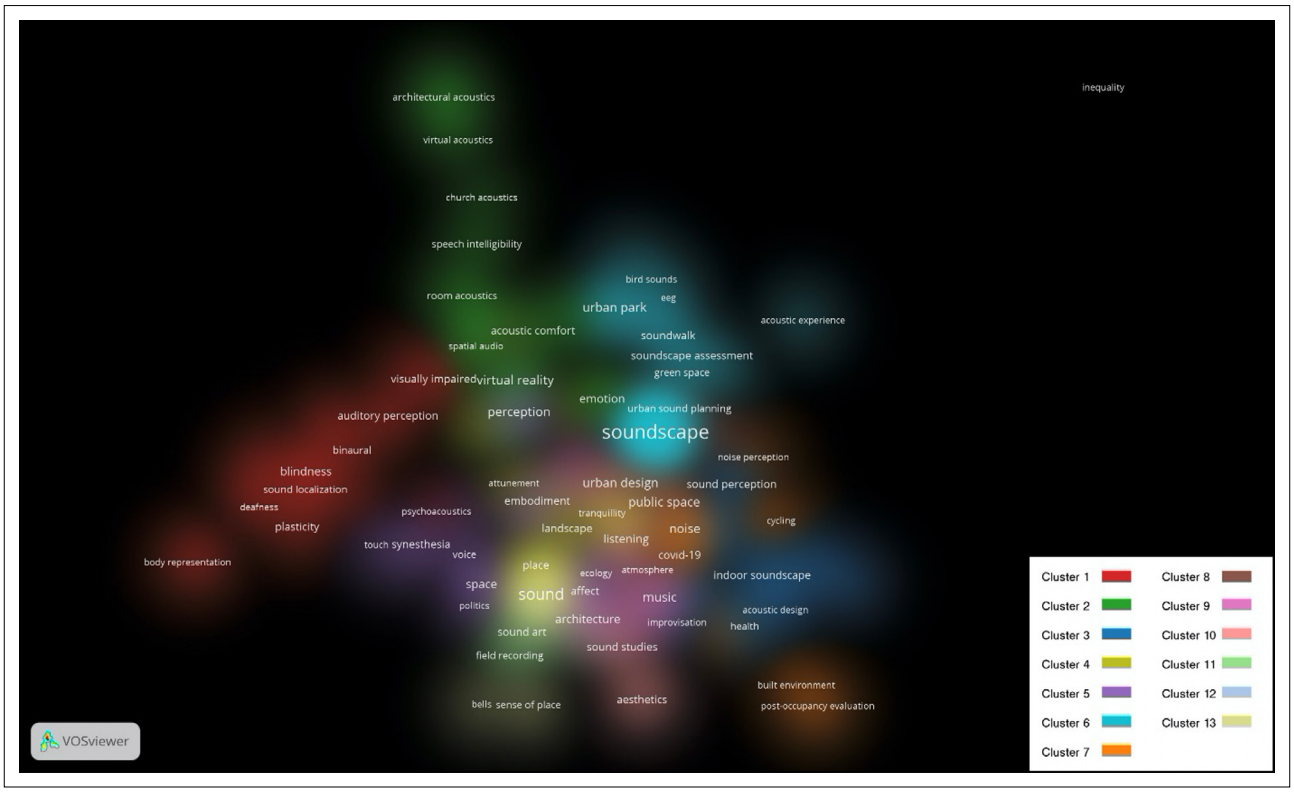

Figure 6. Cluster density visualization map (CDVM).

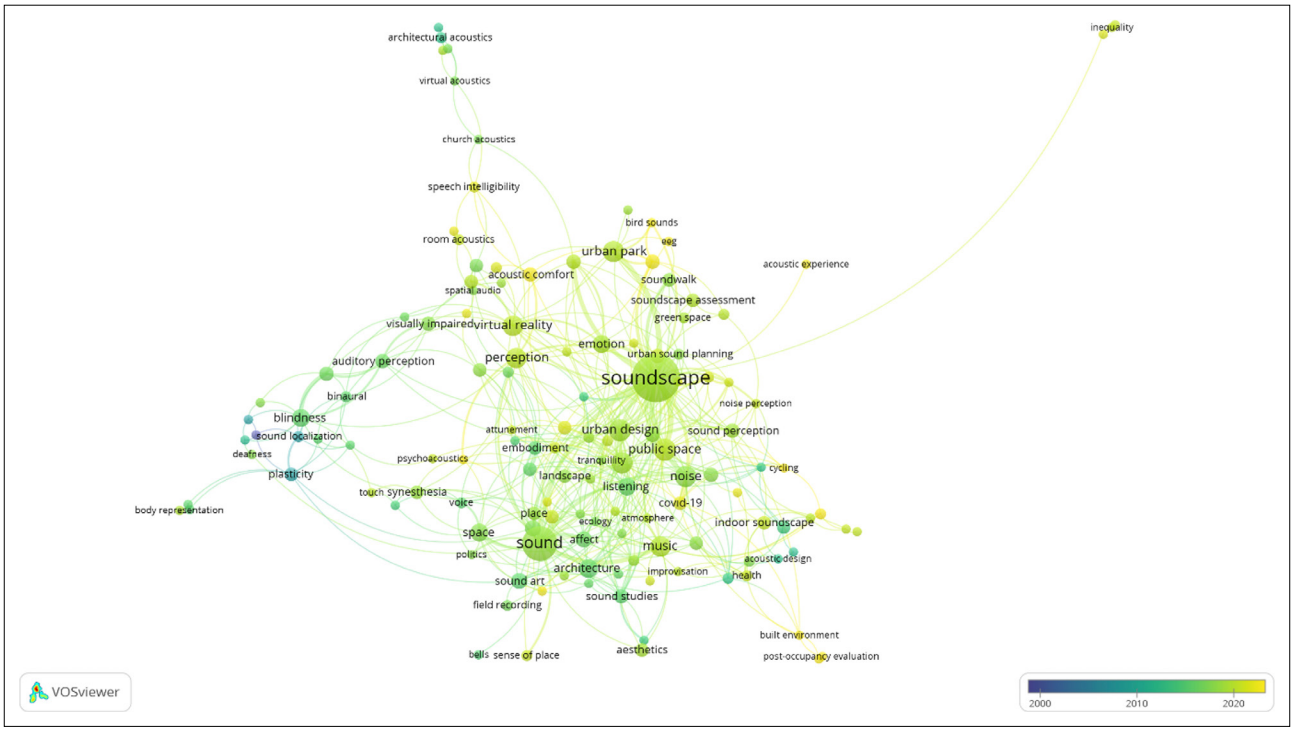

Figure 7. Overlay visualization map (OVM).

about clusters. To make inferences about clusters, the arithmetic mean of APY values of all keywords in a cluster was calculated by the author. Accordingly, it was seen that the cluster with the oldest APY was "blindness" (Cluster 1; APY: 2014.04). This is followed by “listening” (Cluster 10, APY: 2016.22) and “perception” (Cluster 5, APY: 2016.98). The

cluster with the most recent APY in the field is "inequality" (Cluster 12, APY: 2019.83). Following this cluster, “soundscape” (Cluster 6, APY: 2019.52) and “noise” (Cluster 7, APY: 2019.23) appear respectively (Figure 4, Figure 7).

DISCUSSION

Evaluation of Themes

In the third section, binary inferences were drawn about both the items and the clusters based on the evaluation of Figures 4,5,6 and 7. In order to gain comprehensive results, it would be helpful to discuss all of these data at once, especially in regard to the themes.

First, it can be shown from Figures 4-5 and 6 that "soundscape" (Cluster 6; Occ: 94, TLS: 167) has the highest values for total occurrence and TLS out of all the themes. With the help of this information, it is simple to conclude that “soundscape” is covered in the majority of database research and has the strongest connections to all other fields. The "soundscape" has emerged as the most popular and up-to-date theme within the research field, when these data are evaluated along with the APY. In particular, with the recent APY (2019.52), occurrence (Occ: 94), and TLS (167) values, it is clear that this theme has become increasingly important. With all of these characteristics, it is possible to say that the "soundscape" theme will continue to have an effect as a prospective theme within the field and will be a potential area for further research with new concepts it will be associated with.

The "blindness" theme is identified as a significant theme in terms of its occurrence and TLS within the field (Cluster 1; Occ: 58, TLS: 118). The theme has a diverse range of studies, as was seen when the APY values were evaluated (e.g. "auditory system," APY: 2000.50; "psychoacoustics," APY: 2019.50), but it is less included in the database than in previous years (total APY: 2014.04). Consequently, it can be claimed that its popularity has dropped.

The evaluation of the "virtual reality" theme reveals that it is significant in terms of occurrence and TLS (Cluster 2; Occ: 65, TLS: 107), and that it is still relevant to the items it contains in terms of the APY value (APY: 2017.97). It is one of the field's key themes, especially given that it involves features connected to architectural acoustics.

Examining the "perception" theme reveals that it has a TLS value that is significantly higher than the value of occurrence (Occ: 49, TLS: 122). This can be explained by the items' prevalence, and it is also seen in the theme's centrality in the NVM and CDVM graphics (Figures 5, 6). It is clear that the theme has a wide distribution when considered with the APY value (APY: 2016.98). Examining the "public space" and "urban space" themes reveals how closely related their occurrence and TLS values are to the "perception" theme and how centric their graphic placements are as well. On the other hand, it might be claimed that the themes are more current because their APY values ("public space": 2019.08; "urban space": 2018.19).

The "sound perception" theme is ranked in the middle in terms of total occurrence and TLS when it is examined (Cluster 3; Occ: 45, TLS: 89). In terms of its graphic position and connections, it can be noticed that it has a closer connection to the "soundscape" theme than it does to the others (Figure 6). When compared according to APY (2017.72), it can be said that it has an average value.

When the "music" and "noise" themes are compared, it can be seen that they have similar TLS values, occurrence rates, and graphic positions (Figure 6). It is clear from APY values that the "noise" theme is one of the field's most recent themes, whereas the "music" theme has a declining value (Figure 4).

Although "sound," "listening," and "sound art" are perceived as lower-ranking themes in terms of occurrences and TLS values, this is understandable given the low number of items. These themes also have similar features in terms of APY values.

The "inequality" theme's characteristics, which make it seem to be the weakest theme with occurrence value, TLS value, and graphic position in the database, can be explained by the fact that it has the newest APY value (APY: 2019.83). These characteristics suggest that this theme might be an exciting potential for progress in the field. The relationships, degree of use, and relevance of the concepts and themes that emerged within the study field were made clear through the analyses. The result of the research included an analysis of these, looking at their linkages, present status, and occurrence in the literature. Findings concerning the studied area's current state and predictions about future changes were drawn by this analysis.

A future study will see that the most important concept and theme in the field is “soundscape.” In line with the results of the study, it will be seen how the concepts and themes to be investigated are included in the literature, which concepts are more closely associated with previous studies—and which are less associated or not. Future researchers will be able to narrow the focus of their research using the knowledge they gain about lesser-known concepts and themes in the field. For instance, researchers who study "traffic noise" will discover that this concept occurs five times in the research field and is linked to nine other concepts 13 times (“acoustic comfort”: 1, “acoustic environment”: 1, “bird sounds”: 2, “noise annoyance”: 1, “soundscape”: 3, “soundscape

assessment": 1, "urban park": 2, "perception": 1, "public space": 1). They will find that the concept has an APY value of 2021.60 and is still current in the field. They will be able to evaluate how the concept is located in the "soundscape" theme and how it relates to other components. For example, it can be inferred that a study to be carried out by including the keyword "EEG," which is within the same theme but is not directly related, may be a potential topic. For each of the 136 concepts and 13 themes found in the study, similar conclusions can be drawn. Regarding these aspects, it is believed that the data from the study made a special contribution to the advancement of the field.

EVALUATION AND CONCLUSION

Using bibliometric analysis methodologies, a comprehensive and systematic assessment of the literature was carried out for the study, with an emphasis on the auditory experience processes of the space. The purpose of this review was to define the key concepts that emerged in the literature on sound and space experience studies as well as the themes that arose from their combination.

First, descriptive information about the documents gathered after the systematic scanning process is presented. As a result, it has been noted that there is a general upward trend in the field of study. VOSviewer software was used to perform co-occurrence and co-keyword analyses on the documents. As a result, 136 final keywords have emerged as widely used basic concepts in the field of study. All data related to these concepts have been digitized and presented with detailed tables and graphs.

Then, the concepts were categorized according to their occurrence, and the connections between them were determined according to their association strength. With the clustering algorithm, these concepts were divided into clusters, and thematic areas in the study field were determined. Thirteen themes were identified in this regard: blindness, virtual reality, sound perception, urban space, perception, soundscape, noise, public space, music, listening, sound art, inequality, and sound.

To determine which thematic areas were concentrated in the studies and which areas were new and open to research, mutual evaluations were conducted with all the data acquired throughout this procedure. According to these evaluations:

- It turned out that "soundscape" was the most effective concept that emerged in the field of study. The concept of soundscape appears to be dominant, both in terms of frequency of occurrence and the total link strength with others. However, soundscape also has a current date among all concepts in terms of the average publication year. Therefore, it can be clearly said that its impact will continue in future studies within the field.
- After the "soundscape" concept, it was revealed that the concepts of "sound," "public space," "urban design," and "noise" were the other most common concepts in the study area, respectively.
- In studies, the concept of "soundscape" is most frequently associated with the concepts of "urban park" and "public space." From this perspective, it is apparent that these concepts are frequently studied as research subjects together.
- It appears that "inequality" and "sensory ethnography" are the concepts with the weakest connection to the field of study. It may be argued that the term "sensory ethnography" is relatively new to the field of study, particularly considering how recently the average publishing year has occurred. It follows that this might be a possible subject for future research in the field.
- Examining the thirteen themes that emerged from the study, it is discovered that the "soundscape" theme is the most prevalent. The average publication year value of the items included in the soundscape theme is also quite up-to-date compared to other themes. Consequently, it is evident that the thematic area's dominance and the concepts it contains will persist into the future of this field of study.
- It seems that the concept of "traffic noise" is the most current concept within the soundscape theme. As a result, it is evident that recent research has focused on this idea within the theme and that it will continue to influence subsequent research.
- Other themes that emerged after the soundscape theme are listed according to their prevalence as blindness, virtual reality, perception, public space, urban space, sound perception, music, noise, sound, listening, sound art, and inequality. Evaluations related to these themes are also presented.
- The theme of "inequality" has emerged as the most recent and least prevalent theme in the field of study. Given how current it is and the limited amount of existing research, this theme area may prove to be an intriguing topic for future investigation within the field of study.

The results presented above can be extended for all key concepts and themes, along with the outcomes provided by the research. The study enabled the identification of important concepts and themes in the field regarding the sound and spatial experience framework, revealed trends in the field, and contributed to the discovery of new related research areas. Consequently, a future study using this document will be able to rapidly assess how the con-

cepts or themes coming under its scope are covered in the literature, which concepts or themes are more closely related, and which are less closely correlated. In addition, researchers will have the opportunity to gain knowledge about potential progress areas in the field and deepen their research.

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Article

Predicting the urban sound environment pleasantness with the soundscape approach by fuzzy SMRGT method: A case study in Diyarbakır Suriçi

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ABSTRACT

In the soundscape approach, environmental sounds are not considered noise, but as a source and as a component of the spatial planning and design process. It is necessary to evaluate the soundscape in urban spaces in a multifaceted and holistic manner, together with many factors such as physical, social, cultural, psychological, architectural, and so on. In this study, it is aimed to develop an estimation model that will allow the stages that take a long time to progress faster and more systematically in the multifaceted evaluation of the sound environment pleasantness levels of the users in urban spaces with the soundscape approach. For the model's quantitative data, sound quality metrics (loudness, sharpness, roughness) obtained from binaural sound recordings were used. The fuzzy logic estimation model is constructed by using Simple Membership Functions and the Fuzzy Rules Generation Technique (SMRGT) method, considering the characteristics of users and the survey area. In the model, it was possible to convey user experiences, and a simple approach that could be expressed numerically and understood was obtained with the fiction created with verbal concepts. Flexibility is allowed to diversify quantitative and qualitative metrics. The model has been tested with the case study performed with the users. As a result of the study, a close relationship was determined between the model outputs and the subjective data of the users. The efficiency ratios of other variables (age, gender, reasons for coming to the region, frequency of visit, duration of stay) belonging to users not included in the model were also determined. In this study, it has been revealed that the level of pleasantness of the sound environment in urban spaces should be evaluated not only in terms of quantitative data but also on the characteristics of the spaces and users.

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INTRODUCTION

One of the most important conditions for ensuring the acoustic comfort of the users in indoor or outdoor spaces is that they are free of disturbing and unwanted sounds (noise). In many studies (Alves et al., 2015; Asdrubali, 2014; Andringa et al., 2013; Maffei, 2008), it has been emphasized that the noise reduction intended for noise control, which focuses on environmental noise policies (Commission to The European Parliament and The Council, 2002; WHO,

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1999), is not sufficient to improve the quality of life in urban areas and to ensure acoustic comfort. In research, it has been shown that how noise affects people is not consistent with expectations. Therefore, the soundscape approach has emerged in urban acoustic comfort. The term soundscape was first used by urban planner Southworth in 1969 to indicate the acoustic characteristics of cities (Pijanowski et al., 2011), and Schafer (1977) formalized the term "soundscape" as the "auditory properties of landscapes." In ISO 12913-1 (International Organization for Standardization, 2014), soundscape is defined as "acoustic environment as perceived or experienced and/or understood by a person or people, in context." In the beginning, the first soundscape concept was encountered in music and acoustic ecology studies, and it became widespread in other disciplines. In the auditory landscaping studies that started in the late 1960s, the first articles began to be seen in 1999 (Davies, 2013), and in the last 15 years, there has been a significant increase, and many important projects and works have been carried out worldwide (Kang et al., 2016). Extensive data have been obtained in different cultures, from small areas to large cities, from closed, semi-closed to urban open areas.

This soundscape research represents a paradigm shift from noise control policies towards a new multidisciplinary approach. Environmental sounds are not considered as noise but as a resource and as a component of the spatial planning and design process. In studies beginning with questioning the meaning of the soundscape, the context involves not only physical measurements but also the cooperation of humanities and social sciences to account for the diversity of soundscapes across countries and cultures, with more focus on how people actually experience the acoustic environments. In urban spaces, it is necessary to evaluate the soundscape with many factors such as physical, social, cultural, psychological, architectural, and many other factors. Studies should be conducted taking into account both positive and negative sound sources; thus, a different perspective can be developed by combining the methods obtained from various disciplines on human perception of the soundscape. There have been researches on this subject which were developed by a wide range of academic disciplines, and many different methods were applied to them over time.

In the studies related to the soundscape, many methods are used in the objective evaluation of the sound environment or in determining the user perception. In these methods, it is seen that artificial intelligence techniques have been used in acoustics and especially in soundscape as in many scientific fields in recent years. Yu, Kang, & Harrison (2007) developed prediction models using artificial neural networks (ANN) and ordinal logistic regression (OLR) techniques for soundscape evaluations in urban areas. Yu & Kang (2009) have statistically analyzed the data obtained in urban open spaces with physical, social, behavioral, demographic, and psychological characteristics for soundscape evaluations. Artificial Neural Network (ANN) was used for modeling, and it was stated that models based on individual field studies were functioning better and special models suitable for various regions and functions could be reliable. In the study conducted by Yu & Kang in 2010, different kinds of sounds such as nature, human, mechanical, and industrial sounds were taken into consideration and included in the evaluation as factors affecting sound preferences. The results of the study are intended to provide data for soundscape prediction modeling using the artificial neural network technique. Yu (2009) stated that, based on the ANN model, soundscape maps could be produced, and Torija et al. (2014) tried to create the soundscape classification model with Support Vector Machines (SVM). Maristany et al, (2016) used fuzzy logic to analyze the soundscape quality of urban areas.

Scientific and practical guidance on soundscape needs to be provided rapidly and systematically. For this reason, different methods have been developed and diversified in recent years; especially computer simulation and artificial intelligence techniques have been used in studies. In the literature, soundscape studies with artificial intelligence applications are quite limited. The application techniques of artificial intelligence used in many fields of science and also in the field of soundscape should be increased.

The purpose of this study, which is based on the point mentioned above, is to develop an estimation model that will enable the users to progress in a faster and more systematic way to determine the level of pleasantness of the users in the urban areas by using the soundscape approach. This work aims to:

- increase the diversity of research on soundscape,
- contribute to the assessment of the urban spaces soundscape,
- provide a systematic conduct of long-time processes of soundscape by using the fuzzy logic technique of artificial intelligence.

METHODS

This study, which aims to estimate the sound environment pleasantness levels of users in urban spaces with fuzzy logic, was carried out in the Diyarbakır Suriçi region. The study was carried out in two phases. In the first phase, using the quantitative data and subjective evaluations, the predictive model of the users' sound environment pleasantness level in urban spaces was formed by Simple Membership Functions and the Fuzzy Rules Generation Technique (SMRGT) (Toprak, 2009). In the second phase, the model was applied and its accuracy tested. For the quantitative data to be used

in the model, loudness, sharpness, and roughness were used as the sound quality metrics that are effective in the perception of the sound environment of the users (Çakır Aydın & Yılmaz, 2016).

Quantitative data of the sound quality metrics are needed for the prediction model. In the field study, binaural sound recordings were made with reference to the ISO 12913-2 (International Organization for Standardization, 2018) in order to obtain quantitative data of the sound quality metrics. In order to determine the area where sound recordings should be made in the study, sound walks were held in many places in the city center of Diyarbakır. The Suriçi region of Diyarbakır has been identified as the region to be studied with the impressions obtained from these walks. Due to the availability of this area at an accessible location, living with cultural, social, commercial, and recreational activities, having the original architecture on a large scale, not only traffic or human sounds, but also various sound sources including soundmarks belonging to the region, this field has been chosen as the study area.

Sound sources in the region are identified through interviews with users and sound walks held on weekdays and weekends, and the points and routes where sound recordings will be made are determined (Figure 1).

Binaural sound recordings were performed on weekdays (5 days) and on weekends (Saturdays) so that the sound recordings can give detailed information about the general sound environment of the region. Recordings were made between 07:30-09:00 in the morning, 12:00-13:30 at noon, and 17:00-18:30 in the evening when the users frequently use the area. Binaural sound recordings were made using the Brüel & Kjær 2270-A-D00 and the Brüel & Kjær 4101. The calibration of the microphone set was done with the B & K 4231 before each sound recording. Then, binaural sound recordings were made at the specified routes and points. The calibration of the microphone set was repeated when each sound recording was completed. The duration of the sound recordings varied from 5 minutes to 10 minutes, which can reflect the sound environment of the area.

Model

The flow chart in Figure 2 was followed for the prediction model. The operations of the dependent and independent variables were performed, membership functions were created, fuzzy inference was made with rules, and then the system was established by obtaining the output with the defuzzification.

Input: Includes dependent/independent variables of the model and all data about them. The dependent variable was determined, and independent variables affecting dependent variables were determined. The independent variables are inputs, whereas the dependent variable is the output of the fuzzy system. The independent variables of the study consist of the sound quality metrics of loudness, sharpness, and roughness. The pleasantness level of the users' perception of urban sound environments was indicated as the dependent variable of the study.

Figure 1. The points and the routes where sound recordings were made.

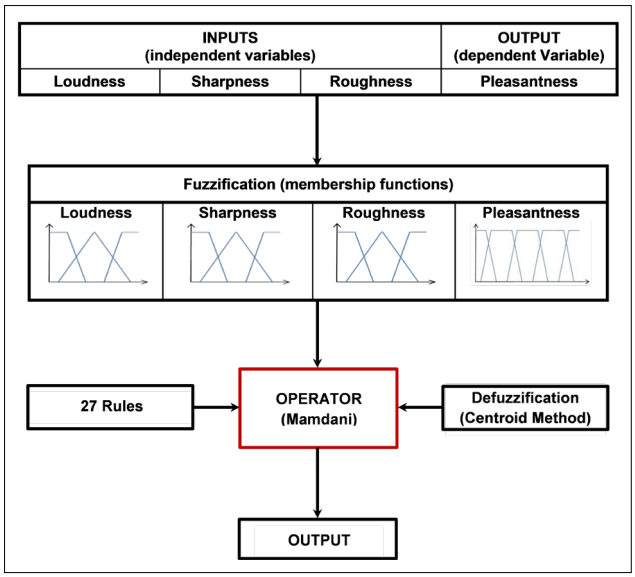

Figure 2. Flow chart for fuzzy SMRGT.

Fuzzification: This step is the phase in which the input information from the fuzzy system and the data from the database are converted into linguistic qualifier values. The linguistic qualifiers to be used for the sound quality metrics in the model were defined as low, medium, and high membership functions. The pleasantness of the users' perception of the urban sound environments was determined as the membership functions of 1, 2, 3, 4, 5 on the Likert scale.

Rules: Depending on the variables in the input parameters, it contains all of the rules that can be typed if-then. In this study, 27 rules were established.

Fuzzy inference: It is an expression obtained by applying fuzzy logic to fuzzy rules (Zadeh, 1996). In this study, the prediction model was constructed using the "Mamdani" fuzzy inference method.

Defuzzification: It is the process of transforming blurred information into a numerical value (Elmas, 2011). In the model, the centroid method was used for defuzzification.

Output: In the last stage of the fuzzy logic system, the dependent variable obtained as a result of the interaction with the information and fuzzy rule bases through the fuzzy inference is determined (Uygunoğlu & Yurtcu, 2006). In this study, the model is prepared by using the Fuzzy Logic tool in MATLAB software. Independent variables, dependent variables, and fuzzy clusters, membership forms, and membership functions were determined, and output data was obtained by creating rules.

For input data, the number and form of membership functions, and the lowest and highest quantitative data of loudness, sharpness, and roughness were determined for the independent variables. The quantitative values of the binaural sound recordings made in the study area have been calculated using PULSE Reflex for the values of loudness, sharpness, and roughness. In the model, for each of the loudness, sharpness, and roughness metrics, fuzzification was performed, and metrics were transformed into low, medium, and high linguistic qualifiers, resulting in three membership functions. In this study, trapezium shapes were chosen for low and high values of membership functions and triangular shapes for medium values. The trapezium was used because when the quantitative values of the metrics go below the lowest value or when the highest value goes up further, there is no change in input. For the intermediate values, triangles were chosen for the medium values of the membership functions since the output could change.

The unit width (*UW*), core value (*Ci*), and key values (*Ki*) of the fuzzy clusters for each sound quality metric created for the prediction model were determined (Toprak, 2009) (Figure 3).

The number of fuzzy clusters of the level of pleasantness that constitutes the output of the estimation model (dependent variable) is composed of 5 clusters. Therefore, the lowest value of the fuzzy clusters is 1 and the highest value is 5. The calculation method used to obtain quantitative data of the independent variables was also used for the fuzzy clusters of the dependent variable. In the forms of the membership functions, the trapezoidal shape is used to reduce fuzziness and to draw the result to an integer (Figure 4).

It is necessary to determine the number of rules of the model to be created with fuzzy logic in order to estimate the users' pleasantness levels in the urban environment.

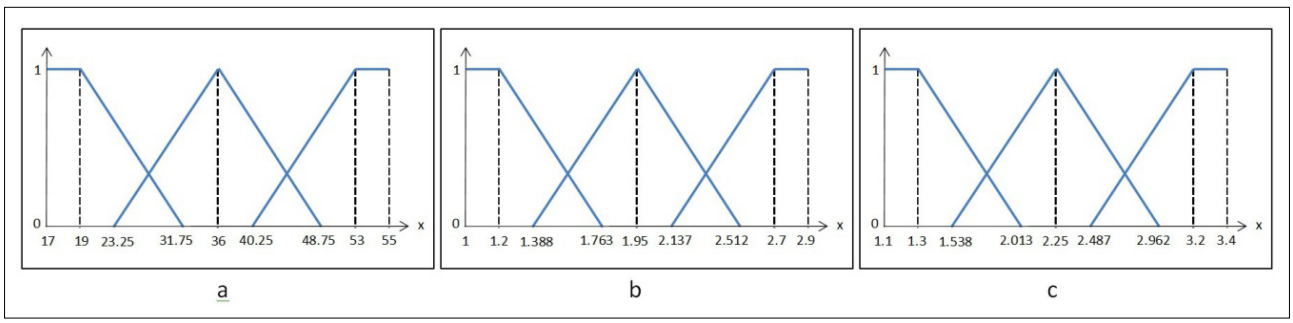

Figure 3. Quantitative values of membership functions a) Loudness, b) Sharpness, c) Roughness

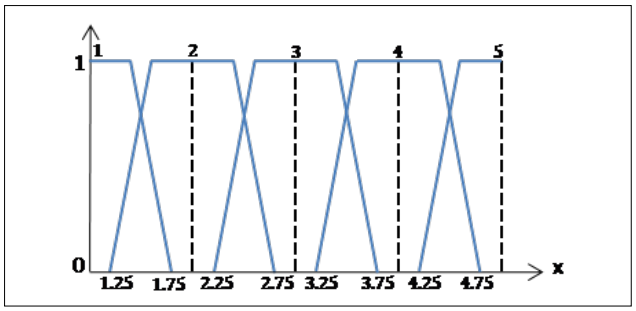

Figure 4. Values calculated for the membership functions of the output.

The number of independent variables and the number of fuzzy clusters per independent variable determine the number of rules. When the fuzzy clusters of low, medium, and high quantitative values of the independent variables formed by the loudness, sharpness, and roughness metrics are considered, 27 different possibilities occur. Therefore, 27 different rules have been established for the model. Many sources can be used in fuzzy logic when creating rules. The rules are formed by data obtained from literature information, experiences, and deterministic methods.

In this study, the independent variables consist of sound quality metrics: loudness, sharpness, and roughness. As the quantitative values of sound quality metrics increase, it is known that users' sound environment pleasantness levels decrease (Zwicker & Fastl, 1999). It is necessary to know the correlation between the three metrics and the level of pleasantness in order to determine the ratios at which these metrics affect the level of pleasantness of the users. At this stage, the results of the previous study were used (Çakır Aydın & Yılmaz, 2016). In the model, it is not enough to create rules according to the correlations between the sound environment pleasantness levels of the users and the sound quality metrics. Although the comparisons made

Table 1. Fuzzy logic rules

Rule 1	If	loudness	low	and	sharpness	low	and	roughness	then	pleasantness	5
Rule 2	If	loudness	low	and	sharpness	low	and	roughness	then	pleasantness	5
Rule 3	If	loudness	low	and	sharpness	low	and	roughness	then	pleasantness	4
Rule 4	If	loudness	low	and	sharpness	medium	and	roughness	then	pleasantness	4
Rule 5	If	loudness	low	and	sharpness	medium	and	roughness	then	pleasantness	4
Rule 6	If	loudness	low	and	sharpness	medium	and	roughness	then	pleasantness	3
Rule 7	If	loudness	low	and	sharpness	high	and	roughness	then	pleasantness	3
Rule 8	If	loudness	low	and	sharpness	high	and	roughness	then	pleasantness	3
Rule 9	If	loudness	low	and	sharpness	high	and	roughness	then	pleasantness	3
Rule 10	If	loudness	medium	and	sharpness	low	and	roughness	then	pleasantness	4
Rule 11	If	loudness	medium	and	sharpness	low	and	roughness	then	pleasantness	4
Rule 12	If	loudness	medium	and	sharpness	low	and	roughness	then	pleasantness	3
Rule 13	If	loudness	medium	and	sharpness	medium	and	roughness	then	pleasantness	3
Rule 14	If	loudness	medium	and	sharpness	medium	and	roughness	then	pleasantness	3
Rule 15	If	loudness	medium	and	sharpness	medium	and	roughness	then	pleasantness	3
Rule 16	If	loudness	medium	and	sharpness	high	and	roughness	then	pleasantness	2
Rule 17	If	loudness	medium	and	sharpness	high	and	roughness	then	pleasantness	2
Rule 18	If	loudness	medium	and	sharpness	high	and	roughness	then	pleasantness	2
Rule 19	If	loudness	high	and	sharpness	low	and	roughness	then	pleasantness	3
Rule 20	If	loudness	high	and	sharpness	low	and	roughness	then	pleasantness	3
Rule 21	If	loudness	high	and	sharpness	low	and	roughness	then	pleasantness	3
Rule 22	If	loudness	high	and	sharpness	medium	and	roughness	then	pleasantness	3
Rule 23	If	loudness	high	and	sharpness	medium	and	roughness	then	pleasantness	2
Rule 24	If	loudness	high	and	sharpness	medium	and	roughness	then	pleasantness	2
Rule 25	If	loudness	high	and	sharpness	high	and	roughness	then	pleasantness	2
Rule 26	If	loudness	high	and	sharpness	high	and	roughness	then	pleasantness	1
Rule 27	If	loudness	high	and	sharpness	high	and	roughness	then	pleasantness	1

in this way have meaning, they do not show the success of the model alone. Together with the correlation coefficient, more criteria should be considered. In this study, in addition to the effect of each metric on the level of pleasantness perceived by the users, the studies in the literature related to the sound environment have also been utilized. The views and experiences of the people who have done similar studies have been utilized. In addition, considering the historical, architectural, and socio-cultural structure of the region, 27 rules were written for the model prepared with fuzzy logic (Table 1). The weight of each input in the model was 1 when creating the rules.

The output data of the model can be obtained after the input created by the dependent and independent variables and the rules that create the interaction between them. In the model, the quantitative values of the loudness, sharpness, and roughness sound quality metrics of a sound recording can be written as input data, and the sound environment pleasantness levels of the users for urban spaces can be estimated. Figure 5 shows the output value of the system in response to the quantitative values of the sound quality metrics loudness, sharpness, and roughness.

The effect of sharpness and loudness metrics on the level of pleasantness is distributed evenly (Figure 6). The level of pleasantness decreases as the quantitative values of both metrics increase; pleasantness level increases with the decrease of quantitative values.

The effect of roughness on the level of pleasantness is lower than that of loudness (Figure 7). There is no significant decrease in pleasantness level, even if roughness is high, in cases where loudness is low.

Sharpness is more effective on the level of pleasantness in the changes that occur in the quantitative data of sharpness and roughness (Figure 8). Even if the quantitative value of roughness is low, the level of pleasantness is low if the quantitative value of sharpness is high. If sharpness is low and roughness is high, the decrease in the level of pleasantness is not significant.

Model Implementation and Test

For the application of the model, quantitative data of the loudness, sharpness, and roughness metrics were obtained from the binaural sound recordings performed in the study area. These data were transferred to the model prepared to estimate the users' sound environment pleasantness levels. Output data were obtained by processing the quantitative values of loudness, sharpness, and roughness metrics in the input data in the model. Thus, the sound environment pleasantness levels of the users in the study area can be estimated. Unlike the study of Maristany et al. (2016), in this paper, the model was tested in order to compare the data with the actual data after the implementation of the model.

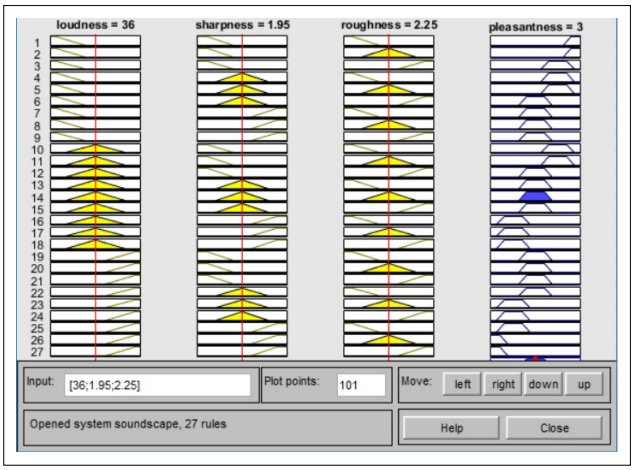

Figure 5. Graphical view of output value generated by rules.

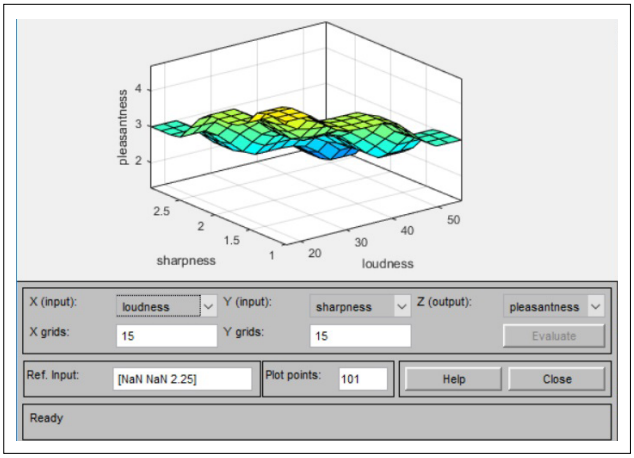

Figure 6. Surface viewer of pleasantness-sharpness-loudness viewer.

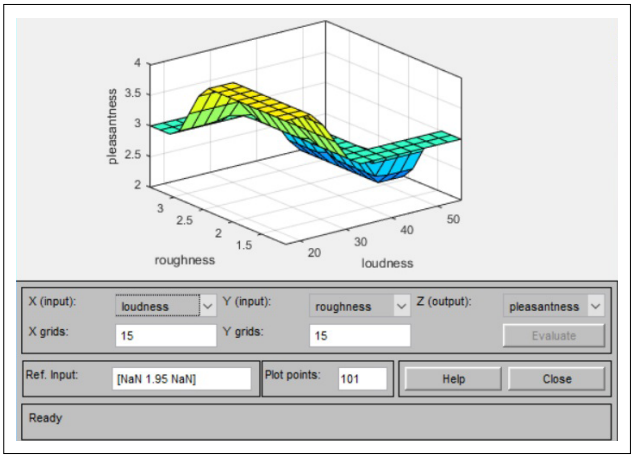

Figure 7. Surface viewer of pleasantness-roughness-loudness.

In the model test, simultaneous surveys were performed while making binaural sound recordings in the study area. The survey was conducted with 390 participants. In many studies in the literature, it was observed that factors such

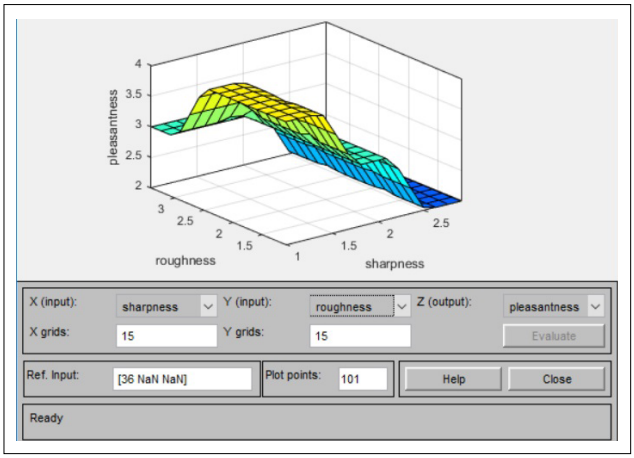

Figure 8. Surface viewer of pleasantness-roughness-sharpness.

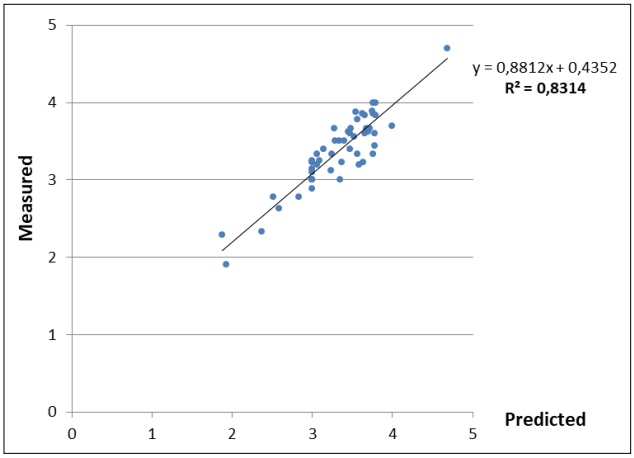

Figure 9. Relationship between the predicted and measured pleasantness level (1-not pleasant at all, 5-very pleasant).

as gender, demographic characteristics, education levels, physiological, sociological, and psychological factors, usage area, and duration of the users were effective in changing their perceptions about the sound environment (Yu & Kang, 2010; Yu & Kang, 2014; Tse et al., 2012; Kang, 2010). Therefore, in the questionnaire applied for the model, participants were asked about their gender, age, education levels, reasons for coming to the field, frequency of arrivals, and time in the area.

Participants were offered options to choose from 1 to 5 for the sound environment pleasantness levels (1: not pleasant at all, 5: very pleasant). Some factors are listed considering the characteristics of the region, as many factors other than sound sources in the perception of the sound environment of urban spaces can affect the choice of pleasant level. In this part of the questionnaire, participants were asked to rank seven factors (sound sources, historical texture, architectural structure, landscape, social structure, commercial structure, touristic value) between 1 and 7, which could affect their pleasant levels.

RESULTS

At the testing stage of the study, Pearson correlation coefficients between the measured (survey study) data and predicted data (SMRGT) were calculated. The regression line was formed between the two data groups and the coefficient of determination was calculated. The Pearson correlation coefficient was 0.91 among the data obtained from the survey conducted in the field with the pleasantness levels of the users about the sound environment predicted by SMRGT. As shown in Figure 9, $R^2 = 0.8314$ was obtained in reliability level. According to Rubin (2013) and Jackson (2014), a correlation of 0.90 and above is statistically significant (Rubin, 2013; Jackson, 2014).

In the model generated by SMRGT, the coefficient of determination (R^2) is 0.8314. This coefficient shows that about 83% of the total changes in the dependent variable are explained by the independent variables. The 1-R^2 value (about 17%) refers to the part described by other independent variables not included in the model generated by SMRGT. In order to determine the parameters affecting approximately 17% of the study, the results of the survey conducted simultaneously with the sound recordings were used in the study area (Table 2).

As a result of the questionnaire applied to the participants, the effect of their gender on the change in pleasantness level is 17%. This study showed that the effect of participants' ages on pleasantness level changes was approximately 24%. It is understood that as the age of the participants increases, the pleasantness levels of the sound environment increase. It was determined that the effect of the level of education on the change in pleasantness level was approximately 34%. It was observed that the reasons for the participants' arrival in the field were about 43% effective in changing the pleasantness level. Employees in the region were negatively affected by the sound environment, and the majority of the participants (31.8%) preferred '1' level of pleasantness. The participants (35.7%) who visited the area to visit and the participants (40%) who relaxed in the area considered the sound environment '4'. When the effect of the arrival frequency of the participants on the change in

Table 2. Effect rates of other independent variables not included in the model

	Chi-Square	p	phi
Gender	11,596	0,021	0,172
Age	22,348	0,004	0,239
Education	44,460	0,000	0,338
Reason for coming	72,704	0,000	0,432
Frequency of arrival	68,352	0,000	0,419
Duration of stay	47,708	0,000	0,350

the pleasantness level was examined, it was determined that there was an effect of about 42%. Thirty-five percent of those who come to the field every day have chosen '1' as the sound environment pleasantness level. Considering the participants who visited the study area several times a year, several times a month, and several times a week, it was observed that the majority of all three groups preferred the sound environment pleasantness level '4'. As a result of the analyses, it was found that the duration of stay of the participants was 35% effective in the change in pleasantness levels. The majority (26.9%) of those who spent 6 hours or more in the field preferred the '1' option as the level of pleasantness.

CONCLUSION AND FUTURE WORK

In this study, a model has been developed in urban areas to predict the sound environment pleasantness levels of users. For this model proposal, artificial intelligence techniques, which are frequently used in prediction models, have been examined in recent years, and a fuzzy logic prediction model has been formed by the SMRGT method. With the testing of the model, it has been demonstrated that the sound environment pleasantness level in urban spaces should be evaluated not only with quantitative data, but also with the historical, architectural, social, and cultural characteristics of the spaces as well as the demographic structure of the users, and the reasons, duration, and frequencies of using spaces. This study shows that the results can be improved by reflecting the spatial and user characteristics together with the quantitative data.

The perception of the countries, regions, societies, and cultures of the soundscape is different from each other. Therefore, the adaptation of studies for a region to other regions may not give accurate results. In this study with fuzzy logic, the characteristics of different societies, regions, and cultures can be reflected in the model. The model to be created can be used for places with different characteristics. In addition, the model has the ability to be developed by recycling.

This study aims to expand the concept of the soundscape and to develop it using new models. To achieve this, a prediction model has been created as an alternative to traditional statistical calculation methods. This model allows for the transmission of both quantitative data and experiential information. Conclusions can be drawn using a straightforward approach that incorporates verbal concepts, which can subsequently be expressed numerically. As a result, this study enhances the flexibility and diversification of both quantitative and qualitative metrics in soundscape research, thereby increasing the diversity of research on soundscape.

It is a time-consuming and laborious process to measure the perception of the soundscape of urban spaces. This model suggestion will allow the long-term stages to evaluate the acoustic comfort of urban spaces in a faster and more systematic way.

In the prediction model studies to determine the sound environment pleasantness levels of the users in the soundscape, the results will be more successful with the development of the models which include the data of the cities and the users with the characteristics of the users with the diversification of the quantitative data. In such studies, analysis of experimental sound data should be developed and interdisciplinary studies should be given importance.

Moreover, this study has provided a valuable contribution to the assessment of the urban sound environment by employing the soundscape approach to evaluate the Diyarbakır Suriçi region. Additionally, sound sources within this area were meticulously recorded and archived, enriching the available data for further analysis and research in the field of urban soundscape.

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PEER-REVIEW: Externally peer-reviewed.

CONFLICT OF INTEREST: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Article

Learning from Swindon Railway Town: A Comparative Study with Alsancak Railway Campus

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ABSTRACT

The railway system, considered an industrial heritage today, emerged in England as a means of transportation and spread rapidly worldwide in the second quarter of the nineteenth century. As in other industrial building types, the advancement of technology and the emergence of new systems for railway structures have been a threat; since the twentieth century's latter half, many railways in the industrial and mining areas have been closed, and the disused buildings have faced the risk of rapid extinction. The deliberate destruction of railway structures in the 1960s, symbolized by the demolition of the Euston Arch in England, started the debate on railway heritage, first in England and then in the world. This study focuses on Swindon Railway Town, a highly significant industrial settlement of its era in England, as an exemplar of railway heritage conservation due to preservation efforts since the 1980s, including various restoration and reused railway buildings. It is an early and important example of both railway construction and conservation practice. This article aims to investigate Swindon as a potential conservation model for the Alsancak Railway Campus, considering their shared similarities in era, scale, and style, through a comparative study focusing on cultural significance and conservation status. These two railway areas were selected as case studies because they showcase the architectural diversity of railway buildings, sharing similar architectural features. Both railway campuses were built by the British as the first and early examples of railways in their countries. They were encountering similar problems such as becoming dysfunctional due to developments and changes in railway technology. The research methodology employed in this study comprises archival research and on-site visits to the railway town of Swindon and the Alsancak Railway Campus. Beginning with the history and significance of Swindon railway town, the study systematically examines the buildings that formed a planned railway town. Secondly, an overview of the railway heritage conservation process in Swindon is provided by highlighting the conservation area status, its management plan, and systematically analyzing the conservation status and transformation process of the historical railway structures. It is followed by a comparative analysis between Swindon Railway Town and Alsancak Railway Campus. Overall, this study presents an evaluation and potential for the conservation of railway heritage areas through a comparative analysis.

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INTRODUCTION

In the early 19th century, Richard Trevithick's pioneering demonstration of the steam locomotive unknowingly laid the foundation for the railway network linking cities. Originating from mining roads, the railway was developed for freight transportation as an alternative to existing canals and roads to meet the increasing demands of England's heavy industry (Coulls, 1999; Jones, 2011). There is consensus that the prototype of the "modern railway" emerged with the opening of the Liverpool & Manchester Railway (L&MR) in northwest England in 1830, and the opening of this line is considered to be the beginning of the railway age. Essentially designed as a rival to the transport of goods via canal, this line met a demand for passenger transport that was unforeseen at the time it was built (Coulls, 1999). The Rainhill Trials of 1829, during which the managers of the L&MR invited locomotive inventors to exhibit their works, represent another turning point in railway history (Simpson & Scott, 1979). The locomotive known as "Rocket," which was designed by George Stephenson and later earned him the title of the "father of the railway," played a vital role in the inauguration of the L&MR. This event demonstrated that steam locomotives could efficiently transport both freight and passengers across substantial distances within a relatively short period, leaving a significant impact on the nation (Jones, 2011). The rapid success of the LMR railway sparked a railway mania in England, inspiring investors and entrepreneurs to explore these opportunities and ultimately leading to the development of railways across the nation (Buchanan, 2006).

Following the emergence of the railway, the Great Western Railway was started as one of the major railway projects under construction in the mid-1830s. The city of Swindon is one of the most significant industrial settlements and pioneering railway cities of its era, known for its repair and manufacture of locomotives, wagons, and carriages, tailored to the needs of the GWR, as well as worker houses and social facilities (Cattell & Falconer, 1995). It connected London to Bristol under the direction of Isambard Kingdom Brunel, one of the most significant names of the railway era in England. Contrary to many other railways constructed during the same period at the beginning of the railway era, it was designed as a whole and an ideal railway project with certain design principles (Buchanan, 2006). Similar to the rest of the country, Swindon began to experience a decline in the 1960s due to advancements in technology and transportation regulations. The railway infrastructure became vacant after the works were shut down in the 1980s.

On the other hand, the Alsancak Railway Campus is the terminus of the Izmir & Aydın Railway, which was the first railway line of Turkey and one of the major railway projects of the Ottoman Empire period. It was constructed by a British company under concession. The railway was built between 1856 and 1866 with the primary goal of utilizing the natural resources of the fertile Aegean region and transporting goods and raw materials to England via İzmir port (Ekizoğlu, 2012). The campus consists of storage, service and maintenance workshops, administrative units, and housing along with railway stations. While Alsancak Railway Campus shares similarities with Swindon Railway Town in terms of the size of the railway settlement, being built by British companies, and being early initiatives of their respective countries, it also faced similar challenges due to technological developments and changing transportation policies. Against this background, this study aims to investigate Swindon Railway Town as an exemplary model for the preservation of railway heritage due to preservation efforts over the years since the 1980s, including various restorations, reused railway buildings, and railway museums. It is also an example of holistic conservation, with the area being declared a conservation area in 1975 and 1987. The study not only explores the cultural significance of Swindon Railway Town but also focuses on the preservation processes of railway structures following the closure of railway facilities and that of current conservation status. Following the case of Swindon, the comparison with Alsancak Railway Campus can lead to present an evaluation and diverse potential for the conservation of railway heritage areas.

CONSERVING RAILWAY HERITAGE IN THE UNITED KINGDOM

Biddle (2011a) defines railway structures as developments that matured in the 19th century as railway construction evolved, pioneering new techniques and responding to demands. The structures built on the early railways reflected a lack of foresight about the potential of railways, as railway companies assumed their primary emphasis would be on freight traffic and viewed passenger transportation as a secondary industry (Parissien, 2014). Over time, due to factors such as the increasing importance of passenger transportation and the necessity to separate freight traffic, railway architecture evolved, forming its archetype (Richards & MacKenzie, 1986). Additionally, the requirement for large spaces as waiting rooms for passengers and train depots during the 19th century pushed the limits of material usage and inspired engineers like Isambard Kingdom Brunel to break new ground in the design of railway constructions (Brindle, 2004).

Railway structures, like other types of industrial buildings, have been created for specific purposes, and as technology advances and traffic increases, they may become obsolete for their original purpose and face the risk of demolition (Minnis, 2014). In 1968, the transition from steam

locomotives to electric or diesel locomotives in the United Kingdom resulted in the demolition of many functional units associated with steam traction (ibid, p. 38). Another contributing factor to this demolition was the intervention in the national railway network in the country, largely stemming from the impact of the 1963 Beeching Report[1], which led to the closure of numerous railway lines (ibid, p. 40; Nevell, 2010). The deliberate demolition that followed the closure of these lines became an increasingly common practice from the 1960s onward, and many stations on the closed lines suffered (Minnis, 2014). The 1960s and 1961s campaign to save the Euston Arch at the London & Birmingham Railway terminal, although unsuccessful, was significant in raising awareness of the importance and vulnerabilities of industrial structures in public discourse. This led to the reuse and preservation of railway structures for tourism purposes and gave rise to a new sector where steam locomotives operated on closed lines (Nevell, 2010).

The preservation of railway heritage in the United Kingdom initially focused on locomotives; for instance, Rocket (Figure 1a) was first acquired by the London Science Museum in 1862, and unused railway vehicles began to be preserved and exhibited. The examination of surviving remnants of the railway network in the 19th century laid the foundations for the discipline of Industrial Archaeology, which emerged in the 1950s and 1960s (Falconer, 2007; Nevell, 2010). In 1977, the exhibition "Off The Rails: Saving Railway Heritage," held at the RIBA Heinz Gallery, brought experts together to emphasize the value of railway architecture as heritage, express concerns, and discuss new functions for disused railway structures (Pearce & Binney, 1977). As part of the celebrations for the 150th anniversary of the line opening of the L&MR, research into the "world's oldest surviving passenger train station," the Grade I listed Liverpool Road Station in Manchester (Figure 1b), highlighted the importance of railways in Industrial Archaeology (Nevell, 2010).

On the other hand, until the 1980s, other functional structures of the railway system received little attention, with the focus primarily on railway history, locomotives, and partially on passenger waiting areas, which represented the public face of stations (Biddle, 2011b). Minnis (2014) argued that railway structures were studied more by railway enthusiasts than by architectural historians or industrial archaeologists, leading to a narrow focus on locomotives or a single railway company in railway studies. However, he also acknowledged the contributions of many amateurs, outside their expertise, to railway history (Minnis, 2014). In 1984, the Railway Heritage Trust was established under British Railways, aimed at preserving, restoring, and maintaining the heritage of the railways for the public good. This centralized conservation efforts related to railway heritage (Soane, 1997). The Railway Act 1993 is important in that it includes the concept of 'Railway Heritage' in England for the first time and subsequently established the "Railway Heritage Committee," but the railway heritage is not defined in the law and does not contain a guide on conservation and restoration. It was issued to restructure the UK railway network (Threlfall, 1997). The Railway Heritage Act 1996 is the law that arose from this need and determines the railway structures that will still be protected today and the authorities for their management. The establishment of the Institute of Railway Studies at the University of York in 1995 further accelerated railway studies having an important task (Burman, 1997). To organize applications for the World Heritage List (WHL), ICOMOS established a guideline setting up the criteria for railway heritage applications for WHL in 1999 (Coulls, 1999). This guideline also included case studies from the UK, such as the Liverpool & Manchester Railway and the Great Western Railway, which is the railway of this study. As regards WHL, the Semmering Railway (Austria), the Himalayan Mountain Railway (India), Rhaetian Railway in the Albula/Bernina Landscapes (Italy, Switzerland), and Trans-Iranian Railway (Iran) have been included in the World Heritage List in 1998, 1999, 2008, and

Figure 1. **(a)** Rocket, National Railway Museum, York; **(b)** Liverpool Road Station, Manchester.

2021, respectively. The management plan of the Trans-Iranian Railway highlighted up-to-date trends in railway conservation as documenting, monitoring, and conserving the historic buildings and other elements that are no longer in use. It also underlined documentation of the engineering elements at the same level of detail as carried out for the inventorying of all tangible features (UNESCO, 2021).

SWINDON AS A RAILWAY TOWN

Railway towns evolved from 19th and 20th-century company towns, where communities of workers, employed by the same company or group, lived in houses owned by the company, and these towns were characterized by the company's control over both economic and social aspects. Some railway companies established railway works in existing industrial cities, while others founded new settlements. Unlike these two, as seen from Swindon, small market towns became central hubs for railway lines (Andreae, 1985).

History of Settlement and Development

In the 1830s, Swindon was a small market town (Figure 2a), but with the establishment of railway repair and locomotive manufacturing works, and railway village and community buildings (Figure 2b) by GWR, it rapidly grew into a significant railway town by the end of the 19th century (Andreae, 1985).

Swindon's railway town comprises two interconnected areas, separately for the railway works and the railway village, including a church, a green park, and community buildings for workers for education, leisure, and health services. Both areas were established due to the GWR company's decision to provide housing for its workers and to establish the works.

In 1833, Isambard Kingdom Brunel (Figure 3a), a prominent engineer of his era in railway, was appointed as the chief engineer by GWR to determine the route for a new railway between London and Bristol. This opportunity allowed Brunel to articulate his vision for an ideal railway in detail, which deviated from the standard railway construction

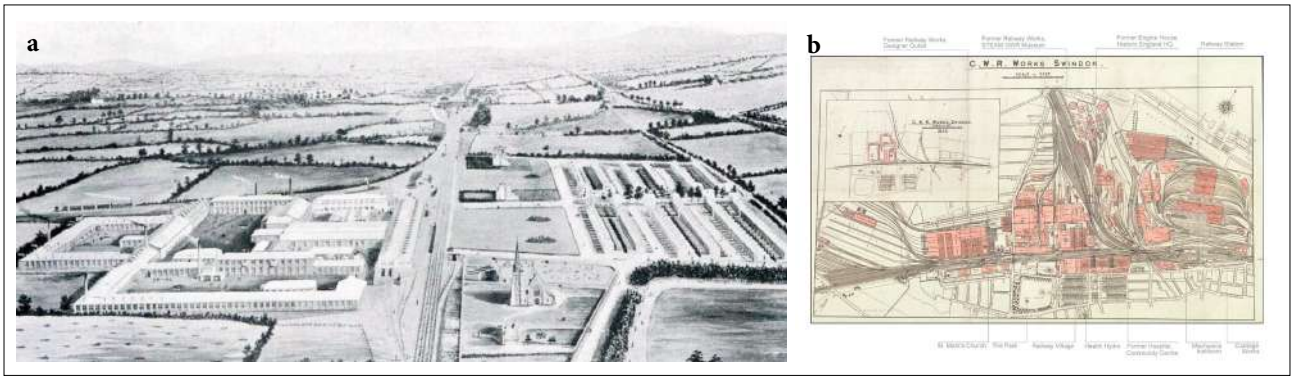

Figure 2. **(a)** Swindon railway works and railway village in 1846, as depicted by Edward Snell, from left to right: railway works and railway village. **(b)** Railway buildings of Swindon (It was prepared by the author on the Swindon Railway Town map obtained from the Great Western Railway Museum, Swindon).

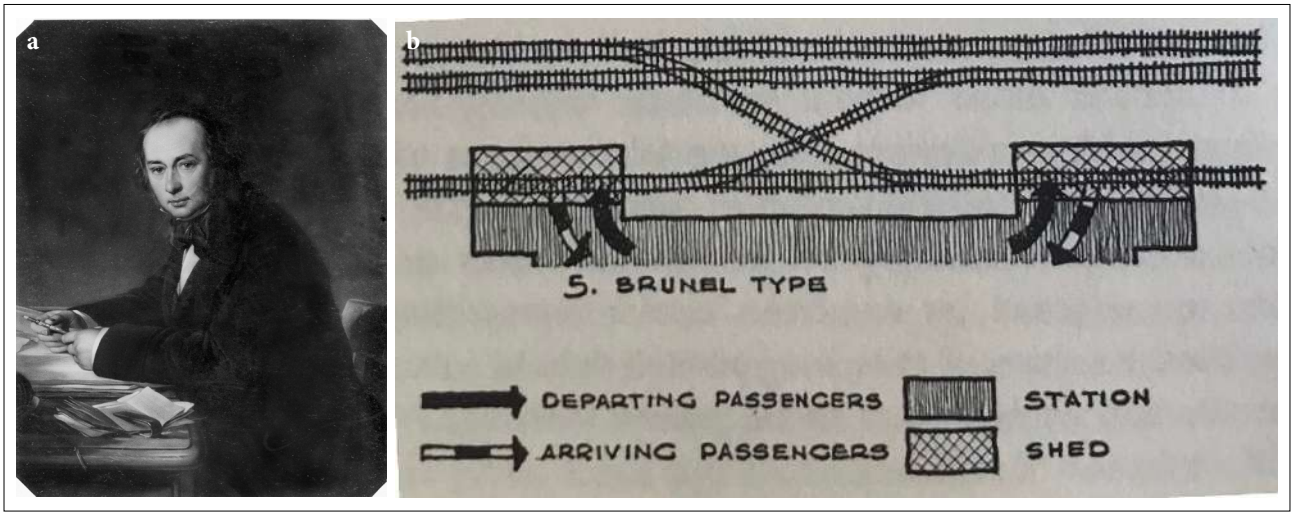

Figure 3. **(a)** I. K. Brunel (National Archives, n.d.); **(b)** Brunel type according to the platform-rail (Meeks, 1957).

practices of the time in two significant ways: first, he prioritized passenger movement in the design, and second, he aimed to achieve high-speed travel to reduce journey times (Buchanan, 2006). In contrast to the prevailing practice of choosing the most economical route, he pushed the boundaries of engineering to achieve the highest standards (ibid, p. 69). As the railway became operational in 1841, Brunel, particularly working on the architectural plans and details of the main stations, created the double-sided platform type that would later be known as the "Brunel type" in station architecture (Figure 3b). Additionally, he was responsible for providing the infrastructure for works that transformed Swindon into a railway town (Buchanan, 2006). The GWR made a strategic decision to establish repair and locomotive manufacturing facilities in Swindon shortly after the opening of the London & Bristol railway line. The choice of Swindon as the central location for GWR's repair and locomotive manufacturing was not random but carefully considered. Swindon's geographical position at the precise midpoint of the London & Bristol line and its access to two existing canals for transporting coal and coke were advantageous factors (Historic England, 2020a).

Construction of the repair works was completed and operational by 1843, just two years after the railway line's opening. Initially intended for locomotive maintenance and repair, the area soon expanded to include locomotive production. A railway village, with rows of houses for the many engineers and workers brought in from outside the town, made it a unique industrial settlement of its time (Brownlee, 2010) and the GWR intervening in the lives of its workers through architecture (Lewis, 2021). Until 1920, Swindon employed more than 14,000 people (Jones, 2011). When British railways were nationalized in 1948, the GWR became one of the four major railways under British Rail. The nationalization led to the reorganization of the works in the 1960s, resulting in some structures becoming disused and eventually demolished. In 1960, the works, where the last steam locomotive (Evening Star) was produced, closed due to the cessation of steam locomotive production and a decrease in the workforce (Jones, 2011). In 1966, while the railway village was planned to be demolished after Swindon Borough Council purchased most of the railway village from British Rail, through a campaign started with volunteer effort, the cottages were saved, and in the 1970s, the cottages were listed and in 1975 designated as a conservation area. In 1986, the works closed entirely, marking another effort by volunteers to preserve Swindon's identity as a railway town (Jones, 2011). For instance, a charitable trust to keep railway engineering alive in part of the works, repairing and restoring old engines for use on preserved and tourist lines throughout Britain (ibid, p.100). Due to many buildings and features having been demolished following the closure, the railway works area was designated as a conservation area in 1987, at which time the area was derelict.

The Buildings that Compose a Planned Railway Town

The town of Swindon was established as the headquarters of the GWR, one of the world's first and renowned railways of its time. The locomotive and wagon repair and manufacturing works (Table 1) established under the leadership of Brunel, pioneers in railway engineering and architecture, held an international position in the field of railway engineering and were among the largest of their kind in the world. The railway town was also known for its railway village worker housing (Table 2), and social facilities to meet the demands of the workforce, making it one of the significant industrial housing areas of its

Table 1. Railway Work

Location	**Construction Date**
North of the London & Bristol railway line	1841-1846
Architect/Engineer	**Original Function**
I.K. Brunel Daniel Gooch	Repair and manufacturing works of locomotives and carriage
Architectural Feature	
The works plan (Figure 4) are simple design, large size, and plain appearance and constructed using stones obtained during the excavation of the Box Tunnel on the railway line (Jones, 2011) and have a local character by utilising Swindon stone. They exemplify the characteristic industrial architectural style of the time (Figure 5a-5b).	
Statement of Significance	
For a century and a half, the railway works served as the focal point of the community had a crucial part in the local economy. The GWR company is responsible for the transformation of the once-small hilltop town into the vibrant railway town. The railway works expanded to become the world's one of the largest facility for repairing and manufacturing locomotives, carriages, and wagons gaining a worldwide reputation as pioneers in this field.	

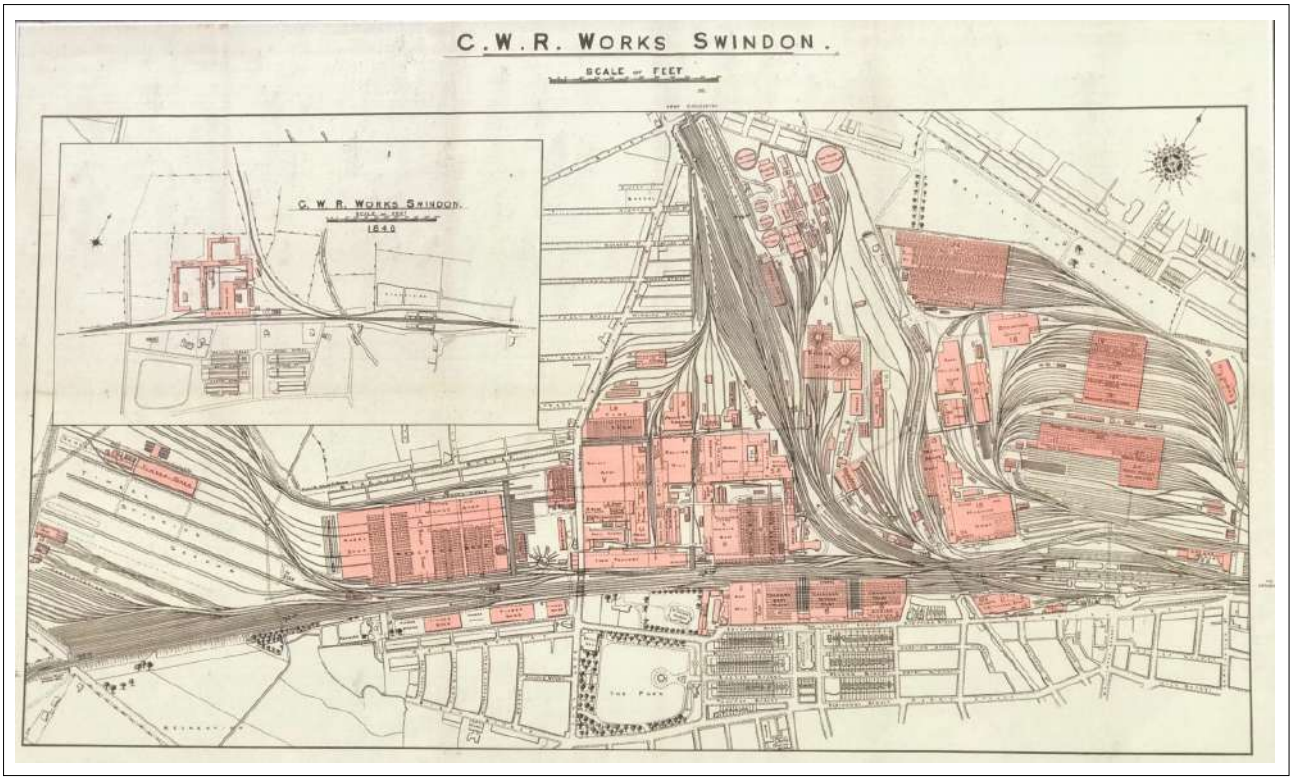

Figure 4. Development of Swindon repair, locomotive, and wagon production works from 1846 to the 1940s.

Figure 5. **(a)** Engine house of railway works; **(b)** Oldest locomotive repair works.

time. Furthermore, the GWR company established the country's first lending library (Table 3), and developed a pioneering healthcare system (Table 4). While the works were expanded with carriage works (Table 5), the village endeavored to improve living conditions with facilities such as the Health Hydro (Table 6) building, which is still in use today. St Marks Church (Table 7) and The Park (Table 8) were other facilities that met the demands of workers. Swindon Station (Table 9) connected railway works and the village to the west and east. All of these are defining characteristics of Swindon, a railway town that developed with a sense of community spirit and collective effort. The railway works, though closed, nevertheless hold significance for people in the area, many of whom had family working here. The buildings that compose a planned railway town are analyzed with the category of basic information such as location, construction date, architect/engineer, and original function; architectural features, and statement of significance which reflect data mainly from listed building contents. It is important to note that while the details given in the listed information have increased over time, their significance has been classified as historical architecture or group value.

Table 2. Railway Village

Location	**Construction Date**
South of the London & Bristol railway line	1842-1847
Architect/Engineer	**Original Function**
I. K. Brunel	Housing for the engineers and workers and social facilities
Architectural Feature	
Railway village was built including cottage housing, recreational areas, shops, and pubs, within a relatively short time frame. Despite their simple designs, these worker houses were notably superior in terms of quality compared to other industrial housing at the time (Andreae, 1985). The worker houses , approximately 300 in total, designed two stories high and featured front and back gardens (Figure 6). They were constructed using Bath stone, which was extracted during the railway's construction. The facades facing the railway line were embellished with decorative elements, while the other facades were more plain (Figure 7). In the central square, designed as the village's focal point, three-story blocks on either side housed company officials, foremen, and shops.	
Statement of Significance	
The railway village represents an early and rare instance of a model community created by a railway for its employees and their families, showcasing unique Victorian architecture and planning. It provided significantly superior accommodation compared to housing for workers during that era (Jones, 2011). The architectural style of the buildings owe much to Brunel's enduring interest in the area and the consistent use of Swindon and Bath stone. Preserved to this day, the village stands as a vital element of England's railway heritage (Catell, 1997).	

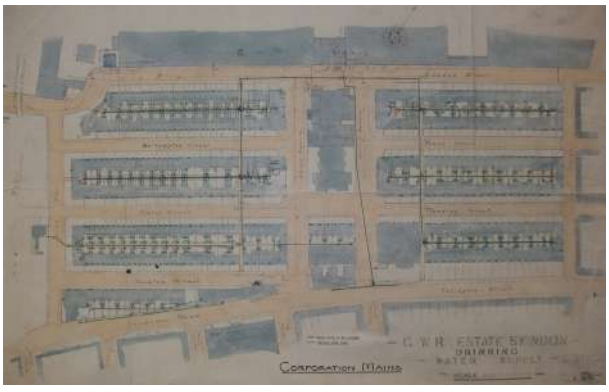

Figure 6. Plan of Swindon Railway Village designed by Brunel and constructed between 1842-1847 (STEAM, 2007).

AN OVERVIEW OF THE RAILWAY HERITAGE CONSERVATION PROCESS IN SWINDON

Railway heritage plays a crucial role in shaping Swindon's identity, and this heritage is a vital part of the Great Western Railway, which is among the most significant historical railway establishments still in existence worldwide (Cattell & Falconer, 1995). It stands as one of the best-preserved early railway settlements in the country. While many of the first railway accommodations in rival settlements like Wolverton, Derby, and Crewe were demolished, Swindon Railway Village, which faced a similar fate in the 1960s, managed to survive. From the 1970s onwards, Swindon Borough Council has been a model in preserving railway heritage through successful restoration and redevelopment projects (Cattell, 1997).

The Preservation History of Swindon Railway Town

One of the initial conservation approaches to Swindon's railway heritage was the establishment of a museum focusing mainly on movable artifacts from the Great Western Railway in 1962 (Cattell & Falconer, 1995). In 1986, the closure of Brunel's workshops signified the start of a new era in the railway town, which had been a significant industrial settlement during the period when the works were active. Interest in preserving the works,

Figure 7. The row houses of Swindon railway village, still in use today in their original function.

Table 3. Mechanics' Institute

Location	**Construction Date**
Emlyn Square, the central of the railway village	1854-1855
Architect/Engineer	Original Function
Edward Roberts	Workers' and their families' education to improve all employees' standard of living
Architectural Feature	
The building is two stories tall and prominently features a raised central hall or theatre, showcasing a Gothic Revival architectural style and made of limestone rubble with ashlar quoins and dressings,the institute consisted of a library, reading rooms (Figure 8a), a large theater, a coffee lounge, and recreational spaces (Figure 8b). Over time, an octagonal indoor market was added to the southern end of the building (Historic England, 2017)	
Statement of Significance	
For nearly a century, it played a pivotal role in the social and cultural life of the railway village (Roden, 2010). It was a central gathering place for various community events related to GWR. It includes the country's first lending library. This institute seems to be a rare survivor associated with a railway company.	

Figure 8. **(a)** Mechanics' Institute reading room (Historic England, 2017); **(b)** Mechanics' Institute.

Table 4. Medical Fund Hospital

Location	**Construction Date**
South of the London & Bristol railway line	Built in 1862 as the GWR works'converted to hospital for GWR workers in 1871
Architect/Engineer	**Original Function**
-	Hospital for the use of railway workers and their families
Architectural Feature	
The building was initially designed to integrate with the neighboring railway village structures, with the central block intentionally distinguished, and despite subsequent modifications, its original architectural form remains recognizable (Historic England, 2020c).	
Statement of Significance	
This initiative is of national significance as it served as an inspiration to Nye Bevan, the founder of the National Health Service, when he visited Swindon in the 1940s, pioneering the establishment of medical centers. Established in 1847 by Daniel Gooch, the Medical Fund Society utilized a fund created by deducting portions from workers' wages to contribute to public health and efforts to improve living conditions (Figure 9a-9b). This fund played a significant role in addressing various epidemic diseases and accidents (Roden, 2010).	

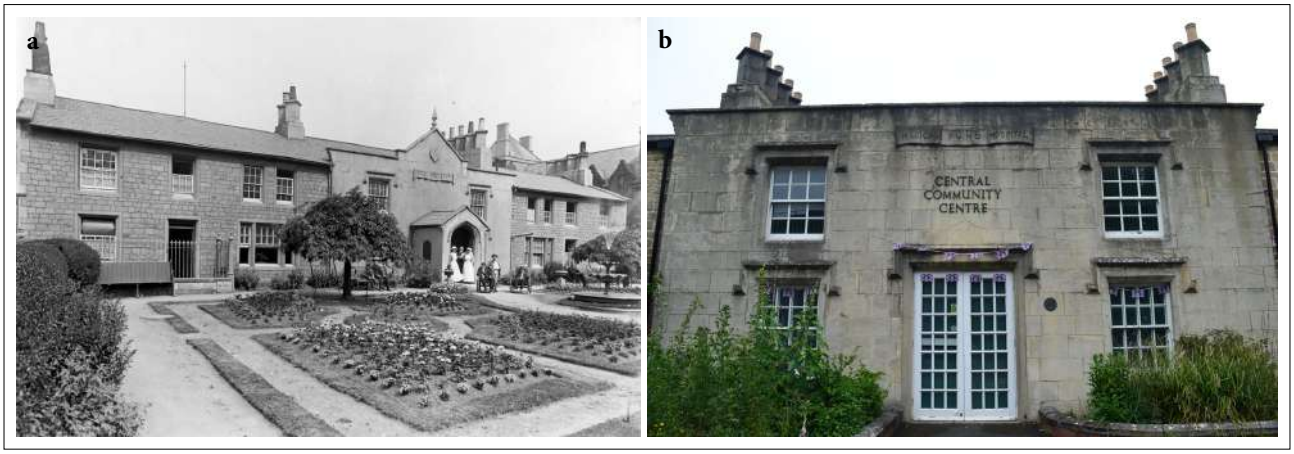

Figure 9. **(a)** GWR Hospital (STEAM, 2023); **(b)** Central Community Centre.

Table 5. Carriage Works

Location	**Construction Date**
South of the railway works between the railway village and the rail line	1874
Architect/Engineer	**Original Function**
Joseph Armstrong	GWR's wagon manufacturing
Architectural Feature	
It stands parallel to main rail line consisting of adjoining buildings. The masonry facade, stretching almost 200 meters, was specifically crafted to complement earlier GWR constructions. It consists of a railway entrance building with a pedestrian subway underneath the railway (Historic England, 2020b).	
Statement of Significance	
At the time of their construction, these works were not only the largest wagon works (Figure 10a) in the country but also exemplified innovative design for this type of railway buildings. In this initial construction phase, brick and iron framing were employed for the interior structure, marking their first use in such a context (Figure 10b). At its busiest, more than 14,000 workers used the entry building and subway tube as the only means of transportation between the works and the railway village (Historic England, 2020b).	

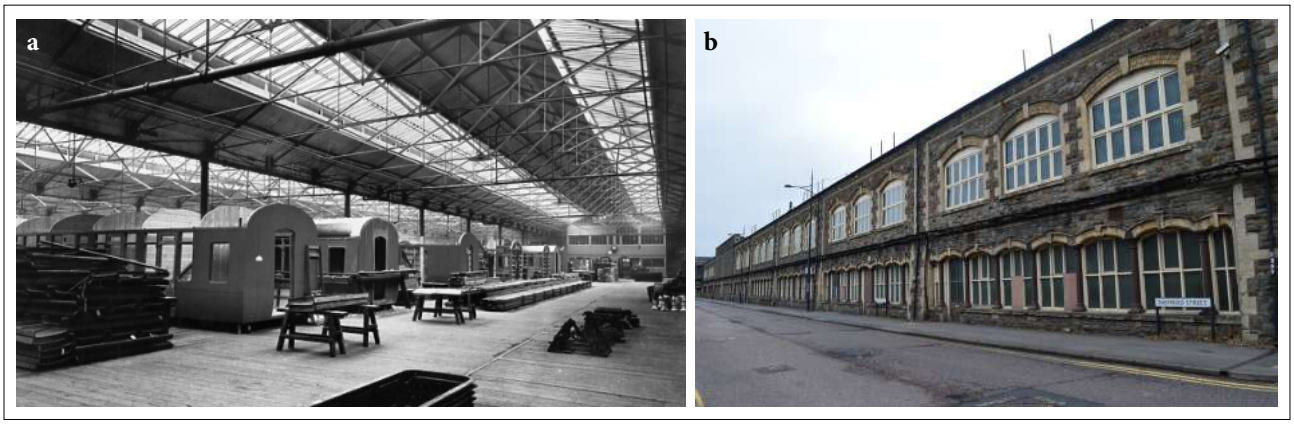

Figure 10. **(a)** Carriage Works (STEAM, n.d.-a); **(b)** Carriage Works.

which had been excluded from the railway heritage until their closure, began when demolition decisions were being considered. To keep railway engineering alive in part of the works, Bill Parker founded the GWR Heritage Trust as a voluntary organization. In the subsequent years, efforts by volunteers across the country led to the preservation of historic railway lines for tourism purposes, with a focus on maintaining old locomotives to be used on these lines

Table 6. Health Hydro

Location	**Construction Date**
South of the London & Bristol railway line	1891-1912
Architect/Engineer	**Original Function**
J.J. Smith	A wide range of medical and recreational facilities for workers, from swimming pools to Turkish baths and dental surgeries.
Architectural Feature	
The building (Figure 11a) occupy a rectangular block functioning dispensary and swimming baths (Figure 11b). The entire structure is constructed using red brick and adheres to a simplified Queen Anne architectural style (Historic England, 2000).	
Statement of Significance	
Long before the government provided universal healthcare, the Great Western Railway established its own comprehensive healthcare system in Swindon, offering services well ahead of its time (Roden, 2010). The Health Hydro was one of these healthcare facilities made available to workers. As the community raised money to build, a characteristic that makes Swindon unique is its sense of collaboration and belonging (Historic England, 2000).	

Figure 11. **(a)** Health Hydro; **(b)** Health Hydro (Historic England, 2000).

Table 7. St. Mark's Church

Location	**Construction Date**
South of the London & Bristol railway line	1843-1845
Architect/Engineer	**Original Function**
Sir George Gilbert Scott William Bonython Moffatt	The Anglican Church built for GWR
Architectural Feature	
The church (Figure 12a-12b) designed by highly significant ecclesiastical architects of the period with the revival of Gothic style. The initial design featured a chancel, six-bay nave, north and south aisles, sacristy, and south porch. The large north tower, adjacent to the north aisle, was a later addition aimed at enhancing the building's appearance from the railway. (Historic England, 2020d).	
Statement of Significance	
It was constructed, particularly for GWR, as a place of worship as part of a comprehensive effort to provide housing, health, and welfare amenities for the workers at the GWR Swindon Works by significant architects of the time (Historic England, 2020d).	

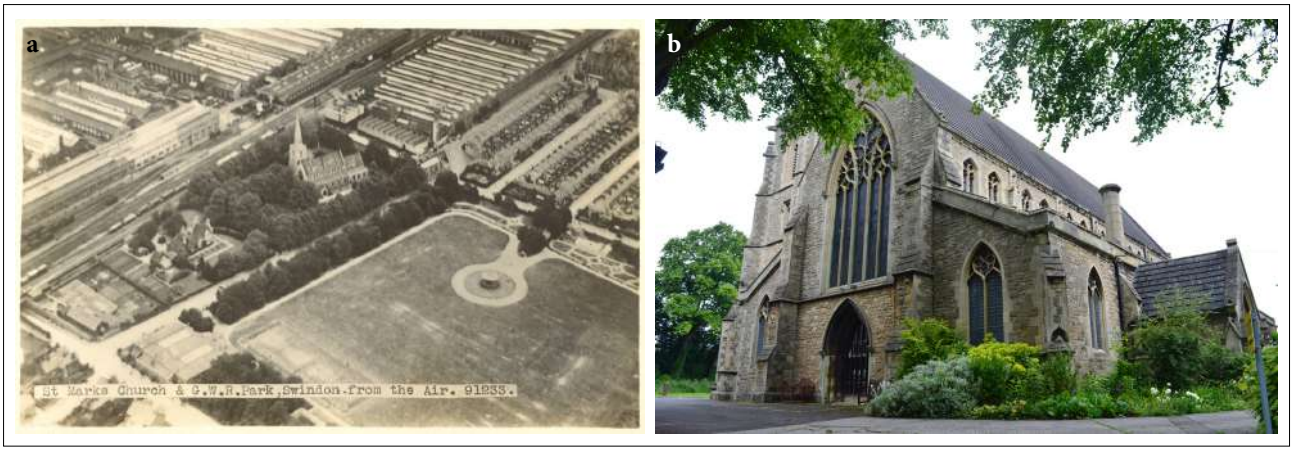

Figure 12. **(a)** St Marks Church; **(b)** St. Mark's Church.

Table 8. The Park

Location	**Construction Date**
South of the London & Bristol railway line	Purchased by the GWR in 1844, became a formal park in 1871
Architect/Engineer	**Original Function**
-	Recreational area and a gathering place for significant celebrations throughout history
Architectural Feature	
To the west of the village, the GWR company purchased land for a cricket ground, which was eventually turned into a formal park. The park, which had its landscaping redesigned in the 1870s, has successfully remained a green space within the settlement to this day (Figure 13b).	
Statement of Significance	
From the 1860s onward, the park served as the area for the annual GWR children's festival (Figure 13a) and holds significant importance in railway history and urban memory. The park has continually held a pivotal position in the community, serving as a venue for events and providing essential open space as the town.	

Figure 13. **(a)** GWR Children's Fete in GWR Park (Swindonstory, n.d.); **(b)** The Park.

(Jones, 2011). While the oldest works were listed by English Heritage, the demolition was halted due to the efforts of retired railway workers and railway enthusiasts who refused to allow the town's railway identity and traditions to be lost in the rubble, considering the destruction a loss of engineering skills and traditions (Taksa, 2008).

Another significant development was the majority of Railway Village properties being purchased by Swindon

Table 9. Swindon Station

Location	**Construction Date**
Middle of the railway works and railway village	1842
Architect/Engineer	**Original Function**
I. K. Brunel	Transportation from London to Bristol
Architectural Feature	
Brunel designed the station (Figure 14a) featuring two island platforms, each equipped with a matching two-story structure and connected by an iron footbridge, complete with attached timber canopies. When the southern island platform was destroyed and the current station tower with an entrance building was built in its place, the layout was significantly changed (Historic England, 2012).	
Statement of Significance	
Despite quite considerable alterations, the surviving building remains (Figure 14b) an integral component of the GWR and holds significance as it connects nearby railway-related buildings to the west and east (Historic England, 2012).	

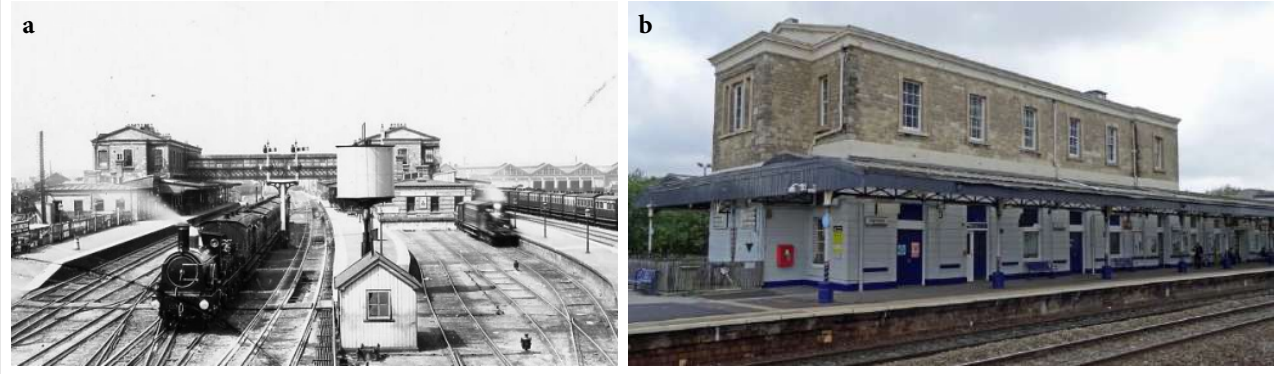

Figure 14. **(a)** Swindon Station was designed with an unconventional layout type by Brunel, differing from his customary plans (STEAM, n.d.-b); **(b)** The part that has survived from Swindon Station to the present day (British Listed Buildings, n.d.).

Borough Council to save them from demolition.[2] This decision, in contrast to the destruction seen in similar industrial settlements of the time, ensured the preservation of much of the character of the Brunel era in the Railway Village (Jones, 2011). In 1970, homes were listed as heritage, and campaigns against their demolition led to the declaration of the village as a conservation area in 1975. Between 1970 and 1980, a comprehensive renovation program for worker housing was implemented with limited changes (Jones, 2011). The actions taken included repairing roofs, cleaning stone facades, removing additions from backyard gardens, burying external wiring, putting long grass strips in place of individual gardens, and enhancing the surrounding public areas and landscaping. One of the houses in the Railway Village was purchased with public funds and restored as a museum to represent the Brunel era (Jones, 2011). The restoration efforts in the Railway Village were considered exemplary conservation practices, earning numerous awards (Cattell, 1997).

With the recognition of the importance of Swindon's railway heritage, both the local community and experts began to express concerns about its tangible and intangible cultural heritage. In 1997, a reuse project was implemented, covering a significant part of the surviving works, and they were transformed into the modern shopping complex known as McArthur Glen Designer Outlet Village. The GWR Outlet Village, visited by 4.5 million people in its inaugural year of business, (Taksa, 2008) triggered financial support from other organizations, leading to the restoration of the oldest repair works listed as Grade II, which were transformed into the award-winning STEAM – Great Western Railway Museum (Figure 15). The museum interpreted the production processes that took place in the works, showcased the lives of railway workers through video interviews, and displayed the skills and methods of the workers (Taksa, 2008). Beyond the collection, with the approach of depicting a wide range of railway operations, including the experience of working in the carriage and locomotive works, it is notable in railway museology (ERIH, n.d.).

Figure 15. Great Western Railway STEAM Museum.

Swindon Railway Conservation Area

In the United Kingdom, the Planning (Listed Buildings and Conservation Areas) Act of 1990 provides the legal framework for the protection of listed buildings and conservation areas in England and Wales. Historic England is the government's statutory adviser responsible for the conservation and management of historic monuments and buildings, advising on the designation of listed buildings and conservation areas, guiding conservation practices, and undertaking research and advocacy to promote heritage preservation in England.

The Planning Act defines a conservation area as a place of "special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance." This includes all of the characteristics of the buildings and monuments, including the topography, the materials used, the streets, the street furniture, the open areas, and the landscaping. Each of these elements influences an area's appearance and character, giving it a unique local identity and sense of place (Historic England, 2019b). In conservation areas, there are extra planning controls and considerations, and development within conservation areas is subject to stricter controls by local planning authorities. In the case of Swindon, it is important to highlight the area designated with railway identity, namely "the Swindon Railway Conservation Area".

The Swindon Railway Conservation Area (Figure 16) encompasses the internationally significant GWR works, the railway village, and the Swindon railway station. Initially, two separate conservation areas were designated in 1975 and 1987. The first one is for the former railway works and the second one is for the railway village. Both areas are interconnected in terms of their origins, histories, and evolution as the village would not have existed without the works, and had the village not been constructed, the works would not have been sustainable. The railway line that separates the two main sections of the Conservation Area is also crucial in terms of the area's character and its significance in why these areas were built within the town. The railway works are considered a significant historical monument from the early days of the British railway era, and they are recognized for their national and international importance. Swindon's railway village stands out as one of the most notable industrial housing developments of its time and is distinguished as one of the best-preserved railway settlements in comparison to other surviving railway towns like Crewe, Wolverton, and Derby in England (Cattell & Falconer, 1995).

Swindon Heritage Action Zone

Swindon Heritage Action Zone (HAZ)[3] is a five-year plan prepared in June 2019 to revitalize the conservation area. HAZ is designed to restore and reuse neglected public buildings that were originally constructed to accommodate thousands of workers in the GWR works, revitalize public areas, strengthen relationships between the village and the city center, and highlight the region's distinctive features. HAZ encompasses sixteen distinct projects, ranging from restoration initiatives to branding

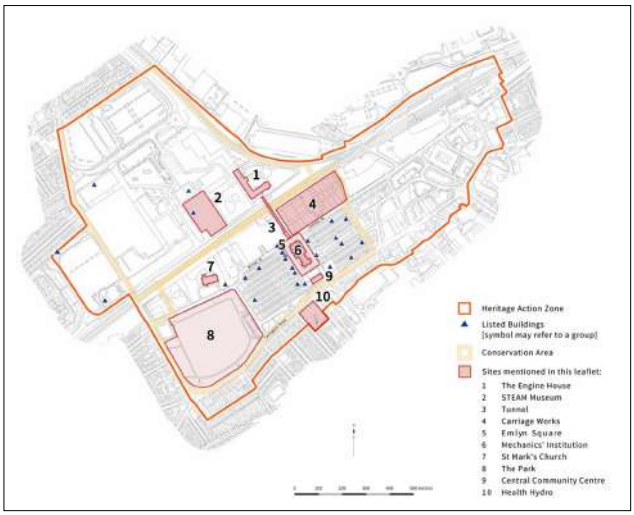

Figure 16. Swindon Historic Action Zone Map (Historic England, 2020a).

efforts and public engagement activities (Historic England, 2019a).

Functional Analysis of Historic Railway Structures in Conservation Area

The industrial and administrative buildings that have survived to the present day showcase innovative construction techniques that met the needs of their time. While exemplifying the style of typical industrial buildings of the era (approximately 1840–1920), the usage of Swindon stone gives them a distinctively local appearance. Projects that have adapted and reused these historic structures have received numerous awards since their implementation, making them potential models for the preservation of railway heritage (Pursell, 2021). In this section, as can be seen from Table 10, the current state of preservation of closed railway structures, after 150 years of use, is examined in three categories based on their functions: those still in their original function, those converted into museums, and those adaptively reused with different functions unrelated to railway museums.

COMPARATIVE ANALYSIS BETWEEN SWINDON RAILWAY TOWN AND ALSANCAK RAILWAY CAMPUS

Alsancak Railway Campus

In the mid-19th century, the Izmir & Aydın (Smyrna-Aidin) Railway, the first railway in Anatolia, was granted to a British-led company, including notable figures like Sir Joseph Paxton and Sir Macdonald Stephenson (Atilla, 2014). It took eight years, starting in 1858, to complete, reaching Aydın in 1866 with the aim of modernizing Ottoman transportation. The British company was chosen for railway construction and management in Ottoman lands due to trust in its railway expertise (Cobb, 2023). It was a notable achievement, connecting once-isolated Anatolian towns to global markets and each other, enabling swift and cost-effective transportation from the inland areas to the port city of Izmir (Inal, 2021).

Alsancak, previously known as Punta, was situated in a rural setting, quite distant from the city center of Izmir, before its selection as the initial point for the Izmir & Aydın Railway (Cobb, 2023). After long discussions, the location of the Alsancak Railway Campus was determined for reasons such as the port planned to be built in Punta, ease of loading and unloading, and the supply of coal required for the railway by sea (Bilsel, 2000). After the station was built, Alsancak, which was originally a suburb of Izmir, transformed into the city center (Demirci & Coşar, 2021).

Alsancak Railway Campus (Figure 18) was built between 1858 and 1861 without a specific plan outline, as seen in early railway examples. The linear layout of Alsancak Railway Station was aligned parallel to the railway tracks and platforms. The railway complex extends to the south and east, including storage facilities, service and maintenance areas, as well as administrative units. Some of the railway buildings, including residential units situated to the northwest of the station building, are presently detached from the campus.

Statement of Significance and Preservation Status of Alsancak Railway Campus

Alsancak Station, one of the most important industrial heritages of Izmir, was the starting point of the first railway line in Anatolia. Alsancak, the initial point of the line, stands out as the largest settlement and also has the most remarkable structures built by the company responsible for the railway's construction (Ekizoğlu, 2012). The railway campus includes different functional group structures not found in other railway areas such as two different passenger stations, wagon repair shops, carpentry shops, warehouses of different sizes, and housing for different groups.

While the railway became a socio-economic milestone for Western Anatolia, Alsancak had a significant impact on both the economy and city planning of that period, as it was the first of its kind and was connected to the Izmir Port. The railway significantly boosted the foreign population in Izmir, with wealthy Levantine families settling in areas close to their countries' living standards. While migrations, population growth, and changing conditions had an impact on daily life, they also brought with them many innovations in agriculture, trade, and communication (Atilla, 2014). The Izmir-Aydın railway construction likely had the most significant impact on Turkey's archaeology, as it led to the discovery of the Temple of Artemis in Ephesus (Kösgeroğlu, 2005). Today, the Alsancak Railway Campus is still active and functions as a central point for IZBAN, a commuter

Table 10. Functional Analysis of Historic Railway Structures in Swindon Railway Town

Category	Building(s)	Listed Status	Original Function	Current Function
In Use with Their Original Function	Railway Village	II	It was designed by Brunel and built between 1842-1847 to house the workers in the locomotive and wagon repair and production works.	In 1966, Swindon Borough Council purchased the railway village from British Rail, and the Grade II-listed houses of the railway village are still within the conservation area boundaries today, continuing their original use.
	Health Hydro	II*	In order to protect the health of the workers in the railway works, a fund established by Gooch was used to build facilities such as a swimming pool and a Turkish bath in 1891.	The Grade II* listed building, located within the conservation area boundaries, continues to be used for its original function by the local community, with improvements initiated in 2021.
Reused as Railway Museums	STEAM	II	This is one of the oldest locomotive repair works. It was established in the 1840s to maintain and repair locomotives used on the London-Bristol line.	Works of 19 and 20 were converted into the STEAM museum, which was established by the Swindon Borough Council in 2000. The museum focuses on the history of GWR and the railway in the town, showcasing the working principles of the works and the skills of the workers (Hoadley, 2001).
	Railway Museum	II	This is one of the houses in the railway village built in Swindon for railway workers to live in. It accommodated railway workers from 1846 until the late 1970s.	This houses was transformed into a "Living Museum", and it was first opened to visitors in 1980. The museum closed in 2000 but was renovated and reopened in 2017 under the management of the Mechanics' Institution Trust.
Adaptive reused with different functions apart from the railway museum	The Engine House	II	It serves as the administrative center of the GWR Works. The drawing office where the first locomotive superintendent Gooch designed some of the steam locomotives.	Since 1992, the building has served as one of the main offices of Historic England (formerly known as English Heritage). Additionally, it houses the archives of the Historic England institution.
	Railway Works	II*	These are works numbered 9, 13, and 15, constructed in 1872 to manufacture locomotives and represent factory buildings of era.	Works numbered 9, 13, and 15, which were originally used for locomotive production, have been reused as the Great Western Designer Outlet Village by McArthurGlen Group since 1997.
	Carriage Works	II	These works, established in 1874 for the purpose of manufacturing wagons for the GWR company, were constructed as the largest in the country at the time.	These works have been partly transformed into working spaces for digital start-up businesses such as "Workshed" and the Royal Agricultural University Cultural Heritage Institute for postgraduate courses (Figure 17).
	Mechanics' Institution	II*	It was established in 1854 at the heart of the railway village to provide education and socialization for workers and their families including a library, reading rooms, a large theater, a coffee lounge, game rooms, and an indoor market.	In collaboration with Swindon Borough Council, Mechanics' Institution Trust, the Theatres Trust, and Historic England, comprehensive research and surveys have been conducted to determine the new function of the building as multifunctional use, including cultural activities (Theatre Trust, n.d.).
	Central Community Center	II	This is the hospital building that was opened in 1871 by the GWR Medical Fund Society, with a mandatory subscription from worker's salary due to the dangers of railway labor.	The hospital remained in service until 1960, then the building was transformed into a community center as still used as the Central Community Center.

Figure 17. Adaptive reuse of historical locomotive and carriage production works with a different function than the railway museum; Great Western Designer Outlet Village, Workshed (Workshed, n.d.) Royal Agricultural University Cultural Heritage Institute (Royal Agricultural University, 2021).

rail system connecting Izmir and its metropolitan area. The railway site holds a central position and possesses significant potential to meet the social and cultural requirements of urban life (Karabağ & Taddonio, 2019).

The declaration of Alsancak as a "historical urban site"[4] in 2017 is significant in terms of the conservation process of the region. The biggest challenge related to the comprehensive preservation of Alsancak, with its historical documents and its role as a space of urban memory, witnessing the development process of Izmir as a port city and the architectural heritage of different periods, is the determination of the conservation area's boundaries (Çırak et al., 2021). Despite the presence of listed structures such as Alsancak Railway Station and railway site, near other boundaries, these areas have not been comprehensively evaluated and have not been included in the historical urban site. The determination of the conservation area boundaries for the Alsancak area requires a more extended and comprehensive discussion. Çırak et al. (2021) suggest that the preservation of Alsancak's historical characteristics should be encouraged through the application of interdisciplinary dialogue-based participatory models within the framework of integrated conservation and planning approaches.

Regarding the functional analysis of the campus, as can be seen from Table 11, some of the railway buildings are still in use with their original function while most of them are adaptively reused.

Comparative Studies of Swindon Railway Town with Alsancak Railway Campus

In this section, Swindon Railway Town and Alsancak Railway Campus will be compared in terms of their similarities and differences in architectural features, conservation processes, and current uses. These two areas were selected based on their sharing similarities in architectural features and diversity; their significance as being early examples in their countries, as well as Swindon standing out as an early and effective effort in the preservation of railway heritage.

- **Pioneering Examples of Railway Constructions:** While GWR is one of the earliest attempts at intercity railways in the UK, the Izmir & Aydın Railway is the first example of railway stations in Anatolia. Thus, in both lines, buildings hold special importance from an architectural point of view as these buildings are among the earliest examples of new building types as railways. Additionally, both areas are important in terms of the use of new materials in architecture[5]. In terms of architectural style, as Cobb (2023) highlighted, the façade architecture of Alsancak Station, which features a steeply pitched Gothic style, shows the influence of the revivalist tendencies that were present in England during the same period.
- **Impact on Urbanization:** In both cases, the rural areas before the railway turned into important settlements in their regions after the arrival of the railway. Both regions were chosen because they are convenient and important strategic points for the construction of the railway settlement[6]. The gradual development of railway settlements in Swindon and Alsancak has made a substantial impact on both economic growth and social progress as well as urbanization. As the population increased and new neighborhoods were established with the railway, these railway areas became new attraction points in both cases[7].
- **Planned Railway Campus with All its Elements:** These industrial settlements, both Swindon and Alsancak, were meticulously planned to provide all required settlements for the workforce, from housing to healthcare and recreation. As Cattell & Falconer (1995) stated, Swindon is "an almost complete planned railway settlement of the 1840s and early 1850s, unrivaled in its state of preservation by Crewe, Wolverton, and Derby, England's other surviving railway company settlements". Similarly, as quoted by Kurmuş (2007) from the speech of British Consul General Redcliff, the Izmir-Aydın Railway is seen as "the great work and initiative of British genius and skill", while Alsancak looks like a railway village (IZKA, 2021) with its railway structures from housing to social buildings within the city on a very large area (Sönmezoğlu, 2016). While the town of Swindon stands out with its identity as a railway town, even though it

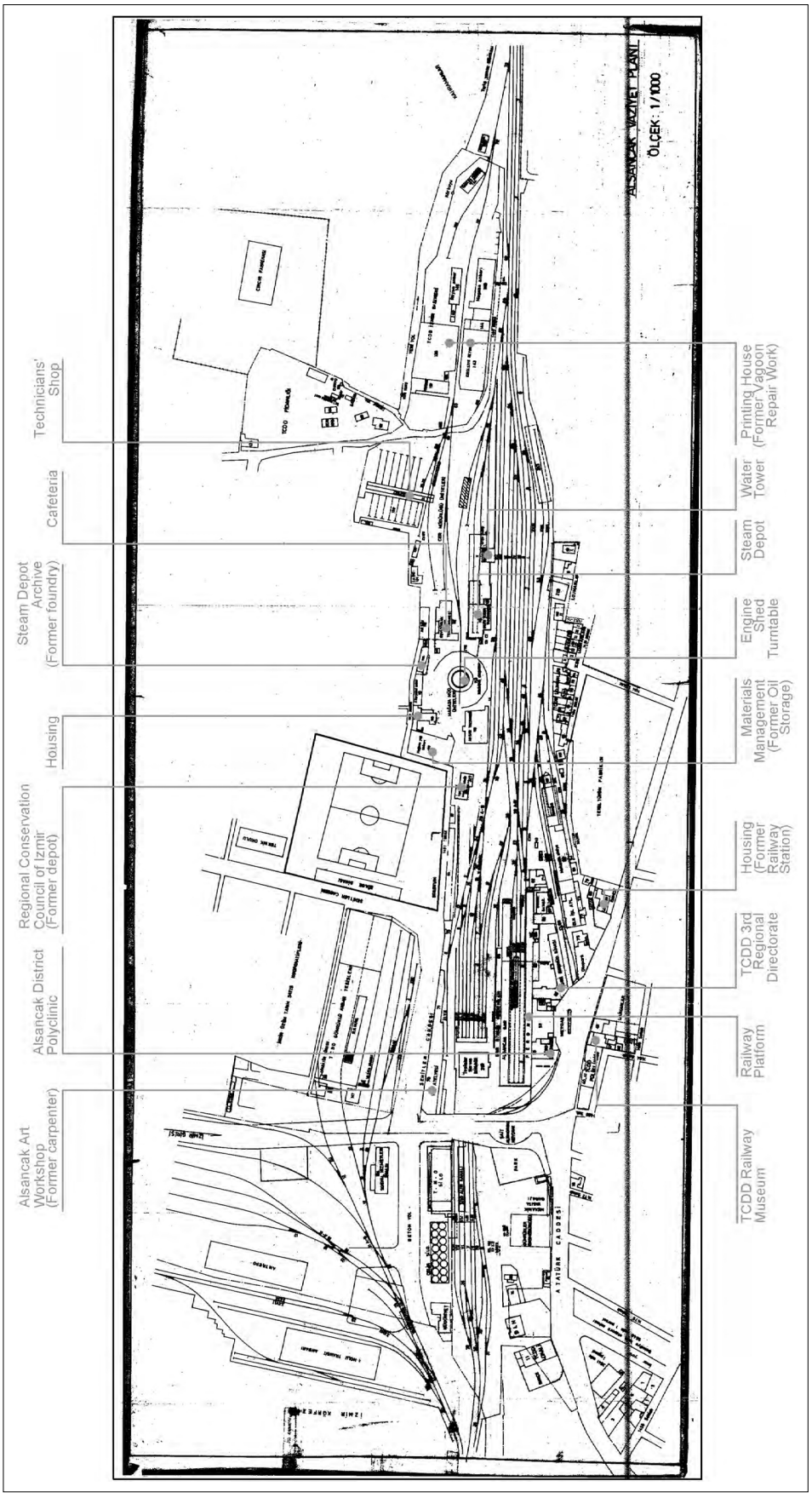

Figure 18. Alsancak Railway Campus with railway buildings (It was prepared by the author on the Alsancak site plan obtained from TCDD 3rd Region Archive.)

Table 11. Functional Analysis of Historic Railway Structures in Alsancak Railway Campus*

Category	Building(s)	Listed Status	Original Function	Current Function	Photograph
In Use with Their Original Function	TCDD 3rd Regional Directorate (former railway termini)	Listed	It was the initial settlement as administrative buildings of major termini of the Izmir & Aydın Railway.	It is home for (TCDD) 3rd Regional Directorate office.	
	Technicians' shop	Listed	It was used as an erecting shop to ensure that locomotives were assembled, maintained, and repaired.	It is the technicians' shop used for maintaining rolling stock.	
	Housing	Listed	It was used as accommodation for railway employees.	It is used as accommodation for railway employees.	
Reused as Railway Museums	TCDD Railway Museum (former commercial warehouse)	Listed & in Conservation Area	It served as a commercial warehouse for British merchants, later becoming the headquarters of British companies and, the residence of the Izmir & Aydın Ottoman Railway Company's manager.	It exhibits a collection Izmir related particularly & Aydın Railway.	
Adaotive reused with different functions apart from railway museum	Housing (former railway station)	Listed	It was the station built in the Alsancak railway settlement for use by Buca suburban line passengers.	It is used as accommodation for railway employees.	
	Printing House (former Vagoon Repair Work)	Listed	The building was used as a wagon maintenance workshop when it was built, It started to be used as a printing house in 1941 until 2000.	Under restoration for an adaptive reuse.	
	Alsancak District Polyclinic (part of former railway termini)	Listed	It was the part of Alsancak Railway Termini.	It is used as a healthcare facility.	

Table 11. Functional Analysis of Historic Railway Structures in Alsancak Railway Campus* (CONT.)

Category	Building(s)	Listed Status	Original Function	Current Function	Photograph
	The Telegraph Building (part of former railway termini)	Listed	It was the part of Alsancak Railway Termini.	It is home for (TCDD) 3rd Regional Directorate office.	
	The Steam Depot Archive (former foundry)	Listed	It was used to cast and mold metal components used in railway equipment.	It is used for storage.	
	TCDD Materials Management (former oil storage)	Listed	Its inital function was oil storage.	It is used as TCDD Materials Management.	
	Alsancak Art Workshop (former carpenter shop)	Listed	It housed an iron workshop and a wood workshop that repaired road sleepers.	It is used as workshop area.	
	Regional Conservation Councils of Izmir (former depot)	Listed	It was used to store and maintain railway campus.	It is used as the head of Office of the Directorate of Regional Conservation Councils of Izmir.	
	Cafeteria	Listed	-	It serves to offer meals and refreshments for railway workers.	
Out of use	Steam Depot	Listed	It sheltered location for the storage of steam locomotives when they are not in use.	It is out of use and neglected and part of building used as a storage.	
	Water tower	Listed	It is functioned to supply steam locomotives with water for steam generation and maintenance.	It is out of use and neglected.	
	The engine shed with a turntable	Unknown	It was served for the maintenance of locomotives and rolling stock.	It was demolished and turned a car parking area of Alsancak railway campus, only turntable is survived.	

is not currently used for its railway function, Alsancak, although this function continues, is isolated from the city due to the heavy land traffic around it.

- **Preservation Processes, Listed and Conservation Area Status:** In both cases, railway settlements have been impacted by technological advancements, resulting in the adaptation of numerous structures for new purposes. While Swindon railway town has diversified its use to include cultural or artistic purposes, the Alsancak Railway Campus still has active railway-related functions. The Swindon Railway Works, village, and all railway-related buildings are encompassed within the Swindon Railway Conservation Area. As the railway played a crucial role in the industrialization and development of Swindon, the designated railway conservation area is crucial in terms of the area's character and its significance. These areas include special regulations and incentives for the preservation of these structures such as controlling changes that could affect the character of the area even minor alterations may require planning permission[8]. In Alsancak, despite its proximity to the boundaries, the historical urban site does not include the Alsancak Railway Campus, so as Çırak et al. (2021) stated, the conservation area boundaries for the Alsancak area require a more extended and comprehensive discussion. The vast majority of railway structures in both areas are listed. On the other hand, Swindon railway town has detailed conservation action plans such as HAZ[9], while the Alsancak Railway Campus, although survey plans are available for most of the buildings on the campus, needs detailed documentation and a management plan.
- **Museums, Restoration, and Reuse:** STEAM, an awarded railway museum, not only preserves and displays historical artifacts but also educates, engages with the community, promotes tourism, and commemorates the crucial role that Swindon played in the development of British railway history and makes it accessible to the public. The railway heritage in Swindon has been preserved through restoration and reuse projects. Many of the old railway structures have been given new functions, ensuring their continued use[10]. This approach contributes to the physical preservation of these structures and the sustainability of conservation areas. As regards the Alsancak Railway Campus, there is a railway museum and art gallery which exhibit mostly movable heritage related to the Izmir-Aydın Railway. Also, one of the wagons of the "White Train" used by Mustafa Kemal Atatürk, the Founder of the Republic of Turkey, during his domestic trips, is exhibited at Alsancak Railway Campus. However, there is a need for a railway museum in which Alsancak should be exhibited with its railway identity and in all its aspects beyond only movable heritage.
- **Local Collaborations:** The Swindon Borough Council has played a pivotal role in supporting the preservation of railway heritage through local collaborations. These collaborations bring local authorities, community organizations, and other stakeholders together to develop preservation projects[11]. In the case of Alsancak, Turkish Republic State Railways (TCDD) is the responsible organization for railways in Turkey, and Alsancak is one of its seven regional managements. However, there is a vital need for support from local collaborations.

Interest, Awareness, and Education

As seen from the preservation history of railway heritage in Swindon, it is primarily driven by a deep interest and awareness of the locals who are related to the works. Residents of the town are known for their commitment to preserving this heritage due to their strong historical connection. Schools and community groups in the town organize educational programs and awareness initiatives related to railway heritage[12]. These efforts, including interpretation boards, guided tours, and other initiatives to preserve these sites, reinforce the town's unique character. As regards Alsancak, there is a growing interest in the Alsancak Railway Campus, as can be seen from universities' attempts at technical visits, and conferences at the railway campus area in recent years[13]. But still, due to the isolated status of Alsancak from the city, there is a need for initiatives to help increase interest and awareness of railway heritage.

CONCLUSION

Railways, first in England and then in the rest of the world, have transformed economic and social life. They are seen as an unprecedented development in terms of their scale and impact on industrial societies. They have enabled travel over distances that just one generation ago seemed nearly impossible with relative comfort. Railway towns are central to the management systems of historical railway companies. These towns both create and exist because of the historical railways they are associated with, and the railway is an integral part of the identity of these towns.

Swindon continues to thrive within the identity of a railway town, uniting former workers and launching various campaigns for the future of the works and the character of the region, even though the railway works have been closed for approximately forty years. Despite some losses in the area, it remains one of the preserved railway complexes in England. The award-winning STEAM Museum serves as an exemplary model for preserving railway heritage in terms of both museology and adaptive reuse of industrial buildings. Currently, the Heritage Action Zone (HAZ) plan, developed in partnership with Historic England and Swindon Borough Council, is being put into practice to improve the protected areas of the railway works and village, as well as to reuse

vacant railway structures. Furthermore, restoration and reuse projects for listed buildings serve as a prime example of a sensitive and viable transformation of a historic railway area. When considering the importance of benefiting from international examples and their experiences in conservation efforts, Swindon exhibits qualities that could serve as an example for the Alsancak Railway Campus. These two railway areas are early and significant examples of railway architecture in their country, while Swindon demonstrates early efforts for similar preservation problems.

Alsancak Railway Campus, a groundbreaking and substantial investment that showcased the most advanced technology of its era, is a pivotal element for both the Izmir-Aydın Railway and the industrialization of Izmir. It should not be overlooked that the Alsancak Railway Campus includes a wide range of conservation concepts, from various building types and intangible heritage to technical equipment beyond the station. A detailed documentation of the campus; identifying and prioritizing the preservation of key historic railway buildings and exploring opportunities for adaptive reuse of vacant buildings are essential for the conservation of the campus. Additionally, considering this area as a whole and the decision of a "historical urban site" is vital for a holistic conservation approach. Involving relevant actors such as the central government, Turkish State Railways, local governments, non-governmental organizations, residents, and railway enthusiasts to collaborate in conservation efforts can also help ensure a holistic conservation approach. Organizing cultural and educational programs at the campus should also be taken into consideration to raise awareness about its historical and cultural significance.

NOTES

[1]In 1963, The Beeching Report, also known as The Reshaping of British Railways, was released by British Railways chairman Dr Richard Beeching, on the future of British Railways. In the UK at the time, British Rail, a division of the British Transport Commission, was in charge of the nationalised railway sector. Subsequently, Britain implemented several rail financing reductions, a move known as the "Beeching Axe". There are several factors at play, including shifting market trends, botched reinvestment plans, and inadequate management. In conclusion, 42% of the line—approximately 13,000 km from 31,000 km—and roughly 60% of the stations—roughly 3700 out of 6400—were closed between 1950 and 1980 (Gibbons et al., 2018).

[2]Council housing in the UK refers to housing provided by local government authorities, known as councils, at subsidized or affordable rents to individuals and families who are unable to afford accommodation on the private market.

[3]Heritage Action Zones (HAZs), designated by Historic England, aim to identify and revitalize historically significant areas across the UK, fostering preservation and revitalization efforts.

[4]Alsancak was declared a "historical urban site" in 1976, following the first identification and registration studies carried out by the High Council for Historical Real Estate and Monuments. However, in 1984, the status of the region was abolished. 33 years later, it partially regained its protection status as an "Alsancak Historical Urban Site" by Number 1 - Izmir Regional Board for the Conservation of Cultural and Natural Assets, with the decision dated May 9, 2017, and numbered 5948. With the decision of the same board dated June 6, 2017, and numbered 6069, the transition period protection principles and conditions of use were determined, and the borders were corrected with the ildecision numbered 6917 dated December 20, 2017.

[5]For instance, carriage works in Swindon exemplified innovative design for this type of railway building with brick and iron framing (Historic England, 2020b). Similarly, new materials were employed to span large openings due to the need for these openings in the repair workshop on the Alsancak campus.

[6]Swindon was also a convenient choice due to its topography, where the terrain became more inclined. This necessitated the attachment of a more potent engine in Swindon to complete the journey to Bristol, so the decision was made to establish the Great Western Railway's engine shed, repair, and manufacturing works in Swindon. As regards Alsancak, the port connection was an important factor in choosing this region for railway construction (Bilsel, 2000).

[7]In the case of Alsancak, Buca is a suburban area that was born and developed with the Izmir & Aydın Railway, and as Ekizoğlu (2012) stated, there was another station in the Alsancak Railway Campus for the use of the upper-class who lived in Buca.

[8]Conservation Areas are controlled by existing planning controls and with the application of an Article 4. For instance as the management plan of Swindon Railway Conservation Area stated "There is a current Article 4 Direction in place within Swindon's Railway Conservation Area covering the residential streets in the railway village as well as Church Place. The Direction means that work such as painting the exterior of a building, any extension or alteration, erection of garden structures and the creation of vehicle cross-overs all require permission".

[9]HAZ includes sixteen distinct projects, from repair plans to branding to public engagement. The main ones are; future planning of the conservation area, which includes the GWR; applications for unlisted buildings; a recovery plan to help local businesses stand out and thrive; Improvement of Health Hydro and its immediate surroundings; reuse of grade II registered Cricketers (local pub); the restoration of grade II listed carriage works and its reuse as a new business

centre and cultural heritage institute; finding a sustainable use for the grade II* listed Mechanics' Institution and securing its future; implementing a management plan for the GWR park. In addition, HAZ branded the conservation area covering the railway works and the railway village by naming it "The Works".

[10]Significant restoration projects are ongoing in both Swindon and Alsancak. The Grade II*-listed Mechanics Institute restoration project, a social building for workers with an important place in industrial heritage as one of the first of its kind in Swindon, continues. The wagon repair workshop in Alsancak, which was used as an Izmir printing house for a long time and had an important place in the city's memory, is now under restoration. In both projects, it is planned to open the buildings for cultural purposes and public use.

[11]These collaborations include; Mechanics Institution Trust, National Lottery Heritage Fund, Swindon & Wiltshire Local Enterprise Partnership, National Trust, Swindon Business Improvement District, Swindon Designer Outlet, English Heritage

[12]Swindon Railway Festival, showcasing the UK's model railway layouts; Swindon Heritage Open Days, to explore historic railway buildings; and We'll Meet Again, a whole-day experience for children at the STEAM are featured examples of railway heritage-related events.

[13]For example, reuse projects were designed by the students of Yaşar University, Department of Interior Architecture and Environmental Design to revitalise the historical Alsancak Train Station with contemporary functions, to bring a new urban and public space to the city, and to raise awareness about the preservation of the cultural heritage of the Alsancak Train Station building. The projects and models prepared by the students were exhibited at Alsancak Train Station with the participation of TCDD Izmir 3rd Regional Directorate personnel.

In October 2023, within the scope of the opening symposium of Izmir Institute of Technology Department of Architecture - Synergies of Place IZTECH Urban Design Studio Course, the concept of "Railways as Transformative Tourism Assets: Space Synergy of Place, Memories of Time" was discussed and held at the Alsancak Railway campus with the hosting and participation of TCDD.

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Article

Investigation of the determinants of user satisfaction in social mass housings in Edirne during the COVID-19 period

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ABSTRACT

The pandemic, with increased time spent at home, has heightened the importance of user satisfaction as needs have evolved. We aim to evaluate user satisfaction in COVID-19-era state-built mass housing and contribute to mass housing design literature.
The study focused on social housing in Edirne, analyzing architectural observations, surveys, demographic information, house characteristics, and spatial adequacy. Correlation and regression analyses explored satisfaction relationships, factors affecting satisfaction, and their influence.
User satisfaction is influenced by demographic characteristics, with insufficient living spaces due to the pandemic causing structural changes. Structural, environmental, interior, location, and access features significantly impact satisfaction, with structural features having the most significant impact.
Maximizing thermal comfort, ensuring high resistance to disasters, and maintaining good physical condition are the key factors that positively affect user satisfaction. However, poor-quality sound insulation materials and craftsmanship standards decrease satisfaction levels. It has been found that users prefer houses located near the city center. Additionally, users consider the environmental and green spaces of the house more important than its interior features.
Satisfaction with houses is greatly influenced by their structural and environmental features. It has been recognized that green areas and social spaces are essential and should be increased. Furthermore, flexible space planning has been emphasized to ensure the house can adapt to changing living conditions.

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INTRODUCTION

The COVID-19 pandemic, which started in Wuhan, China, rapidly affected the whole world and changed our lives, lifestyles, social relations, and habits, adversely affecting many sectors such as health, education, trade, etc. (Salama, 2020). To avoid the danger of the deadly epidemic, all business areas reorganized their work. As a result of the rapid spread of the virus, educational institutions took an immediate break from face-to-face education and switched to online education. Most business sectors turned to

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working from home. The rapid increase in the number of cases caused curfews. People became familiar with concepts such as "social distance," "mask," "quarantine," and "washing hands frequently during the day." Our homes are no longer just places where we eat, rest, and meet our daily needs; they take on many various functions. For adults who find it inconvenient and dangerous to leave the house, the rooms have turned into offices where online working orders are established, places where meetings and teleconferences are held, gyms where exercise is done, and balconies that have turned into closed spaces have turned into classrooms where children listen to their teachers over computer screens (Gür, 2022). The virus, which carries a higher fatal risk, especially for individuals over the age of 65, has caused them to stay at home for much longer periods, not being able to go out at all (Güngör, 2022). Although the epidemic was partially controlled with the discovery of the vaccine, this extraordinary situation between 2020 and 2022 made everyone unprepared to question life's social, economic, and societal aspects. Just as Paris and London renewed their entire infrastructure during the cholera epidemic in 1954 (Yüksel, 2022), it changed the perspectives of designers, city planners, and interior architects. It showed that all design dynamics should be rearranged despite the pandemic being left behind. Urban planners and landscape architects saw the importance of open and green spaces in planning much better (Andreucci et al., 2019). The concept of "pandemic architecture" came to the fore, and architectural design evolved into spatial arrangements where social relations and business life could coexist.

The housing phenomenon has reminded us again of the vitality of architectural design, as it is one of the issues where the user spends the most time during the pandemic and meets all life needs. In addition to the living function, the installation of additional functions and the increase in the use of the house have changed the need for additional spaces and the expectations from the house (Rogers & Power, 2020). In particular, the owners of the houses built for low- and middle-income families, whose size and usage area are kept to a minimum to enable more families to own housing by producing the maximum number of houses, faced this situation more during the pandemic.

The study aimed to identify the factors determining user satisfaction in social mass housing and residential areas built by the state for Turkey's low- and middle-income families during the pandemic. We selected the sample area of the research as Edirne, a rapidly developing border city in Turkey that hosts social housing projects. Since no previous study had analyzed the statistical data to evaluate user satisfaction in social mass housing built in Edirne during the COVID-19 pandemic, we saw this as a weakness and a decisive factor in choosing Edirne as the study area.

The State Mass Housing Administration builds social mass housing that offers affordable housing options for families who wish to own a house. These houses are cheaper compared to the free housing market. Despite the recent earthquake, which caused damage to many buildings in the affected provinces, the social housing estates remained undamaged thanks to reliable construction solutions such as "raft foundation," "tunnel formwork carrier system," and high-strength concrete. Due to their reliability, the demand for these houses has increased among families (NTV News, 2023). We conducted an intense application process for 11,844 houses, the foundations of which have been laid, and they are scheduled for delivery in 2025. We completed the draw for the houses on March 11, 2023. Our research conducted in Edirne aimed to set an example for similar studies to be carried out in other regions of Turkey. This research is unique in determining the criteria contributing to user satisfaction with their housing during the pandemic period. The study also identifies spatial qualities that should be present in mass housing designs to be produced in the future. We used a survey investigation as the research method for this study. We will analyze the survey results statistically to obtain answers to the questions posed in the research. The main question of the research is whether users were generally satisfied with their residence and its features, including structural, environmental, location, and access features, throughout the pandemic. The study also aims to determine the demographic characteristics that affect housing satisfaction and the factors contributing to user satisfaction with their housing during the pandemic. Additionally, the study aims to identify the design approaches that should be followed in future social housing for low- and middle-income families.

Although the COVID-19 pandemic is behind us, we have learned valuable lessons from the research conducted during this time. Specifically, we have identified critical design criteria that can increase the satisfaction of users living in social mass housing built for low- and middle-income families, particularly in the event of possible pandemic situations in the future. These findings can pave the way for new and improved designs that prioritize the safety and well-being of residents.

LITERATURE REVIEW

User satisfaction is a complex and subjective matter that varies depending on the person, place, and time. Researchers have conducted studies to understand the relationship between the quality of life and user satisfaction, evaluate the success of housing projects built by both the private and public sectors, and determine users' perceptions of the inadequacies of the residential environment. In the literature, many researchers have investigated the economic, social, physical, and personal dimensions of user satisfaction in different areas. Generally, demographic characteristics,

physical characteristics of the house, characteristics of the housing environment, and the relationship between the location of the house and satisfaction are chosen as the main topics in user satisfaction studies. Some researchers have examined the relationship between time spent in housing and satisfaction (Kasarda & Janowitz, 1974; Hunter, 1978; Hourihan, 1984; Satsangi & Kearns, 1992; Mohit et al., 2010; Caldieron, 2011); some have pointed out how factors such as age, family size, whether the woman of the house works or not, and the size of the area per person in the house affect satisfaction. It is important to note that housing satisfaction is a subjective concept that depends on individuals' perceptions and expectations, so research cannot come to a definitive conclusion. This study explored user satisfaction; nonetheless, significant studies in both domestic and foreign literature have contributed to user satisfaction.

Studies frequently include socio-demographic characteristics directly related to satisfaction in the literature (Marans & Rodgers, 1975). Mohit et al. (2010) found that having more family members and a working woman in the household negatively affects satisfaction with housing. Adams (1992) identified marital and educational status as additional factors determining housing satisfaction. In a recent study, Özdeniz (2022) examined the impact of quality of life on housing preferences in Mersin, a city in the Mediterranean region of Turkey, and found that quality of life factors directly influence housing preferences. In a study by You et al. (2022), the relationship between the physical and mental health of individuals living in affordable housing in Hangzhou, China, and their housing satisfaction was investigated. They found that the mental and physical health of the users is affected by their own socio-economic and demographic characteristics. As a result, their satisfaction with their housing was high. Esen & Çivici (2022) also explored the satisfaction levels of public housing users with their living conditions and surroundings in Balıkesir, Turkey. They considered the satisfaction levels based on household size and ownership status. They found that forcing families of different sizes and income levels to live in the same type of housing reduces user satisfaction. They suggested that flexible space solutions are the correct planning principle in housing designs.

The literature also includes studies showing how the house's physical characteristics affect user satisfaction. Lane & Kinsey (1980) stated in their study that housing characteristics are more important than demographic characteristics. Suggested that various housing features, such as the number of bedrooms, the size and location of the kitchen, and the quality of housing units, strongly correlate with user satisfaction. Similarly, Mohit & Raja (2014) stated that the number and size of bedrooms, the placement of the kitchen in housing planning, its relationship with other spaces, and the number of bathrooms and toilets are also factors that affect satisfaction. Physical features of the house, such as comfort, building quality, housing plan, and house size, provide higher satisfaction (Türkoğlu, 1997). Tran & Vu (2017) investigated the relationship between house features and user satisfaction with life. They emphasized the importance of improving the facilities of houses where the elderly live, as satisfaction with the house has a strong positive effect on a person's satisfaction with life. In his study conducted in 2009, Gür aimed to measure the satisfaction levels of users who lived in houses built by the Mass Housing Administration in Bursa. The study showed that the users were unhappy with their houses due to specific spatial and structural problems. Gür also provided suggestions for future improvements in the design of these houses. Lee & Jeong conducted a study in 2021 to investigate the effect of residential environment features on user satisfaction in Seoul, Korea. They examined the relationship between housing-environment satisfaction and social environment factors such as accessibility, comfort, security, and location attachment. The study found that place attachment, especially accessibility, positively affected housing satisfaction. The production of high-quality housing was also found to be important in ensuring the architectural sustainability of the house. In Adriaanse (2007)'s comprehensive research on residential environment satisfaction in the Netherlands in 2007, he used multivariate analysis techniques to analyze data collected from a housing demand survey he conducted with users. The study found that the user's relationship with their social environment was satisfaction's most critical component. Çanakçıoğlu (2021) discussed the significance that residents attach to social-environmental relationships in their homes and pointed out that they do not favor urban transformation as they are content with their neighborly relationships. Another study in Bursa, Turkey, examined the relationship between happiness and user satisfaction. It was concluded that residents' satisfaction with their housing and neighborhood relations impacted their perception of happiness (Gür et al., 2020). Berköz & Kellekçi (2007) researched determining the satisfaction of Bahçeşehir mass housing residents with their housing and environment and identifying the necessary conditions for their satisfaction. They concluded that the housing environment is equally important as the housing quality for the residents and that physical, social, and economic factors affect both. Kellekçi & Berköz (2006) conducted another study to determine the factors affecting satisfaction with housing and environmental quality in the Istanbul Metropolitan area public housing. They found that the location of the house, residents' opinions about the environment and recreational areas, structural and environmental security, neighborly relations, and the physical appearance of the residential areas are the factors that most significantly increase the quality and, therefore, the residents' satisfaction. You et al. (2022) found that immigrants living in affordable

housing in Hangzhou, China, were dissatisfied with their housing environment and security expectations. They also highlighted the importance of following housing policies to improve housing conditions for the future. Another study by Mohit et al. (2010) investigated user satisfaction in public housing built at low costs in Kuala Lumpur. The study found that users were more satisfied with open spaces, service units, social environment, and neighborhood relations than the house's physical features. Uşma & Akıncı (2021) emphasized the need to investigate all factors affecting satisfaction in housing thoroughly. They evaluated different opinions based on existing studies on user satisfaction in the literature. By comparing satisfaction criteria in certified buildings, they concluded that the house and its environment should be considered together in future housing designs. They also highlighted the importance of the socio-demographic and cultural characteristics of the user, as well as the physical, social, and economic characteristics of the house and its surroundings when analyzing satisfaction.

Asim et al. (2021) highlighted that the COVID-19 pandemic has emphasized the importance of housing in human life. They noted that users' satisfaction with their homes is directly linked to factors such as natural light, proper ventilation, and the inclusion of open areas such as balconies and terraces in the design. They also mentioned that housing satisfaction significantly impacts physical, mental, and emotional well-being. Bettaieb & Alsabban (2020) conducted a study to determine how Cide residents met their users' psychological, social, and cultural needs during and after the pandemic. They found significant differences in users' satisfaction levels and perceptions before and after COVID-19. The study revealed that the flexibility of the design was related to the house's functional, cultural, and structural features. The authors proposed design suggestions to develop the foundations of flexible housing based on social and cultural values. Torres et al. (2021) investigated the perspective of homeowners in Mexico during the pandemic period. They revealed that most homeowners were satisfied with the size of their homes and spaces but felt that the open spaces were inadequate. The authors suggested that, in light of the current conditions, there is a need to rethink architectural design and incorporate new paradigms that emerged during the pandemic. Torres et al. (2021) researched in Spain to investigate if residential properties satisfied the needs and expectations of users during the pandemic period. The study revealed that architectural design had a significant impact on user satisfaction. The researchers suggested that housing design should be rethought, and existing housing should be renewed, considering the emerging spatial needs. Alavad (2021) investigated how users interact with and adapt to their homes in line with their increasing needs during the pandemic in different countries and found that users have been giving new functions to their existing spaces and adding appropriate equipment to meet their increasing needs (such as turning bedrooms into study rooms with added desks) and argued that flexible space solutions should be included in housing design. According to Li & Tang (2021), the COVID-19 pandemic has highlighted the importance of good home ventilation. Poor ventilation can lead to a higher risk of infection and can negatively impact user satisfaction. Li and Tang's study found that occupants were less satisfied with their living conditions in houses with unmet ventilation needs. In 2022, Gür examined how the pandemic affected the use of space in homes in different regions with varying socio-economic levels in Bursa, Turkey. The study found that changes in hygiene, shopping, and transportation habits also impacted the frequency of people meeting others outside their homes. As a result, users require flexible design solutions that provide multi-purpose spaces. Bayer & Yazıcı (2022) investigated the impact of daylight on working spaces in homes, which became increasingly important during the pandemic when many people were working from home. The research revealed that users who lacked adequate daylight in their workspaces made changes to their homes, highlighting the significance of daylight in terms of the function of the space. The importance of solutions that enable change in residential interior designs and green space arrangements around the residence was discussed by Yüksel (2022) in terms of architectural sustainability. This is based on the increase in the functions of the residents due to the pandemic.

The Concept of User Satisfaction and its Examination in Mass Housing for Low-Income Families

The state of "well-being in general" is the most tangible result that is directly related to the satisfaction of one's life (Diener et al., 2009). The factors that affect happiness and well-being and the components that make up life as a whole are in interaction (Larsen et al., 1985; Diener, 2000; Kahneman, 1999; Veenhoven, 2000; Larsen & Eid, 2008; Diener et al., 2009). Quality of life, satisfaction with life, well-being, and living conditions are essential for satisfaction (Headey & Wearing, 1992; Diener, 2000; Veenhoven, 2000). Satisfaction is a concept related to fulfilling one's goals and meeting one's needs in various areas of life (Ibem & Amole, 2013). The most important of these living spaces are the residences where the person spends most of his life. Housing satisfaction, one of the critical factors in an individual's quality of life, is a relative concept and varies depending on time and person (Huang & Du, 2015). Housing is where the need for shelter is met, people's cultural, social, and economic identity takes shape, and social rules and relations are learned, representing comfort and security (Karahan & Özüerken, 2009). User satisfaction, an important parameter in determining the

residents' reactions to their environment, defines the user's satisfaction regarding the current housing situation (Mohit & Nazyddah, 2011). The dwelling and its immediate surroundings, which occupy an essential place in the user's life and determine the quality of life, are well-planned and can meet needs, increasing satisfaction (Güremen, 2016). Understanding the true meaning of user satisfaction is possible by first measuring the determinants and effects of this concept (Gifford, 2014). These measurements, whose results differ from country to country from the past to the present, are usually carried out through survey research with users in scientific studies (Smrke et al., 2018). Moreover, determining the parameters that increase the satisfaction of homeowners with their homes is seen as the primary goal (Wang & Wang, 2016). Another issue that is as important as housing planning is a well-planned housing environment. Satisfaction with the residential environment, a primary living area where the various needs of people living in the house are met (Lawrence, 1987), has also been the subject of much research, just like housing satisfaction (Oktay, 2001). There are many factors (such as location) that affect the user's satisfaction with the residence (Cao & Wang, 2016; Lin & Li, 2017). Demographic characteristics, socioeconomic status (age, occupation, economic status, marital status, etc.) (James et al., 2019), physical characteristics of the residence (number of rooms, insufficient or unnecessarily large rooms, whether there is a balcony, number of bathrooms, etc.) (Fuller et al., 2000), features of the residential environment (open and green areas, sports areas, recreation and social areas, etc.), location of the house, and features that determine the relationship of the house with the city (access to the city center, access to shopping and health units, etc.) are the variables that determine the satisfaction or dissatisfaction of the user with his home (Gan et al., 2019). The evolution of today's living conditions, driven by the technological age we live in, has changed the needs of homeowners and their perception of their living environment. This shift has increased the importance of satisfaction with one's home, especially in extraordinary situations such as pandemics. With the COVID-19 pandemic, it has been better understood that the flexible planning approach that can be adapted to all kinds of user needs, depending on the changing living conditions, is today's ideal design approach. It is not the individual's adaptation to the dwelling; the adaptability of the dwelling to the individual is an essential factor in increasing the residents' satisfaction. User satisfaction is related to architectural design, urban planning, geography, psychology, etc. Although it has been a subject that has been researched in many disciplines for many years, its importance has increased even more with the COVID-19 pandemic, whose effects have been ongoing since 2019 (Dekker et al., 2011; Aigbavboa & Thwala, 2016; Wang & Wang, 2016). Since the house undertakes many additional functions besides its own, such as sleeping, eating, and resting, the user's expectations from the house have increased accordingly, and the house has been insufficient in many respects to meet the user's needs.

When mass housing applications produced for low-income families worldwide are investigated, different dimensions are seen in housing production for various reasons, such as migration, rapid urbanization, and population growth in every geography. Considering the development of social housing, it is noteworthy that after the Second World War, large-scale mass housing was produced for the working class in the city peripheries in Europe. However, there was no social housing construction in Turkiye at that time (Bican, 2020). Large-scale social mass housing practices, which emerged as a solution to the housing problem with the government's policies in Turkiye, started mainly after the 2000s (Alkiser & Yürekli, 2004). The government focused on constructing social housing to address the housing crisis during a specific period. The objective was to build a significant number of homes in a short amount of time without generating profit. Construction began in 2003, and the goal of 500,000 homes was achieved by 2011. A new objective of 700,000 homes was established with a completion target of 2023, aiming to produce 1.2 million homes (TOKİ, 2023). The primary emphasis in constructing social mass housing is ensuring the fundamental human right of access to housing. This involves providing financial support to families who cannot afford housing (Bayraktar, 2006). The goal is to ensure that low-income families can access stable and affordable housing with low payments over extended periods. Moreover, the objective is to regulate the housing market using the production model it has determined while minimizing costs and maximizing quality by utilizing state-owned lands. Research has demonstrated that the contentment of families living in social mass housing projects is crucial. These projects encompass housing production and social amenities such as education, health care, commerce, sports, recreation, and religious areas, as stated in Chapter 2. Mass housing production has resulted in the emergence of many properties, but the quality is often subpar due to the increase in housing demands (Gür, 2009). Numerous studies in the literature demonstrate that while social mass housing projects fulfill the expected housing demand by increasing the production of housing units, they often fail to provide user satisfaction due to the lack of emphasis on producing high-quality housing. In Turkey, social housing, urban transformation, and improvement projects have been subject to frequent criticism by both academic and non-academic media. Difficulties in obtaining social housing for low-income families, along with the feeling of social exclusion experienced by those who live in such areas and the poor quality of housing planning and design,

have been long discussed by architectural designers. It has been argued that using the same architectural plans for all housing production without considering the design's social, cultural, topographic, and geographical context leads to physical and functional deficiencies. The spatial organization of these plans results in fixed layouts and low-usage areas that do not allow for remodeling (Bican, 2020). Given the current circumstances, it has become crucial to conduct research to assess the level of satisfaction of families residing in social housing, particularly during the pandemic when most people are confined to their homes. This will help identify areas for improvement in the social housing designs that are being developed daily to enhance the residents' overall living experience.

DATA AND METHOD

Study Area

The city of Edirne, chosen as the study area, is a city in the northwest of Turkiye, located in the Marmara region, which includes metropolitan cities such as Istanbul, Bursa, and Tekirdag and covers the entire border of the country with Greece and most of the border with Bulgaria. The city, adjacent to the Aegean Sea in the south, has maintained its importance as a settlement on transit routes throughout history due to its location. Today, Turkiye, which is mainly in the Anatolian peninsula and the Asian continent, is the most extreme point on the European continent, as it is located in the Thrace region, separated by the straits. This means that the country and the Middle East are on the border with the European Union, being on the border between East and West both culturally and politically, and this location has economic, social, and cultural consequences. Despite this, according to TUİK data, although there was a decrease in the population until 2010, a rapid increase was observed in the city's population after this year (Türkiye İstatistik Kurumu, 2023). The reasons for this increase include the rise in the number of university students due to the Higher Education Institution's Strategic Plan in 2007, Turkey's offering of a more comfortable life for citizens from Europe because of the global economic crisis since 2008, immigration and refugee movements resulting from the civil war in Syria and other Muslim-based countries since 2010, and Edirne's location on transit routes between countries (Deniz, 2014).

Housing construction has increased rapidly in Edirne in recent years, in parallel with the increase in population in many cities in Turkiye. Today, owning a house has become a challenge not only for low-income families but also for middle-income families. As housing prices continue to rise, there is a growing demand for social housing that provides more affordable solutions to owning a house. In Edirne, social housing projects were developed in 7 stages in Fırınlarsırtı and Hadımağa. (Figure 1, Figure 2) Since the number of houses and users in the Hadımağa settlement was insufficient and did not have conditions suitable for the study, it was excluded, and the houses in the Fırınlarsırtı locality were included. In 2021, the foundations of 221 houses were laid in Hadımağa as the 7th stage, and finally, 120 houses as the 8th stage in 2022.

All residences, except for stages 4 and 7, are situated in Fırınlarsırtı. The first phase of the residences was built in 2007, consisting of 784 residences in 49 blocks. Each block has 16 flats, and 26 of them are "K type" with a 3+1 plan, while 23 are "F type" with a 2+1 plan scheme. The second phase of the residences was built in 2009, comprising 458 residences in 28 blocks. There are 176 flats in 11 blocks, called "BY type," with a 1+1 plan scheme, and 282 flats in 17 blocks, called "DY type," with a 2+1 plan scheme. The 3rd stage, built in 2010, includes 368 flats with a 2+1 plan scheme in 11 blocks called "CYB" type. The 5th stage consists of 80 residences, "B1 type," built in 5 blocks in 2014, consisting of 2+1 residences. In 2017, 137 residences were built, 97 of which are called "A type," with a 2+1 plan scheme, and 40 are called "D type," with a 3+1 plan scheme. Due to the growing need for public housing for low-income individuals, the number of social houses in Edirne increased from 784 to 2468 in 2021. These residences are

Figure 1. Social mass housing in Edirne.

Figure 2. Working area: Social housing in Fırınlarsırtı location (Edirnejet news, 2022).

on a 60,000-square-meter settlement in Fırınlarsırtı, with 24,000 square meters of green areas. Besides the residences, the Fırınlarsırtı settlement also includes schools, nurseries, health centers, commercial centers, mosques, children's playgrounds, outdoor seating, recreation areas, and sports areas in the design. (Figure 3)

In addition to allocating space for a healthy infrastructure system, the planning includes transportation connections with the city, ramps for disabled access at residential entrances, and necessary points. (Figure 4)

The apartment complex comprises buildings with four floors, a ground floor, and three upper levels. Each floor has four apartments, most 2+1; they have 1+1, 2+1, or 3+1 plan schemes. (Figure 5) The apartments have a usable area ranging from 48 to 106 square meters. Depending on the plan scheme, the apartments have two or three bedrooms, a kitchen, a bathroom, and a balcony. For instance, the 1+1 apartments are designed without a balcony, with an open kitchen-living room, a bedroom, and a bathroom. On the other hand, the 2+1 and 3+1 apartments have separate kitchen-living rooms, bedrooms, and a bathroom. The 3+1 apartments have a balcony that is connected to their kitchens. The design clearly shows that the day and night parts of the apartments have been planned separately, and spatial relations have been established functionally. The planners included a sufficient size and number of windows to provide room lighting and ventilation. In contrast, small numbers and sizes have included open spaces such as balconies. The apartment sizes have been planned to create minimum areas to meet the needs.

Figure 3. Images from the social areas of the residences.

Figure 4. Images from residences.

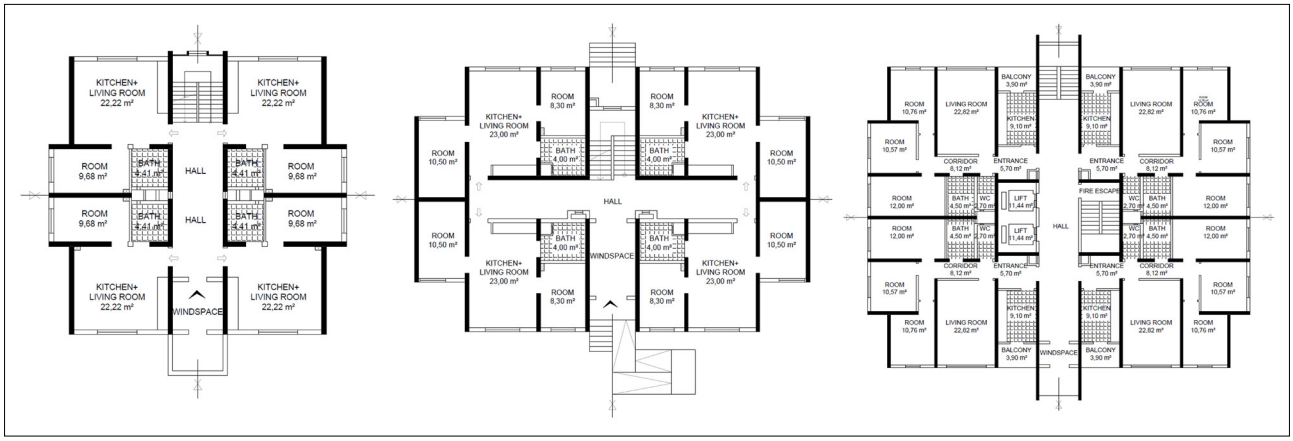

Figure 5. 1+1,2+1 and 3+1 housing plans of Edirne Fırınlarsırtı social housing (TOKİ, 2023).

Data Collection

The data for the study, which aims to measure the satisfaction level of users living in social mass housing built by the state during the pandemic, was obtained through a survey. During this period, curfews and the rapid infectious effect of the virus prevented users and surveyors from meeting face-to-face, and the necessary legal permissions to conduct the survey could not be obtained, so the survey investigation could only be carried out after the pandemic. All survey forms prepared using scientific research methods were conducted in face-to-face interviews with users. A simple random sample selection technique determined the participants among the probability-based sample selection types. All 50 questions were asked to users, of which ten were multiple-choice. The remaining 40 questions were based on a 5-point Likert scale, ranging from "very dissatisfied" to "very satisfied." These questions were carefully selected after reviewing previous literature on user satisfaction in social housing for low- and middle-income groups and satisfaction with housing during the pandemic. The survey was divided into five main sections: demographic characteristics of the user, spatial characteristics of the residences, environmental characteristics of the residence, structural characteristics of the residence, and characteristics of the residence-city relationship. The survey was conducted between April 13, 2023, and May 15, 2023. It targeted 457 people between 12:00 and 18:00, during which housewives usually stayed home most of the day. The necessary permissions were obtained from the Trakya University Institute of Social Sciences Ethics Committee in February 2023, along with the survey questionnaire and application petition. The sample size was calculated using Cohen's sample calculation table (Cohen, 1988). Out of the total number of users, 73 individuals declined to participate in the survey, and the responses of 6 users were considered invalid. The survey was conducted with the remaining 378 participants who spent the entire pandemic period in these residences.

Method

We first thoroughly reviewed national and international literature in our research. We examined user satisfaction studies in mass housing built for middle- and low-income families in various countries worldwide and also researched the changing use of houses during the COVID-19 pandemic. In the next stage, on-site detection, examination, observation, and photographs were carried out in Edirne Fırınlarsırtı residences, which was determined as the study area. A face-to-face meeting was held with the site management to obtain the necessary information and access the architectural projects of the residences. In the next stage, a survey investigation was conducted, a quantitative data collection technique widely used in housing satisfaction research to measure user satisfaction. The answers were transferred to the SPSS program, and answers to the research questions were sought with correlation and factor analysis. In order to measure the relationship between satisfaction and the variables in each section of the survey, correlation analyses were conducted between the variables. In order to determine their effect on general satisfaction, the variables were classified by factor analysis. Regression analyses were subsequently conducted to determine the effect of the found factors on satisfaction. The stages of the study are shown below. (Figure 6)

RESULTS AND FINDINGS

Demographic Information

In light of the information obtained from the survey, the frequency distribution of the demographic characteristics of the users is shown in Table 1. According to this,

- 225 (59.5%) of the participants are female, and 153 (40.5%) are male participants.
- 116 participants (31%) are 18-24 years old, 46 people (12.2%) are 25-39 years old, 81 people (21.4%) are 40-54 years old, 115 people (30.4%) are 55-69 years old, and 20 people (5.0%) are over age 70.
- 207 participants (54.8%) are married, and 171 (45.2%) are single.
- 89 (23.5%) of the participants are literate, 47 (12.4%) are primary school graduates, 99 (26.2%) are high school

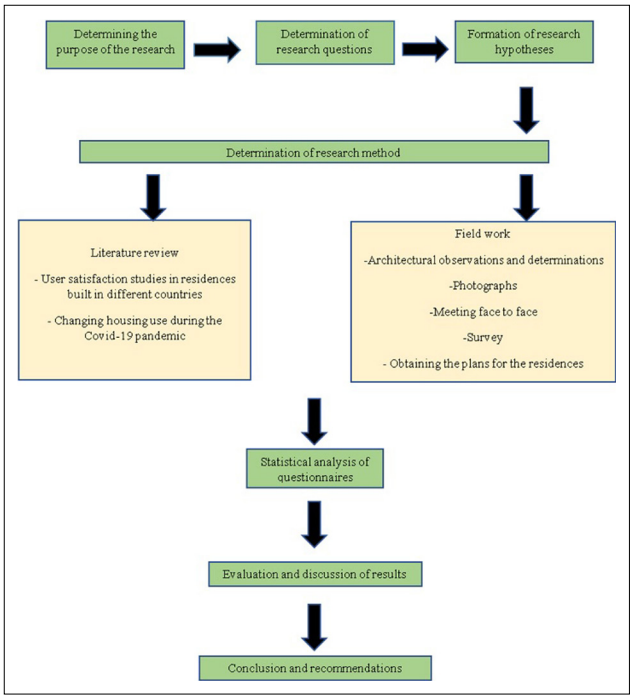

Figure 6. Stages of the study.

Table 1. Demographic information frequency analysis

	N	%
Gender		
Female	225	59,5
Male	153	40,5
Age		
18-24	116	31,0
25-39	46	12,2
40-54	81	21.4
55-69	115	30,4
70>	20	5,00
Condition		
Married	207	54,8
Single	171	45,2
Educational status		
Literate	89	23,5
Completed primary school	47	12,4
High school graduate	99	26,2
Associate degree	53	14,0
Bachelor's degree	82	21,8
Post graduate	8	2,1
Vocation		
Civil cervant	35	9,3
Worker	28	7,4
Health	18	4,8
Housewife	54	14,3
Unemployed	8	2,1
Retired	83	21,9
Freelance	82	21,7
Student	70	18,5
Total monthly income (₺)		
5.000-9.000	46	12,2
9.001-11.000	52	13,7
11.001-20.000	100	26,5
20.001-35.000	110	29,1
35.001>	70	18,5

graduates, 53 (14.0%) have associate degrees, 82 (21.8%) have Bachelor's degrees, and 8 (2.1%) have postgraduate education.

- In the occupational status distribution, 35 participants (9.3%) are civil servants, 28 (7.4%) are workers, 18 (4.8%) are healthcare professionals, 54 (14.3%) are housewives, 8 (2.1%) are unemployed, 83 (21.9%) are retired, 82 (21.7%) are freelance, and 70 (18.5%) are students.
- In monthly income distribution, 46 of the participants (12.2%) earn between 5,000-9,000 ₺, 52 (13.7%) earn 9,001-11,000 ₺, 100 (26.5%) earn 11,001-20,000 ₺, 110 (29.1%) earn 20,001-35,000 ₺, and 70 (18.5%) have a monthly income of 35,001 ₺ and above.

FINDINGS REGARDING HOUSING TYPE AND USERS

The first stage of the residences, which were built in 7 stages in total, is the Fırınlarsırtı residences, which were built in 2007 and consist of 784 houses. In the same region, the construction of a total of 826 additional houses continued in the second and third stages in 2009 and 2010. In 2011, 420 houses were built in the 4th stage in Hadımağa. In 2014 and 2017, 217 houses in the fifth and sixth stages were constructed in Fırınlarsırtı, and in 2021, 221 houses in the 7th stage were built in Hadımağa. Finally, in 2022, the foundations of 120 houses were laid as the 8th stage in the Hadımağa location. According to the survey results, information about the characteristics of the houses and the users is shown in Table 2.

Table 2. Residence and housing estate information

	N	%
House satisfaction during the pandemic		
Very satisfied	0	0
Satisfied	225	60
Medium	117	31
Not satisfied	17	4
Not satisfied at all	19	5
Property status		
Homeowner	160	42,3
Tenant	209	55,3
Other	9	2,4
Number of household		
1	64	16,9
2	118	31,2
3	142	37,6
4	47	12,4
5>	7	1,9
Type of residence		
2+1	264	69.8
3+1	52	13.7
1+1	62	16.5

- 160 participants (42.3%) are renters, 209 participants (55.3%) are homeowners, and 9 participants (2.4%) live temporarily in a relative's house.
- 64 (16.9%) of the participants live alone, 118 (31.2%) live with two people, 142 (37.6%) live with three people, 47 (12.4%) live with four people, and 7 (1.9%) live with five or more people in their residences.
- 264 (69.8%) of the residences consist of 2+1, 52 (13.7%) consist of 3+1, and 62 (16.5%) consist of 1+1 plan schemes.

The hypotheses of the study, which aims to measure user satisfaction in social housing where middle and low-income families live during the pandemic, are as follows:

- H1: User satisfaction is related to the user's demographic characteristics.
- H2: The most influential factor in user satisfaction during the pandemic is the adequacy of the house's interior space.
- H3: During the pandemic, the environmental characteristics of the house and its open and green area arrangements affected user satisfaction.
- H4: The house's location relates to satisfaction during the pandemic period.
- H5: During the pandemic, users' access to the needed units did not affect user satisfaction.

STATISTICAL ANALYSIS FINDINGS

Reliability Analysis

The reliability of the scales of the 5-point Likert-rated questions throughout the questionnaire was tested and compared with both Cronbach's alpha and exploratory factor analysis. In the reliability analysis of the questionnaire, in which participant preferences were measured with 35 Likert-scale expressions, the "Cronbach's alpha" finding of 0.892 showed that the scale was highly reliable (Table 3). (Cortina, 1993).

Analyses Determining the Relationship Between Demographic Characteristics and General Satisfaction

The relationship between the user's demographic characteristics and overall satisfaction with the residence was determined by multivariate regression analysis at a 95% confidence interval. As a result of the analysis, the Anova Sig. $p<0.001$ value showed that the established regression model was significant and that at least one of the independent variables consisting of demographic characteristics significantly affected overall satisfaction. In addition, finding the "adjusted R^2" value of 0.280, as shown in the model summary table, has shown that 28% of the overall satisfaction was due to the demographic characteristics of the users (Table 4).

In the next step, correlation analysis was performed to determine the degree, strength, and direction of the relationship between the variables that make up the demographic characteristics and general satisfaction. Correlation analysis is an analysis method that shows the linear relationship between two or more variables in scientific research. The correlation coefficient calculates the relationship between the variables. The correlation coefficient to use depends on the scale level of the variables, whether they are continuous or discontinuous, and whether the data is linear or not. In the analysis, the overall satisfaction average was found to be 3.45. The VIF

Table 3. Reliability Analysis (Cronbahs alpha)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,892	,895	35

Table 4. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	ANOVA Sig.
1	,544a	0,296	0,280	0,673	<0,001

Table 5. Relationship between demographic characteristics and general satisfaction, Correlation table

	Mean	Std. Deviation	N	VIF	Sig.	Pearson Correlation
General Satisfaction	3,45	0,794	378			
Age	2,67	1,170	378	2,592	,300	,111
Gender	2,81	1,453	378	1,401	<,001	-,194
Marital Status	2,36	1,495	378	2,072	<,001	,275
Educational status	2,10	1,131	378	1,419	,922	,005
Vocation	3,60	2,586	378	3,370	<,001	,194
Property status	2,69	1,474	378	1,463	,015	-,125
Number of House hold	2,81	1,076	378	1,480	,003	-,150
Monthly income	2,24	1,044	378	1,073	,790	,014

(variance inflation factor) values, as shown in Table 5, were below 4, indicating that the relationship between the variables was not strong. Therefore, the model did not have a multicollinearity problem (Hair et al., 1995). According to the correlation analysis table, the "sig. value" of demographic characteristics such as gender, marital status, occupation, property, and the number of people in the household statistically significantly affects overall satisfaction, with $p<0.05$. In this instance, the data did not support the H1 hypothesis, positing that all demographic characteristics affect satisfaction. It was observed that age, education level, and income level do not significantly affect satisfaction ($p>0.05$). Upon examining the Pearson correlation values among these characteristics, it was found that marital status and occupation positively correlated with general satisfaction. At the same time, gender, property ownership, and the number of people in the household showed a negative correlation. This analysis suggests that individuals who are married, male, retired, and homeowners tend to be more satisfied with their homes. Furthermore, it was observed that satisfaction levels tend to increase as the number of people in the household decreases.

Analyses Determining the Spatial Adequacy of the House During and Before the Pandemic Period

The adequacy of the spatial features of the house, which constitutes the second part of the survey, was evaluated by frequency analysis. It has been observed that changing lifestyles before and after the pandemic have changed users' ideas about their homes (Table 6).

The acquired data from frequency analysis reveals that 76% of users were satisfied with the spatial adequacy of their residences before the pandemic. However, following the pandemic, this percentage decreased to 57%. Additionally, it was ascertained that out of the 42% of users who found their homes inadequate after the pandemic, 14% undertook spatial changes to cater to their needs. The findings indicate that the changes made to the living spaces were predominantly aimed at increasing the usable area. Specifically, 68% of users reported incorporating their kitchen balcony into the kitchen, while 31% combined their kitchen and living room.

Table 6. Frequency analysis of spatial adequacy and changes in housing before and during the pandemic

	Frequency	Percent(%)
Before the Pandemic		
Sufficient	288	76,20
Insufficient	90	23,80
During the pandemic		
Sufficient	216	57,10
Insufficient	162	42,90
Spatial changes during the pandemic		
Spatial changes made	54	14,30
No spatial changes	324	85,70
Type of the spatial chang		
Combining the balcony with the kitchen	37	68,52
Combining Kitchen and Living Room	17	31,48

In the next step, factor analysis was performed to reduce the number of variables by separating the correlated ones among 35 variables according to their categories and obtaining fewer factors. However, before this stage, whether the data was suitable for factor analysis was measured with the "KMO coefficient" and "Bartlett's Test of Sphericity" (Büyüköztürk, 2007). The KMO coefficient is a number that indicates whether the sample size is suitable for factor analysis. For the sample size to be sufficient, the KMO value must be at least 0.60 and above; Bartlett's test should also be significant ($sig.<0.05$) (Tabachnick & Fidell, 2013). As a result of the analysis, the KMO value was 0.627, and the Bartlett test result was $sig<0.005$, indicating that the data were suitable for factor analysis and that the sample size was sufficient (Table 7).

Analyses Determining the Factors Affecting Satisfaction and Their Degree of Impact

After conducting exploratory factor analysis, we excluded satisfaction scales with a "factor loading" value below 0.5 and those loaded on more than one factor. These scales included bath size, number of bathrooms, separate kitchen, open kitchen, open spaces, pedestrian ways, resting areas, shopping opportunities, scenery, anti-theft security, and ventilation. We concluded that these factors did not affect housing satisfaction during the pandemic. Among the variables that were not included in the analysis, when the kitchen size scale was excluded, the reliability rate decreased, so it was included in the analysis without being excluded from the grouping. Among the 35 variables, 22 scales with a "factor loading" value above 0.5 were considered. Following the factor analysis, we identified variables with an "eigenvalue" exceeding 1, reducing the variables to five primary factors: environmental house features, accessibility to necessities, interior adequacy, location characteristics, and structural attributes. The structural features of the house constituted 28% of the total variance, the environmental

Table 7. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	,627
Bartlett's Test of Sphericity	
Approx. Chi-Square	4928,483
df	210
Sig.	,001

features 14%, the interior adequacy 10%, the location of the settlement 7%, and accessibility 7%. All factors together explained 65% of the total variance, showing that they affected 65% of the variation in overall satisfaction (Table 8).

In the next step, as a result of factor analysis, the average of the scales divided into five main groups (variables computed by mean) was subjected to multiple linear regression analysis. Thus, the effects of these five main factors on overall satisfaction were revealed. (Table 8)

According to the "adjusted R^2" value in the model summary, all factors affect approximately 29% of overall satisfaction. In other words, 29% of overall satisfaction is based on these five main factors. Since the significance value in the ANOVA analysis is $p<0.001$, at least one factor significantly affects overall satisfaction. (Table 9).

A correlation analysis was conducted between the variables and satisfaction in order to determine the effects of the variables determined under the five main factors on user

Table 8. Factor analysis of variables that have an effect on satisfaction

Items	Variables	Factor Loading	Eigenvalue	Variance(%)	Cumulative Variance(%)
Main factor: Structural features			6,081	27,639	27,639
HA1	Disaster resistance	0,821			
HA2	Physical condition	0,736			
HA3	Thermal insulation	0,653			
HA4	Sound insulation	0,649			
HA5	Material quality	0,649			
Main factor: Environmental features of the house			5,078	13,609	41,248
HA6	Green spaces	0,729			
HA7	Playgrounds	0,694			
HA8	Sports fields	0,575			
HA9	Block distances	0,565			
HA10	Parking adequacy	0,565			
Main factor: Interior adequacy			2,186	9,937	51,185
HA11	Number of rooms	0,788			
HA12	Balcony size	0,778			
HA13	Kitchen size	0,570			
HA14	Living room size	0,538			
HA15	Bedroom size	0,517			
HA 16	Entrance hall size	0,471			
Main factor: Location			1,591	7,233	58,418
HA17	Public transport facilities	0,869			
HA18	Urban location	0,807			
HA19	Distance to the city center	0,710			
Main factor: Accessibility			1.547	7,033	65,452
HA20	Access to health units	0,586			
HA21	Access to shopping units	0,580			
HA22	Access to education units	0,577			

Table 9. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	ANOVA Sig.
1	,543[a]	,295	,285	,671	<0,001

a. Predictors: (Constant), structural features, location, accessibility, external features and interior adequacy

Table 10. Descriptive statistics and correlations between variables

	1	2	3	4	5	VIF
General Satisfaction						
1- Exterior features	1					1,369
2- Accessibility	0,271*	1				1,497
3-Interior adequacy	0,299*	0,339*	1			1,850
4- Location	-0,176*	0,441*	0,325*	1		1,566
5- Structural features	0,182*	0,255*	0,586*	0,168*	1	1,538

*p< 0.01.

satisfaction (Table 10). Column 1 on the table shows the values about exterior features: the 2nd column is accessibility, the 3rd column is interior adequacy, the 4th column is location, and the 5th column is structural features. Upon examining the ratios of all factors to each other in the matrix based on the values in Table 10, it is evident that no value exceeds 0.800, and the VIF values are all less than 4. This indicates that the relationship between the variables is not highly robust, thus confirming the absence of multicollinearity in the established model. (Hair et al., 1995).

In the next step, the accuracy of The study's H2, H3, H4, and H5 hypotheses was tested by regression analysis. In the regression analysis, it was found that all five factors have a significant effect on overall satisfaction, with p-values less than 0.05 (see Table 11). The β value examined in this test quantifies the influence of the independent variables on the dependent variable. The fact that the β value of the house's structural features is β=0.317 showed that the variable that most affected satisfaction was the structural features. The residential environment characteristics followed this β value ranking, the interior space adequacy of the house, and the house's location. Access to needs in the settlement was found to have little effect on satisfaction (Table 11).

Table 11. Effect of factors on general satisfaction*

	β	t	Sig.
(Constant)	0,963	4,215	<0,001
Structural features	0,317	4,586	0,000
Environmental features	0,277	4,890	0,000
Interior adequacy	0,251	3,847	0.000
Location	0,176	3,192	0,002
Accessibility	-0,150	-2,066	0,040

*Dependent Variable: General Satisfaction.

DISCUSSION AND EVALUATION

The pandemic has forced us to stay home, making ensuring user satisfaction with our living space more important than ever. A recent study identified five factors that determine satisfaction, all of which positively affect it. The data gathered from the survey revealed that during the pandemic, users were mainly satisfied with their homes' structural features, environmental features, and interior adequacy. However, they were less satisfied with the location and access opportunities. Regression analyses were conducted separately to determine the relationship between satisfaction and the subheadings of each of the five primary factors. While the correlations between the variables were examined to determine the relationship, not all were included in the article due to page limitations. The main findings of the study can be summarized as follows:

- Through this exceptional process, it has been determined that most users are generally content with their homes. The house's spatial and structural aspects, the surrounding environment's features, and the location and accessibility of the settlement where the house is situated have all contributed to ensuring that the user is satisfied with their dwelling.
- It has been observed that users' specific demographic characteristics directly impact their satisfaction levels. Among these characteristics, marital status, profession, gender, ownership status, and the number of people living in the household are the key factors that affect satisfaction. Studies have shown that users who are male, married, retired, homeowners, and have 1-2 people living in their household tend to be happier. However, these findings may differ from study to study, as the demographic parameters affecting satisfaction can vary. For instance, Maina (2021) conducted a study in Nigeria and found user satisfaction was higher among families with 4-6 people, high-income levels, who had lived in their residences for more than ten years, and had more than three bedrooms. In a study conducted by Mohit et al (2010), the researchers explored the factors affecting

user satisfaction in homes built for low-income families in Malaysia. They discovered that satisfaction was influenced by various aspects such as age, household size, number of working individuals, profession, house size, previous residences, and even the house floor. Meanwhile, Inha et al (2009) found that satisfaction levels decreased in Korea with lower income and higher age. Another study in Bangladesh examined housing satisfaction from a socio-demographic perspective and revealed that age, gender, and marital status impacted the level of satisfaction. In particular, married, elderly, and women expressed higher satisfaction levels. Dekker et al. (2011) researched nine European countries and discovered that as age and income levels increased, families tended to become more satisfied with their housing.

- During the pandemic period, the house's structural features had the most positive effect on user satisfaction. Other sub-factors that increased satisfaction included the excellent physical condition of the houses, the provision of qualified thermal insulation, and the good physical appearance of the buildings. The thermal insulation of the rooms, which were frequently ventilated to reduce the spread of infectious viruses, satisfied the users by ensuring thermal comfort. Choosing high-quality materials that provide thermal insulation during the construction phase, reflecting innovations in construction practices by considering the advancements in material technology, and carrying out inspections with a meticulous attitude and sensitivity during the application phase have enabled the production of structurally high-quality houses. Good sound insulation has become very important during this period for individuals who spend most of their daily lives working remotely and sharing separate spaces, as well as for students receiving distance education. However, it was determined in the analysis that users were not satisfied with the sound insulation and craftsmanship of the materials used and the heat insulation. Users evaluated the presence of social facilities in their settlements as a positive factor during closure periods with curfews. So much so that the environmental features of the house affected satisfaction even more than the interior space capabilities. The importance of settlements having places where individuals can go to open spaces, walk-in gardens, spend time in nature, provide entertainment for children in playgrounds, carry out sports activities, and have a high-quality physical environment was better understood in this period. During this period, individuals over 65 are at higher risk of going out on the streets. Therefore, having access to open and green areas within their settlement, where they can maintain social distance, has been crucial. It has allowed them to spend this period more comfortably and improve their quality of life and satisfaction. Users have expressed satisfaction with the social areas of their residences and the adequacy of these areas. Spending time in open spaces helped to mitigate the adverse effects of being away from social life and interaction. Martin et al. (2012) found that the lack of open spaces around housing negatively affects satisfaction. Torres et al. (2021) reported that users were generally unsatisfied with the insulation during this period. However, having open spaces such as terraces and verandas in their residences helped them go through this process more comfortably. Peters & Halleran (2020), Gür (2022), and Yüksel (2022) have pointed out that giving importance to environmental regulations in design can increase user satisfaction. Grum (2016) identified three parameters that determine user satisfaction: the house's physical, environmental, and socio-economic characteristics. Ghazizadeh & Rückert (2013) stated that designers should consider residential environmental design an essential part of the planning process.
- Most houses have 2+1 plan schemes and 1+1 and 3+1 plan types. The houses' interior space adequacy and physical features are important factors that positively affect users' general satisfaction. Before the pandemic, users were generally satisfied with the spatial features of their houses. However, after the pandemic, there has been a decrease in the number of people satisfied with their houses. The size and number of some spaces, such as balconies and kitchens, were inadequate to the users' needs, which reduced satisfaction with the interior space adequacy. As a result, some users have enlarged the usable area by including the balcony belonging to the kitchen or expanded the living room volume by removing the wall between the living room and the kitchen. This situation has highlighted the importance of including flexible spatial solutions in planning during the design phase. The cost of flexible planning is often avoided despite being the most beneficial solution for users in the long run. Özyurt & Altun (2015) found that the number and size of balconies in housing were insufficient, and users needed more balcony space. Studies in the literature mainly conclude that user satisfaction during the pandemic is related to satisfaction with the house's interior. Bettaieb & Alsabban (2020) emphasized that spatial needs have changed due to COVID-19 and that planning should include flexible spatial solutions. The lack of flexibility in design is attributed to cultural, structural, and functional issues. Alawad (2021) stressed the importance of adequate interior space and flexible space solutions in design. The pandemic allowed users to get to know their homes better, and their perspectives on their homes have changed. Peters & Halleran (2020)

emphasized that architects are responsible for creating healthier user living environments in their designs. They highlighted the importance of mental health, suggesting that interior windows be designed to maximize daylight exposure and placed in positions that overlook the sky, green areas, or city streets. Clean air quality, thermal comfort, and acoustic separation were necessary for good living conditions. In addition to balconies, green spaces, common lounges, roof terraces, and courtyards should be included in outdoor spaces for residences, allowing for access to nature while maintaining social distancing. Yüksel (2022) also stressed the importance of flexible design for housing, while Gür (2022) noted that user habits and spatial needs have changed with the pandemic, necessitating additional space in residences. They recommended that future designs prioritize balconies and outdoor green areas. According to Martin et al. (2012), three critical factors affect satisfaction when it comes to housing. These factors are related to outdoor space, interior quality, and satisfaction with structural features. The study found that the type of housing, the number of spaces in the house, the small size, and the general insulation in the interior spaces harm satisfaction. Additionally, the authors suggest that existing housing stock should be updated to prepare for possible emergencies and improved to enhance the user's quality of life.

- Although the location of the settlement appears to have less impact on satisfaction than other factors, users' satisfaction was increased because the residences are near the city center. However, limited and inadequate access to the center and other parts of the city through public transportation reduced the effect of satisfaction. Users were least satisfied with their access to healthcare units, shopping centers, and education units. Access to hospitals via public transportation is risky for users, mostly aged between 55 and 69, who have health issues and no private vehicle due to the contagious effect of the virus. In this period, when there are curfews throughout the country of Turkey, accessing markets during certain hours on weekdays and full-time on weekends to meet families' food needs has been difficult for users due to the remoteness of the settlement. In general, it has been concluded that users are dissatisfied because the settlement is far from health, education, and shopping facilities. Therefore, it is essential to plan social housing designs according to the principles of correct location selection. Böge (2019) and Yin et al. (2019) discovered that satisfaction decreased as the distance of residences from shopping centers increased. Similarly, Aksel & İmamoğlu (2020) found that satisfaction decreased as the distance from the city center increased. Ruiz et al. (2019) stated that user satisfaction with the settlement's location is linked to their perception of well-being.

Several studies have examined local and foreign publications investigating user satisfaction in social housing built for low-income families, regardless of the pandemic's impact on user satisfaction. Gür (2009) conducted a study on social housing implemented in Turkey, which found that quality housing is available in these housing units. Nevertheless, some findings indicate that production targets are not considered, and typical projects are produced. Böge (2019) conducted a study investigating user satisfaction in social housing and emphasized the need to design social housing environments in new areas that align with the user's usage habits and preferences. The study concluded that security measures in residences and inadequate garbage collection services negatively affect satisfaction. Kutor et al. (2022) revealed that housing users who have lived in the settlement for a long time, have good social relations, and receive support from local governments are more satisfied with their housing. Özyurt & Altun (2015) found that satisfaction mainly stems from the choice of location where the houses are located, and being in areas outside the city with green areas and playgrounds for children positively affects satisfaction. The studies show that dissatisfaction with housing during the pandemic is related to the limited usage area and number of spaces. The need for more extensive and more comfortable living spaces has become apparent. The housing design should prioritize open spaces, balconies, terraces, and flexible spaces. Insulation is also deemed necessary in general. The studies have also highlighted the significance of social reinforcement areas and environmental regulations. Overall, these findings are similar to those of many other publications reviewed, and any differences detected are thought to be due to the socio-cultural and economic reasons of the user.

CONCLUSION AND RECOMMENDATIONS

This research focused on determining the satisfaction of users living in social mass housing produced for low- and middle-income families during the COVID-19 pandemic. For this purpose, the parameters affecting user satisfaction and the relationships between them were determined by regression analysis, which is the most widely used in scientific studies and gives the most accurate results. In the study, five factors were found to affect user satisfaction positively. Among these, the three highest factors were determined to be the structural features of the house, environmental features, and interior space adequacy. It has been observed that the location of the settlement and access to needs are the factors that have the least positive effect on satisfaction, and even the access to needs factor has a decreasing effect on satisfaction.

In general, it was observed that 91% of the users were satisfied with their homes during the pandemic, and some demographic characteristics affected satisfaction. These features include the user's marital status, profession, and gender. According to the research results, married, retired, and male users are more satisfied with their homes than other user profiles. It can be said that single users were not satisfied with this period because social interaction was minimized, and people could only communicate with individuals within the house. Before the pandemic, family members who could not stay at home or be together for long periods due to busy school and work lives had the opportunity to spend time together and get to know each other better during this time. However, the fact that all family members are always at home during the day has increased the workload of the women in the house. While women continue to work remotely, they have had to deal more with eating and drinking, cleaning, childcare, and household chores. Due to changes in the amount of time spent at home and how homes are used during the pandemic, many people have found that their living spaces are insufficient for their needs. Women, who typically have more involvement with the home than men, have experienced decreased satisfaction with their living arrangements. For this reason, it has been determined that the overall satisfaction of male users is higher than that of females. The fact that retired users over the age of 65, who were most targeted by curfews and most negatively affected by the virus, had the opportunity to spend time with each other in the green areas of their settlement during this period increased their satisfaction levels. Satisfaction levels were higher for homeowners who owned residential property, as they lived here permanently, than tenants.

Researchers have been attempting to answer a question regarding the COVID-19 pandemic: "What factors affect housing satisfaction, and how do these factors impact satisfaction apart from demographic characteristics?" The findings indicate that users were primarily satisfied with the structural features of their homes, such as disaster resistance, thermal insulation, and physical appearance. Notably, satisfaction with the house's structural features was considered more important than other factors like interior comfort, adequacy, and physical environmental quality. Among the structural features, it was observed that the factor that increased user satisfaction the most was the disaster resistance of houses, thanks to solutions such as raft foundations, tunnel formwork carrier systems, and high concrete strength applied in buildings. The fact that the Fırınlarsırtı location was considered the safest area of the city by seismic experts has increased users' confidence and satisfaction in their homes in the Edirne social housing. This study has again shown how vital ground strength is in choosing the location of mass housing. Adequate insulation material thickness and coated-insulated glasses help maintain thermal comfort in houses, increasing user satisfaction. Moreover, the good exterior appearance of buildings is another structural factor that enhances satisfaction. It has been observed that environmental and climatic conditions do not harm houses; even after 16 years of age, they look solid and durable from the outside. However, two structural factors can reduce house user satisfaction: sound insulation and the quality of materials used in construction. During the pandemic, users faced difficulties due to sound interference between floors. The absence of materials such as stone wool and glass wool for sound insulation led to poor sound insulation. Despite aiming for quality in housing production, it has been observed that material and technical requirements are not met sufficiently, leading to user dissatisfaction.

In all mass housing settlements, the design of the surroundings of the houses is as important as the housing design. This study observed that the users of Edirne social housing estates were more satisfied with the housing environment's features than the adequacy of the house's interior space. This can be explained as the longing for nature and understanding the importance of green spaces, as users must stay home during the pandemic. The presence of vast open and green areas in the settlement, the communication established with the neighbors in the apartment gardens, and the hours spent ensured that the neighborly relations remained strong. The playgrounds in the neighborhood allow children who are unable to attend school to engage in distance learning. Additionally, residents have access to sports facilities for activities like basketball and volleyball, and there are plenty of safe parking spaces for their vehicles. These amenities contribute to the overall satisfaction of the residents. Considering the social distance, the common areas that strengthen the interaction between the individuals have increased satisfaction. In addition to the social reinforcements, users stated they were satisfied with the distance between the blocks.

The study observed that satisfaction with the adequacy of the residential interior space was also high, except for balcony size, kitchen size, and number of rooms. During this period, open spaces such as terraces and balconies were life-saving, so the interest and need for these spaces increased, and the size of the existing balconies became insufficient. The importance of including more oversized balconies in the design that can be opened and closed when necessary has been understood. The fact that the entire household stays at home all the time and there is an increase in the time and number of meals prepared at home has led to increased use of the kitchen, which has caused the kitchen size to be insufficient for the users. In addition, since kitchens, like many other spaces, sometimes serve as study rooms and classrooms, the available space is insufficient for the users. Some users have tried to intervene

in this situation by making spatial changes of their own. Apart from these two factors, it was seen that the users were satisfied with all the spatial features of the house.

Another study finding is that the user was satisfied with the house's location, an essential factor in residential settlements. Considering that the city is developing towards the ring road in the north, it is seen that the Fırınlarsırtı residences are also located in the developing region of the city as a part of this process. Due to its proximity to residential areas, it has been determined that the users are generally satisfied with their residences. However, according to other factors, the reason for the lower effect on satisfaction was that users avoided public transport due to the contagious virus during the pandemic period. In addition, the limited number of public vehicles reaching the region during this period was seen as a situation that reduced satisfaction and restricted access to health and education units. It has been concluded that users are not satisfied with their access to hospitals and shopping units.

This study evaluated user satisfaction in social housing built for low- and middle-income families during the pandemic. The findings showed that preparing for possible future pandemics in the housing and its surroundings is crucial for user satisfaction. The sudden and unprepared situation during the pandemic shed light on the need for new design approaches to address the negative experiences in and around the house. Therefore, conducting more studies in this direction, domestically and internationally, is essential to improve housing design further and ensure better user satisfaction.

Housing should be constructed using high-quality materials that do not compromise safety and comfort. As homes now double as schools and workplaces, it is essential to use insulation materials that effectively control sound and prevent noise pollution. A team of experts should install these materials with care and precision. Landscape design is just as important as interior design for residential spaces. The environment around the homes should be planned according to the occupants' needs, focusing on functional and practical social facilities and avoiding unused spaces. All environmental arrangements should be considered holistically, considering the continuity of life inside the house. The positive effects of green areas on human psychology should also be considered, and landscape areas should be designed in proportion to the size of the settlement, taking into account social distances and following regulations. Landscape architects play a crucial role in this regard. Social areas suitable for various activities, such as walking, eating, spending time together, resting, doing sports, parks, and hobby gardens, should be arranged in these areas. Children's playgrounds should be designed in safe areas away from traffic and visible to families. Pedestrian paths should be included in the settlement to provide easy access. In this day and age, when daylight and visual connection with the outdoors are more crucial than ever, these areas should be considered in settlement planning.

In this extraordinary period where all time is spent at home and spatial needs increase, it has been understood that interior spaces should be able to respond to activities such as work, eating, resting, and sports. The ability of a space to serve more than one function depends on its ability to be a place that can change and transform. Therefore, the COVID-19 pandemic has shown designers the importance and necessity of flexible space solutions. By incorporating flexible space solutions and modular systems into the design, spaces will have multiple functions, the number of spaces will increase, and architectural sustainability will be ensured in a spatial sense. Spaces can meet needs with open and closed systems, enlarged, reduced, and detachable. In addition, since needs will vary depending on family types, analyzing different plans will increase user satisfaction as it will offer a choice to the user. In our age where technology is rapidly advancing, including smart home systems in designs is an important method that enables the transformation of spaces in line with needs. It is a situation that increases satisfaction when the designer and the user come together, consider the user's demands, and make joint decisions by evaluating the user's opinions through mutual discussions.

According to a study, user satisfaction in the field of social mass housing in Edirne was found to be high, with a value above the average during the COVID-19 pandemic.

Two primary stages must be followed to increase user satisfaction in all future social housing plans. The first stage is to enhance and improve the positive results determined in the research conducted for this purpose to benefit the user. The second stage involves designing plans to eliminate all the negatives and deficiencies that reduce satisfaction. In future studies, user satisfaction with social housing in different countries or cities can be investigated and compared to determine similarities or differences between the factors affecting satisfaction. Therefore, with the help of the design strategies developed, housing designs with high user satisfaction can be achieved.

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Article

Resilience of rural cultural landscapes: A case study of hazelnut in the Giresun-Ordu subregion

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ABSTRACT

This article examines the resilience of the rural cultural landscape (RCL) shaped by hazelnut production in the Eastern Black Sea Region of Türkiye. Addressing the cultural landscapes shaped by agricultural production with their economic dimensions constitutes the original aspect of the article. In the study, the resilience of RCLs is discussed in the context of the socio-ecological resilience approach. The main aim is to evaluate the resilience of the RCL of the region by identifying causal relationships between socio-cultural, economic, and institutional dynamics in the Giresun-Ordu Subregion.

In the study, historical profiling, which enables the provision of context-specific detailed information, has been adopted. Within the scope of the article, the effects of the historical change and development of socio-cultural, economic, and institutional dynamics in the Giresun-Ordu sub-region on the RCL of the region are analyzed comparatively in three periods. This comparison has been carried out through agricultural production mode-method-economy, social structure and culture, and physical space features. The changing, unchanging, and evolving characteristics of the rural cultural landscape of the region were identified.

As a result of the method followed and the evaluations made, migration and demographic changes in the region have brought about adaptations in the agricultural production style, method, and economy. These adaptations have transformed the way of life by making migration permanent and continuous. It is possible to say that the rural cultural landscape of the region, which can continue its traditional economic and social structure by adapting to all these changes and transformations, is resilient.

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INTRODUCTION

Heterogeneous agricultural areas, that is, rural cultural landscape (RCL) areas where agricultural product production and management decisions are based on interactions between socio-cultural, economic, and spatial factors, cover two-thirds of the world's land surface. These areas constitute a significant part of cultural landscapes (Farina, 2000; Wrbka et al., 2004; Found & Berbes-Blazquez,

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2012; Wijetunga & Sung, 2015; Cañizares & Pulpón, 2018). RCLs are faced with interrelated economic, demographic, social, cultural, and environmental changes, such as increase/decrease in population, intensification/abandonment of agricultural activities, urbanization pressure, disaster risk, especially globalization, and climate change (Plieninger & Bieling, 2012; ICOMOS, 2017). These changes lead to a decrease in the level of welfare in rural areas, an increase in unemployment, and migration of the population to urban areas. Moreover, the aging of the population and, in parallel, a decrease in agricultural production, loss of traditional practices, rural lifestyles, local knowledge and culture, and loss of natural vegetation and biodiversity are consequent results of this process. However, these areas need to be protected to eliminate these problems—to increase the quality of life of the local people, to provide employment, to prevent migration, to ensure the continuity of tangible and intangible heritage, and to protect the natural-ecological environment (Rescia et al., 2010; Ioan et al., 2014; ICOMOS, 2017; Li et al., 2019). Therefore, RCLs are discussed in the context of a socio-ecological resilience approach that takes into account the connections between social, economic, and natural components. The resilience of these landscapes is possible by preserving and maintaining the integrity of their economic, socio-cultural, and spatial structures and functions against internal and external threats (Giannecchini et al, 2007; Rescia et al., 2010; Rescia et al., 2012; Oteroz-Rozas et al., 2012; Found & Berbes-Blazquez, 2012).

The protection of RCLs shaped by agricultural production should be considered together with the resilience of agricultural production and the agricultural economy. Only in this way is it possible to talk about the protection of RCL areas in the context of their adaptability to changes (Plieninger & Bieling, 2012; Meuwissen et al., 2019). In other words, the changes caused by the interactions between economic, socio-cultural, and spatial structures constitute the nature of the unique dynamic structure of RCLs that lives, continues, and is transmitted. In this context, it is possible to maintain the resilience and preservation of RCLs, which can maintain their traditional economic and social structures by adapting to changes (Bürgi et al., 2012; Rescia et al., 2010). Fundamentally focusing on uncertainty, change, the dynamics of change, how to adapt to change, and how to shape change, resilience is defined as the capacity of a system. This system functions to experience shocks while maintaining essentially the same function, structure, feedback, and therefore identity (Berkes & Seixas, 2005; Adger, 2000; Carpenter et al., 2001; Folke, 2006; Holling, 2001; Plieninger & Bieling, 2012; Utami, 2020; Nicholas-Davies et al., 2021; Viñals et al., 2023). In this regard, it is possible to say that RCLs can be preserved with the continuity of agricultural production and the lifestyle based on this production, and, of course, the population engaged in production.

In this context, hazelnut and tea are two products that define the RCL specific to the Eastern Black Sea Region in Türkiye. Türkiye is one of the most important producers in the world for both of these products. While the produced tea is consumed in the domestic market, the produced hazelnut is exported. Despite the demographic structure of the Eastern Black Sea Region, which has been migrating out of the region and country since the 1950s, its economy is based on agricultural production[1].

In this article, the resilience of the RCL of the region is discussed by examining the changes that the Giresun-Ordu Subregion, which we can define as the RCL shaped by hazelnut production, has undergone since the 1950s. Addressing the cultural landscapes shaped by agricultural production with their economic dimensions constitutes the original aspect of the article. From this point of view, the contribution of the study is that it offers a unique approach to evaluate the resilience of rural cultural landscapes by identifying the causal relationships between socio-cultural, economic, and institutional dynamics. This study reveals how hazelnut production in the Giresun-Ordu Subregion, which is under the pressure of urbanization and losing its rural population, continues with its own conditions and rules. It also contributes by emphasizing the critical importance of socio-cultural structures in terms of the continuity of agricultural production in the region and the resilience of the cultural landscape of the region.

RESEARCH METHODOLOGY AND DATA

This research study area includes Giresun and Ordu provinces, located in the Black Sea Region of Türkiye. (Figure 1) The reason for choosing these provinces is that they are the places where traditional hazelnut production first started in Türkiye, and hazelnut has been the main agricultural product for about 70 years (Kaptan, 1978; Kaynar, 2018). In the following parts of the study, the term Giresun-Ordu Subregion is used for these two provinces.

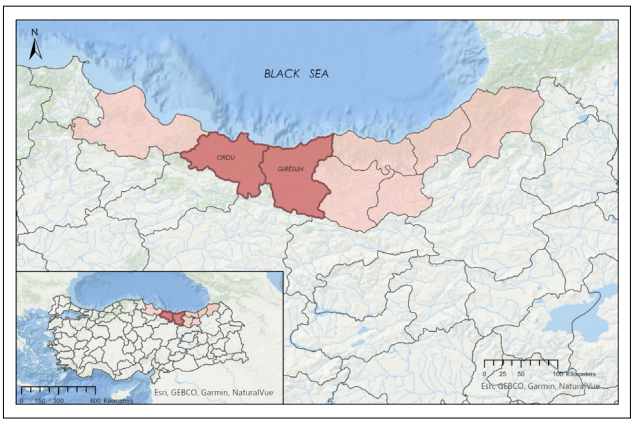

Figure 1. Location of the Giresun-Ordu subregion in the Eastern Black Sea Region.

The resilience of rural cultural landscapes is influenced by complex relationships between socio-cultural, economic, and institutional dynamics. Qualitative research allows examining these dynamics and the interactions between them in detail and provides detailed and comprehensive information specific to a particular geographical or cultural context. For this reason, a qualitative research method was followed in the study, and the examination of printed and non-printed materials for hazelnut production and the study area and observation-based determinations constitute the data collection techniques. The fact that not much is known about the ongoing processes in cultural landscapes reveals the importance of interpreting this landscape within its own historical and cultural context (Antrop, 2004; Antrop, 2005). Therefore, historical profiling was adopted as a method to evaluate the effects of socio-cultural, economic, and institutional dynamics, changes, and developments on the RCL of the region from the 1950s to the present in the Giresun-Ordu Subregion (Carpenter et al., 2005). The historical profiling method allows the effects of the change and development of these dynamics on the rural cultural landscape of the region to be addressed with a comparative evaluation. Historical analysis of RCLs is critical for classifying distinct dynamics and assessing causal relationships between different periods. For this study, considering the effects of the socio-cultural, economic, and institutional dynamics of the study area on the RCL of the region, three periods were determined: 1950-1980, 1981-2000, and 2001-2020.

The examination of the region in this context was carried out in three areas: agricultural style-method-economy, social structure and culture, and physical space.

Agricultural production style-method-economy includes features specific to the structure of agricultural production in the region. Social structure and culture include features related to the demographic structure, lifestyle, and cultural values in the region, and physical space includes features related to hazelnut production areas and land cover in the region.

The study consists of three consecutive stages. In the first stage, the examination items under three areas revealed the characteristics within which the resilience of the RCL will be evaluated. These characteristics were determined through a combination of literature review on the resilience of social and ecological systems, farm systems, and agricultural landscapes, preliminary research into the region, and assessments of the current situation regarding the resilience of cultural landscapes. In the second stage, the changes experienced in the Giresun-Ordu Subregion in three periods, 1950-1980, 1981-2000, and 2001-2020, were examined in the fields of agricultural production style-method-economy, social structure and culture, and physical space. As a result of this analysis, the unchanging, changing, and evolving historical profile of the RCL was obtained by evaluating the cause-effect relationship between each feature or different features and the change in each period. In the last stage, the changes and transformations of the RCL of the region in the historical process were determined and it was discussed whether the resilience of the RCL of the region could cope with change, could adapt to the dynamics of change, and could reorganize if necessary.

Data Sources

Primary and secondary sources were used in this study, which focuses on hazelnut production in the Giresun-Ordu Subregion of the Eastern Black Sea Region. The primary source of the study is the authors' observations of field studies carried out in the Eastern Black Sea Region, especially the city of Ordu, in July-August-September 2021 and 2023. The main contribution of the field study is the compilation of information on the hazelnut production process in the region, social relations, cultural values, and demographic and spatial structure in the rural area.

Considering the secondary sources used in the compilation of this information, historical information about the hazelnut production process, actors, institutions, and socio-cultural structure in the region is compiled from various academic research from different disciplines[2], especially the associate professor thesis titled "Eastern Black Sea Rural Area Settlement Order and Agricultural Production Relations" (Kaptan, 1978). In addition, reports of public institutions such as the General Directorate of Cooperatives (2015), the Competition Authority (Gündüz et al., 2018) and the Development Foundation of Türkiye (2022), were also used as a source of information about the current situation, actors, and institutions in the hazelnut production process. For statistical data on hazelnut production in the region and throughout Türkiye and data on demographic structure such as population, migration, immigration rate, Turkish Statistical Institute (TUIK) data between 1950 and 2020 were used at regular intervals (Turkish Statistical Institute, 2024). Information about the economic, spatial, demographic, and cultural changes in the region after the 2000s was obtained from regional plan reports. Finally, Coordination of Information on the Environment (CORINE) land cover data for the years 1990, 2000, 2006, 2012, and 2018, created by the European Environment Agency, were used to determine land use and changes.

Preliminary Information on Hazelnut Production in the Giresun-Ordu Subregion

83% of the production in the Eastern Black Sea Region, which meets 44% of hazelnut production for export in Türkiye, is defined as the traditional production region, and it is carried out in the Giresun-Ordu Subregion. The economy of both provinces is largely[3] based on the only agricultural product, hazelnut (TUIK, 2024). The approximately 298 thousand tons of hazelnut production of this subregion in

2020 correspond to 37% of Türkiye's total. At the same time, 46% of Türkiye's total hazelnut production areas are within the borders of this region (TUIK, 2024), and 22% of the raw material production in the world chocolate industry is met from here (Gündüz et al., 2018).

32% of the land cover in the Giresun-Ordu Subregion is agricultural areas, and the majority, 27%, consists of agricultural areas where hazelnut is produced. Forested areas and meadow-pasture areas, which constitute the natural vegetation of the region, define 54% of the land cover. Thus, hazelnut production areas and forested areas, two important elements of the cultural landscape of the region, constitute approximately 81% of the land cover (TUIK, 2024; Dikçınar Sel, 2021).

The Eastern Black Sea Region, which includes the Giresun-Ordu Subregion, is the region in Türkiye whose economy continues to be dominated by the agricultural sector and where agricultural employment is the highest (TUIK, 2024). In the region, ongoing agricultural economic conditions prevail due to the effects of uncertainties, constraints, or opportunities in the production of hazelnut (Kaptan, 1978). Under the influence of these conditions, domestic and international migration, which started after the 1950s and continued thereafter, had demographic and spatial reflections in the region and effects on the local economy. The prevalence of hazelnut production in the region initially caused the agricultural areas, especially corn and sub-corn vegetable areas, to shrink, and animal husbandry and transhumance to decrease. Subsequently, the conversion of forested areas into hazelnut production areas led to the decrease and aging of the rural population. The lifestyle based on four-season labor and animal husbandry has been replaced by a lifestyle based on hazelnut production, which is a seasonal occupation.

Hazelnut Cultivation and Production Process in the Giresun-Ordu Subregion

Hazelnut, which can be harvested 50-60 years after it starts to bear fruit, is produced in gardens created with traditional methods in small-scale family businesses in the region (Yılmaz, 2014; Balık, 2023). The hazelnut production process consists of three stages (Figure 2):

1. Pre-harvesting agricultural practices: With these practices carried out between May and July, hazelnut orchards are prepared for the harvest that will start in August.
2. Harvesting, threshing, storage, and transportation: Hazelnut harvesting is done in two ways by hand: from branches or from the ground. Hazelnuts brought to the threshing floor are dried for 3-5 days. Then, the hazelnuts are separated from their shells by a hazelnut sorting machine and, after being dried again in the threshing floor, they are bagged and prepared to be taken to the market. Hazelnuts require a short period of time and intense effort, including harvesting, threshing, storage, and transportation, covering 30 days of the season.
3. Post-harvesting agricultural practices: With these practices carried out between September and April, hazelnut orchards are prepared for the next harvest.

All hazelnut production activities take a maximum of 75 days, assuming a good garden of 3 hectares (Kaptan, 1978).

Except for the hazelnut sorting machine used to separate the hazelnut from its green shell and the machines used to disinfect the hazelnut quarries, all remaining production activities are carried out by manual labor (General Directorate of Cooperatives, 2015; Kaynar, 2018). The most important feature of hazelnut production in the region is that the workforce remains dependent on manual production,

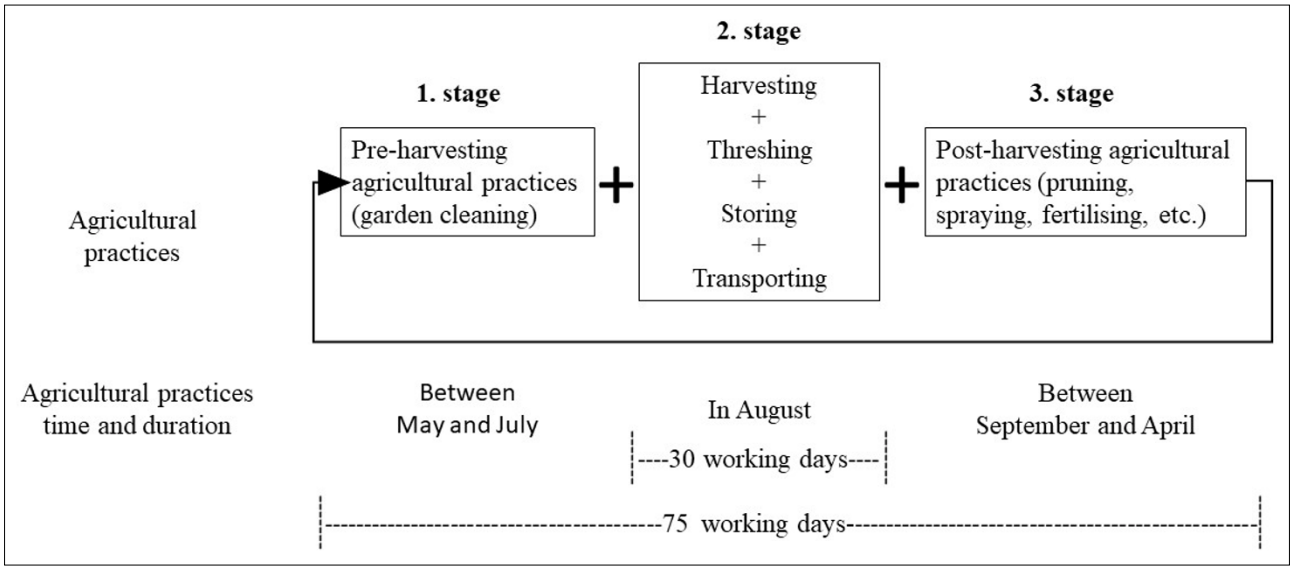

Figure 2. For hazelnut production on a 3-hectare field, agricultural practices, including their timing and duration.

and since mechanization is not possible, there is a seasonal need for workforce (Kutluata, 2015; Kaynar, 2018).

Changes and Developments in the Socio-Cultural, Economic, and Institutional Dynamics of the Giresun-Ordu Subregion and Their Impact on the Rural Cultural Landscape

Hazelnut cultivation has a 2500-year history in the Giresun-Ordu Subregion, benefiting from a favorable climate (Kayalak & Özçelik, 2012; Doğanay, 2013; Gündüz et al., 2018; Development Foundation of Türkiye, 2022). Despite this, significant production began with the Republic's declaration in 1923, following the Izmir Economic Congress's agriculture-focused policies (Boratav, 2016). Türkiye then specialized in exporting raw materials, including hazelnuts. To meet global demand, Türkiye developed legal and institutional frameworks for hazelnut production, trade, and export. Key developments included the establishment of the Giresun Hazelnut Stock Exchange in 1926, the world's first Hazelnut Institute in Giresun in 1936, and the Hazelnut Agricultural Sales Cooperatives Association (Fiskobirlik) in 1938 to enhance hazelnut agriculture (Korkmaz, 2021). By the 1950s, hazelnut production had become a significant socio-economic activity in the region.

As stated before, in this study, the change and development of socio-cultural, economic, and institutional dynamics in the Giresun-Ordu Subregion were examined in three periods: 1950-1980, 1981-2000, and 2001-2020. Geographical features in the region and the hazelnut production that developed accordingly in these three periods have reshaped the relations between agricultural production style - labor use, agricultural production actors - market presentation, demographic structure - migration, people, and land.

The 1950s are important in terms of hazelnut becoming the only agricultural product in the region and the involvement of local actors in the formation of the hazelnut production and buying-selling order (institutionalization of Fiskobirlik and merchants). While Fiskobirlik, which became a state institution in 1964, became an important actor in hazelnut exports, its power was weakened with the intervention of the central government in the 1980s and was replaced by the private sector. The 2000s are important in that Fiskobirlik, a local producer cooperative, was privatized and the production mechanism began to break away from the local, and international investors with foreign capital began to take part as a local actor. While the fact that agricultural production is based on hazelnut as the only product, the population engaged in agricultural production, and the income obtained from agricultural production caused these changes, they were also affected by the changes themselves. Due to the low productivity in hazelnut production in small-scale family businesses, the region has constantly emigrated. However, due to the increasing demand for hazelnut and the existence of the market, hazelnut production has maintained its leading role in both agricultural production in the region and the regional economy. The state has supported hazelnut production either through legal regulations or by intervening in the market or not. These dynamics have shaped agricultural production, demographic structure, lifestyle, living habits, and land cover in each period.

The Form of Agricultural Production and Practice, the Actors of Agricultural Production, the Income Obtained from Agricultural Production

The form of agricultural production and practice, the actors of agricultural production, and the income obtained from agricultural production are highly important issues in this process. Additionally, the fact that the migrating population maintains its relationship with the place where it migrates, and the population's belonging to the place, may cause changes to reduce or exacerbate the effects of the difficulties and/or threats that arise in this shaping process. For this reason, the reflections of the changing dynamics in the region in these three periods were examined under the fields of agricultural production style-method-economy, social structure and culture, and physical space.

Agricultural production style-method-economy includes features specific to the structure of agricultural production in the region. These features are the size of the agricultural enterprise, the number of days worked in the agricultural enterprise, the purpose of production, the mode of production, the way the land changes hands, the type of agricultural enterprise, the form of agricultural practice, the use of labor in agricultural practices, the income obtained from agricultural production, the form of presentation to the market, the role of the state, the harvest method, harvest season, and market formation (Ashkenazy et al., 2018; Berkes & Sexias, 2005; Fang & Liu, 2008; Found & Berbes-Blazquez, 2012; Folke, 2006; Garmestani et al., 2006; Huang et al., 2018; Kaptan, 1978; Meuwissen et al., 2019; Nera et al., 2020; Rescia et al., 2010; Zambon et al., 2017).

Social structure and culture include the characteristics of the demographic structure, lifestyle, and cultural values in the region. These features are the ratio of the rural population in the total population, rural population change, net migration rate, the relationship between entering and leaving migration, seasonal population change/difference, lifestyle, tradition, customs, rituals and agricultural production relationship, and sense of belonging and sense of place (Rescia et al., 2010; Pătru-Stupariu et al., 2019; Bender & Haller, 2017; Keitsch et al., 2016; Król, 2020; Adger, 2000; Stephenson, 2008; Ioan et al., 2014; Cumming et al., 2005; Basile & Cavallo, 2020).

Physical space includes features related to hazelnut production areas and land cover in the region. These

features are the production region, production area, change of ownership of agricultural land, and change in natural vegetation (Giannecchini et al, 2007; Rescia et al., 2010; Rescia et al., 2012; Oteroz-Rozas et al., 2012; Found & Berbes-Blazquez, 2012).

The study areas and the characteristics that define these areas were constructed from data groups that can reveal the basic structure of each area in the context of the resilience of the RCL. These features differ in the periods subject to examination, and this difference helps to monitor the change and transformation of the rural structure.

The examination carried out within the scope of these features is important in terms of being able to more clearly reveal the cause and effect relationships in each period and between periods, and showing how the RCL of the Giresun-Ordu Subregion evolved and which features were effective in this process. Because there is a mutual relationship between spatial and cultural structures in RCLs shaped by agricultural production. Agricultural areas and natural areas provide both a physical and ecological spatial environment for agricultural production. Traditional practices, knowledge, skills, and traditions, and such cultural accumulation can contribute to the conservation and preservation of agricultural production.

The Period Between 1950 and 1980

The 1950s represent the period when hazelnut production began to increase in the Giresun-Ordu Subregion and became the dominant agricultural product until the 1980s. This situation has caused changes in the traditional agricultural structure of the region in the last 30 years. First of all, while hazelnut production areas increased, corn, sub-corn vegetable production, and animal husbandry decreased. Due to the production of hazelnut for marketing, there has been a transition from subsistence agriculture to commercial agriculture in the region, and socio-economic transformation has occurred. During this period, the rural population increased (Table 1). This situation has brought about a change in the lifestyle based on four-season agricultural activities.

Table 1. Change in rural population size and rural population ratio in Giresun-Ordu subregion (TUIK, 2024)

	Rural Population			Rural Population Change	Total Population			Ratio of Rural Population (%)
	Giresun	Ordu	Total		Giresun	Ordu	Total	
1950	264785	340106	604891	-	299555	373028	672583	89.94
1955	293694	368032	661726	56835	334297	407687	741984	89.18
1960	322363	411245	733608	71882	381453	469379	850832	86.22
1965	352946	460278	813224	79616	428015	543863	971878	83.68
1970	360773	490680	851453	38229	451679	608721	1060400	80.30
1975	354749	515553	870302	18849	463587	664290	1127877	77.16
1980	352972	543715	896687	26385	480083	713535	1193618	75.12
1985	341156	543790	884946	-11741	502151	763857	1266008	69.90
1990	279973	493285	773258	-111688	499087	830105	1329192	58.18
2000	240503	471134	711637	-61621	523819	887765	1411584	50.41
2007	177138	320126	497264	-214373	417505	715406	1132911	43.89
2010	173875	314793	488668	-8596	419256	719183	1138439	42.92
2011	170951	305102	476053	-12615	419498	714390	1133888	41.98
2012	170598	318076	488674	12621	419555	741371	1160926	42.09
2013	173196	0	173196	-315478	425007	731452	1156459	14.98
2014	159369	0	159369	-13827	429984	724268	1154252	13.81
2015	151132	0	151132	-8237	426686	728949	1155635	13.08
2016	151853	0	151853	721	444467	750588	1195055	12.71
2017	146756	0	146756	-5097	437393	742341	1179734	12.44
2018	176238	0	176238	29482	453912	771932	1225844	14.38
2019	148608	0	148608	-27630	448400	754198	1202598	12.36
2020	146462	0	146462	-2146	448721	761400	1210121	12.10

During this period, hazelnut production in the subregion was carried out in small family businesses in agricultural areas divided by geographical conditions and inheritance. Although hazelnut producers who cultivate their own land generally carry out their agricultural activities based on family labor, they receive support from seasonal workers during harvest. This harvest is carried out by the picking from the ground method. Hazelnut farming, which is an occupation in which working in an agricultural enterprise for a maximum of 75 days a year is sufficient, has become the main livelihood product of the rural population. However, corn, sub-corn vegetable production, and animal husbandry activities have decreased, but since hazelnut production is an activity that does not cover the whole year, these traditional agricultural activities have continued to exist.

While Fiskobirlik, a local producer cooperative, and merchants were active in the formation of the hazelnut market until 1964, as of this year, the purchase guarantee for hazelnut has been given by the state through Fiskobirlik, and this made the state the leading actor in the formation of the market. The state's supportive role for producers has contributed to hazelnut continuing as the agricultural item that is most produced. The agricultural areas of the region producing hazelnut increased by 42% in this period (TUIK, 2024). This increase occurred when corn production areas, one of the main agricultural products of the region, turned into hazelnut production areas, and the coastal zone/middle zone below 500m altitude became the hazelnut production areas (Figure 3). This situation caused hazelnut to become the only agricultural product that generates income below 500m altitude. During this period, the rural population of the region increased by 48% due to hazelnut production, whose productivity increased with agricultural measures and the accompanying agricultural income (TUIK, 2024) (Table 2).

However, after the 1970s, the production amount in existing hazelnut production areas reached its highest level. This situation means that the productivity of hazelnut production can no longer increase. The shrinking of the size of the agricultural enterprise[4], and the vegetative structure of the hazelnut, which yields more crops in one year and less in the next, have led to a gradual decrease. The effects of this decrease in productivity can be observed from the fact that the rural population growth between 1975 and 1980 fell behind the increase values in 1950 and 1970 (Table 1). Considering the net migration rate values between 1975 and 1980 in Table 3, it is seen that the rural population rate decreased from 90% to 75% due to migration from rural areas to cities or out of the region due to economic reasons (Table 1).

However, the traditional lifestyle based on four-season occupation with corn production and animal husbandry has changed with the changing agricultural business structure

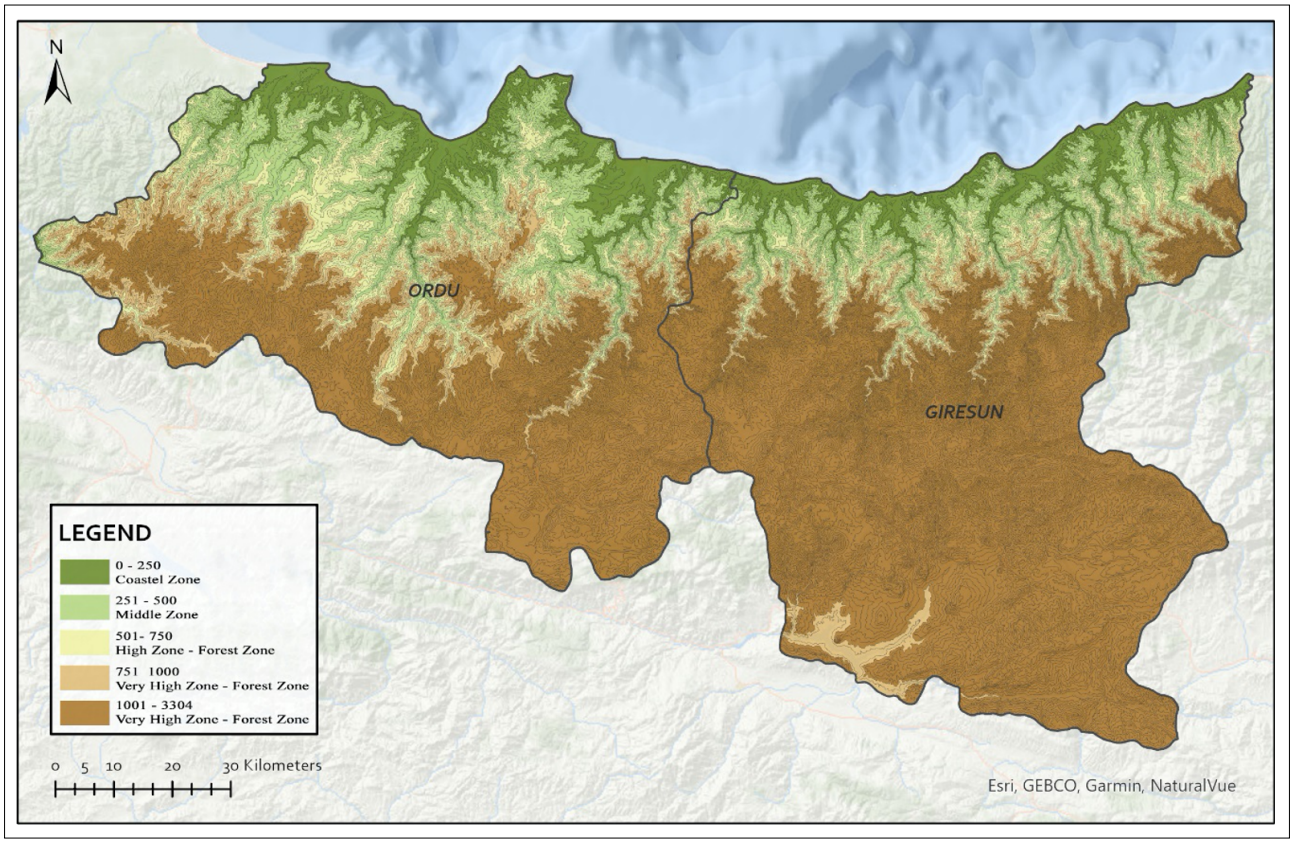

Figure 3. Altitude map of the Giresun-Ordu Subregion - hazelnut production zones.

Table 2. Changes in hazelnut production areas and rural population in the Giresun-Ordu sub-region (TUIK, 2024)

	1950	1960	1980	2000	2020
Hazelnut production areas	-	139.000	197.154	271.823	345.019
Change in hazelnut production areas	-	-	42%	38%	27%
The ratio of hazelnut production areas in land cover	-	11%	15%	21%	27%
Rural Population	604891	733608	896687	711637	146462
Rate of change in rural population size	-	21%	22%	-21%	-79%

Table 3. Change in the net migration rate for the provinces of Giresun and Ordu (TUIK, 2024)

	Giresun		Ordu	
Years	Net migration	Net migration rate	Net migration	Net migration rate
1975-1980	-17.523	-40.6	-20.668	-32.3
1980-1985	-19.955	-43.4	-24230	-34.5
1985-1990	-34.828	-73.9	-42.91	-54.6
1995-2000	-5849	-12.1	-36.958	-44.7
2008	1550	3.68	-3739	-5,18
2009	-2597	-6.14	-961	-1,33
2010	-3040	-7.22	-8345	-11.54
2011	-2288	-5.44	-10509	-14.6
2012	166	-0.4	21645	29.63
2013	3283	7.75	-15540	-21.02
2014	3237	7.56	-11382	-15.59
2015	-4634	-10.8	-2765	-3.79
2016	15092	34.54	15766	21.23
2017	-9146	-20.69	-12194	-16.29
2018	14405	32.25	24661	32.47
2019	-7985	-17.65	-21254	-27.79
2020	286	0.64	5492	7.24

and migrations with hazelnut. It is possible to summarize the lifestyle changed by migration with what we call "guest workers." They mostly spend their time working away from their hometowns, and they only come to their homeland during certain periods of the year and carry out agricultural activities based on hazelnut. This situation reflects the mode of production in the region and the dynamics of rural life in the region.

The Period Between 1981 and 2000

In the 1980s, although the rural population in the Giresun-Ordu Subregion increased quantitatively from 1950 to 1980, the rural population rate decreased from 90% to 75%, which will drop to 50% with the migration in 2000 (Table 1). Despite this remarkable decrease in the rural population, the agricultural areas producing hazelnut increased by 38% between 1980 and 2000 (Table 2). This increase in hazelnut production areas can be explained by the change in land cover in the region. The hazelnut production region, which was only up to 500m altitude in the previous period, expanded to upper altitudes after the 1980s. In fact, the declaration of the entire region as a legal hazelnut production area in 1989 caused corn production areas between 500m and 750m altitude to turn into hazelnut production areas. The examination of the land cover shows that hazelnut production increased up to an altitude of 1000 meters and that some of the forested and pasture areas at this altitude have turned into agricultural areas (Tables 4-5).

As mentioned, although hazelnut production areas increased from 197,154 hectares in 1980 to 271,823 hectares in 2000, it is understood that hazelnut production areas expanded towards lands less suitable for production and, naturally,

Table 4. Distribution of land cover in the Giresun-Ordu subregion based on CORINE data (%)

	1975 (*)	1990	2000	2006	2012	2018
Artificial Surfaces	0.1	0.44	0.69	0.79	0.99	1.05
Agricultural Areas	30.2	39.03	38.57	44.15	45.05	45.03
Forest and Semi Natural Areas	69.7	60.19	60.25	54.55	53.41	53.36
Water Bodies	-	0.34	0.49	0.51	0.55	0.56

(*) (Kaptan, 1978).

Table 5. Agricultural land change in Giresun-Ordu subregion based on CORINE data (%)

	1990	2000	2006	2012	2018
Non-irrigated Mixed Agricultural Areas	54.78	54.94	28.09	25.93	25.90
Agricultural Areas Mixed with Natural Vegetation	39.98	40.02	26.88	23.22	23.27
Non-irrigated Fruit Areas	**0.56**	**0.58**	**39.85**	**45.78**	**45.75**
Irrigated Mixed Agricultural Areas	0.97	0.97	0.76	0.83	0.83
Pastures	**0.54**	**0.37**	**0.53**	**0.46**	**0.45**
Non-irrigated Arable Land	2.06	1.99	2.75	2.62	2.62
Permanently İrrigated Land	1.11	1.12	1.14	1.13	1.13
Irrigated Fruit Areas	0.00	0.00	0.01	0.04	0.04

production did not increase at the same level (Güvemli, 1997). It is possible to see the effect of this situation on the net migration rate of the period (Table 3). Despite the insufficient economic income based on agriculture in the countryside, due to the economic and social opportunities offered by big cities, the region continued to lose population by migrating out of the rural areas, and the ratio of the rural population dropped to 50% (Table 1).

In hazelnut production in small family businesses, labor force loss due to migration has been tried to be compensated by increasing the use of chemical fertilizers and pesticides. However, the migrating population continued to operate its own land either through relatives or sharecroppers (Kaptangil, 2005). In this way, the use of land for agricultural purposes continued without changing land ownership in the region. In addition, while the migrating population could carry out agricultural practices as agricultural workers on their own land during their residence in rural areas, they filled this gap by employing temporary agricultural workers after migrating (Özbekmezci & Sahil, 2004; Atalar, 2015). Thanks to these adaptations, the migrating population was able to continue hazelnut production by coming to the region with their families only during the harvest season. However, since these types of hazelnut producers have to complete the harvest during their stay in their hometowns, they have adapted their harvesting method. While previously harvesting hazelnut was done by picking them from the ground, they shortened the harvest time by starting to pick them from the branches. Hazelnut is now harvested from both the ground and the branch.

These solutions, shaped according to dynamics, enabled agricultural production to continue despite the 21% decrease in the rural population. Due to hazelnut farming, which is a seasonal agricultural activity, the lifestyle in the region has transformed into one where a part of the rural population not only works "abroad" as in the previous period but also lives and comes to their hometown for a month during the harvest season. We call this situation "guest workers-seasonality" due to the fact that the population living abroad maintains their connection with the place they migrated from and the seasonal nature of hazelnut production. Rural life has maintained its vitality seasonally, depending on hazelnut production, with both producers and seasonal workers.

The state's hazelnut purchase guarantee, which lasted from 1964 to 1994, reshaped the market formation with the state's restriction on Fiskobirlik's exports in this year (Şentürk, 2010). The export of hazelnut, which Fiskobirlik now purchases from producers as well as traders, has begun to be dominated by the private sector. During this period, hazelnut production remained the most profitable product in the region. Although there is a decrease in productivity due to various reasons, especially the decrease in the size of agricultural enterprises through inheritance, the income obtained from hazelnut production has been considered a source of assurance for hazelnut producers. Hazelnut

production has become a way for the hazelnut producers, both in rural areas and abroad, to meet the planned or unplanned expenses of themselves and their families in daily life, such as a child's school expenses, marrying a daughter, circumcising a son, and paying debts.

The Period Between 2001 and 2020

In the Giresun-Ordu Subregion, where the rural population has been decreasing since 1950, hazelnut production areas in the region have increased continuously between 2001 and 2020, as in previous periods (Table 2). Between 2000 and 2020, agricultural areas producing hazelnut in the region increased by 27%, from 271,823 hectares to 345,019 hectares. When the land cover data of the subregion is examined, this increase occurred as the hazelnut production region expanded to cover almost all agricultural areas (Figure 4). However, it is seen that hazelnut agricultural areas, which were up to 1000m altitudes in the previous period, have increased to areas above 1000m altitudes, and forested areas at this altitude continue to turn into agricultural areas (Tables 4-5) (Figure 4).

In the previous period, hazelnut producers operated their land through sharecroppers/divider, which caused agricultural practices to be inadequate (Kaptangil, 2005). This practice has led to a further decrease in the efficiency of hazelnut production in family businesses, which are gradually shrinking due to the problems caused by division through inheritance. In addition, the increase in the agricultural areas producing hazelnut has expanded to lands less suitable for production, making agricultural practices difficult as in the previous period. Therefore, rural population in the region continued to decrease due to the ongoing low productivity in hazelnut agriculture over the years (Table 1). In this context, looking at the values given in Table 1, between 2000 and 2020, the ratio of the rural population decreased from 50% to 12% and the rural population decreased by 79%, but this information does not reflect the truth. In reality, although the rural area continues to lose population and its rate continues to decrease, it must be said that there is not as sharp a decrease as stated. As can be seen in this data, the reason why the rural population rate decreased to 0 in 2013 is that the villages in rural status were moved to urban neighbourhood status due to Ordu province gaining metropolitan status. Although the net migration rate decreased during this period, it continued to lose population through emigration.

In this period, alongside the migrating population from the subregion, a new breed of producers emerged: those born and raised abroad, representing the generation of previous migrants. They continue agricultural practices by cultivating inherited land. While agricultural tasks were typically carried out by seasonal and temporary workers,

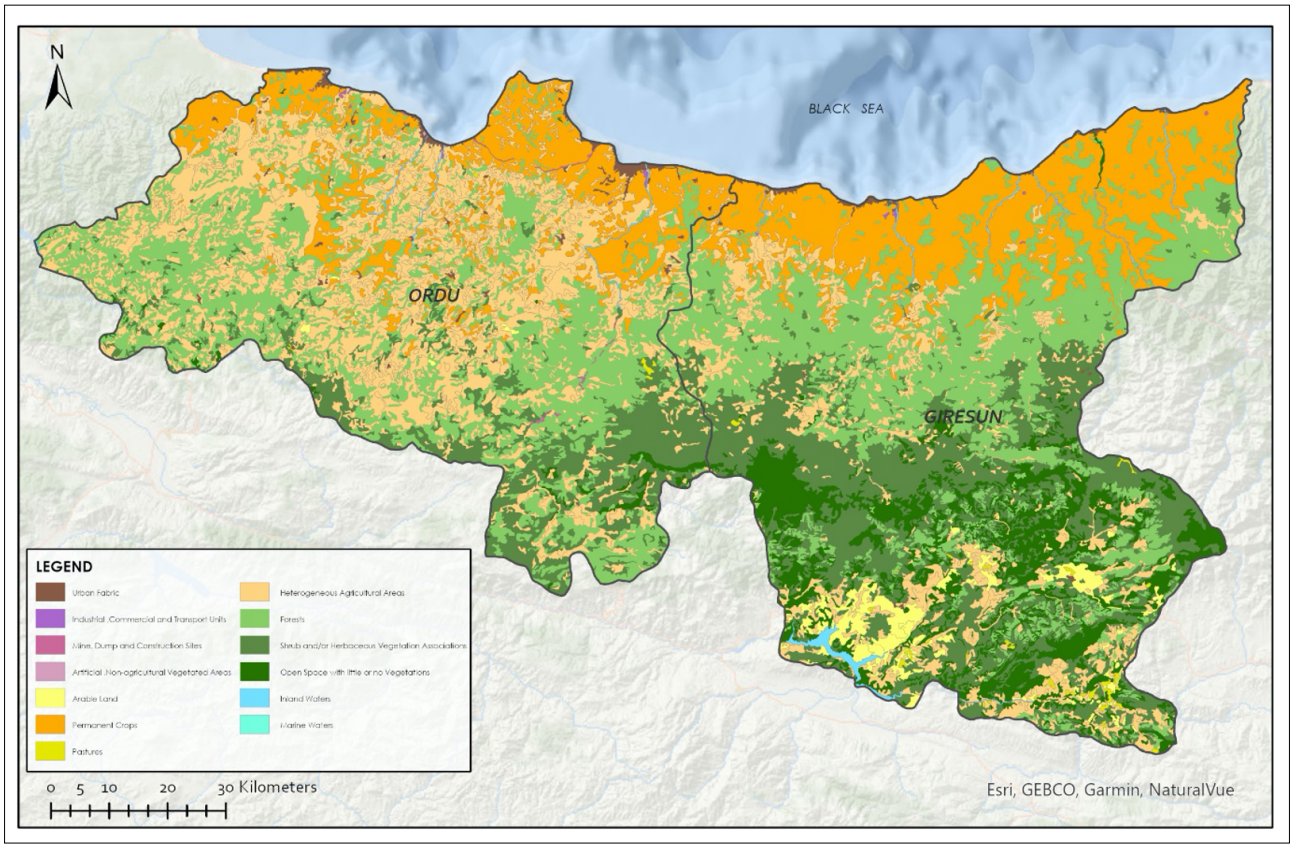

Figure 4. Land cover map of the Giresun- Ordu subregion in 2006, based on CORINE data.

hazelnut harvesting shifted towards the branch-picking method, which gained preference. Additionally, hazelnut producers now spend more time in the production area. Despite being able to maintain sufficient relations, they may only stay for two to four weeks. Nevertheless, their continued connection to the region remains a crucial factor in sustaining hazelnut production.

However, as can be seen from Table 4 and Figure 5, in addition to climate change, the effects of increasing urbanization in the region, forested areas are lost by turning into hazelnut orchards. Also increasing mining activities on the natural structure and climate of the region have increased the frequency and severity of natural disasters, especially floods and landslides. This situation affected both crop productivity and caused the hazelnut harvest in August to be extended until mid-September. Hazelnut producers, who arranged his arrival to his hometown according to the harvest season, continued hazelnut production by adjusting the harvest date according to themselves, as he had to complete the harvest in the limited time he was in his hometown. Although it is important that agricultural practices that affect the yield of hazelnut and harvest are carried out on time, the product continues to be obtained in any case.

During this period, the presence of the private sector in the market strengthened its already dominant position with the entry of foreign capital. So much so that it is known that 68% of hazelnut exports in Türkiye were made by a single foreign capital company in 2019 (Ordu Chamber of Commerce and Industry, 2019). Of course, the state appears to have an encouraging role in this process. Especially after Fiskobirlik was privatized in 2001, the state continued its purchases through the Soil Products Office, but this was subject to changing practices from time to time. For example, between 2009 and 2017, the state had no intervention in the hazelnut market, and the trader became an important actor during this period. Even in this case, economic prosperity continued regardless of the fact that hazelnut is a product dependent on location and its quality, actors and practices.

In the early 2000s, a large part of the rural population of the Giresun-Ordu Subregion migrated domestically and abroad, and it became a geography where a certain part of the population made “guest workers” lifestyle permanent due to the seasonal structure of short-term hazelnut production during the harvest season each year. In other words, while approximately 20% of the region's population lives outside the region as "guest workers”, the region has become a "visited geography" during the harvesting season. It is understood that the region continues to be the dominant region in the country where hazelnut production is made, and in this context, agriculture continues to be the main economic sector of the region despite all these changes.

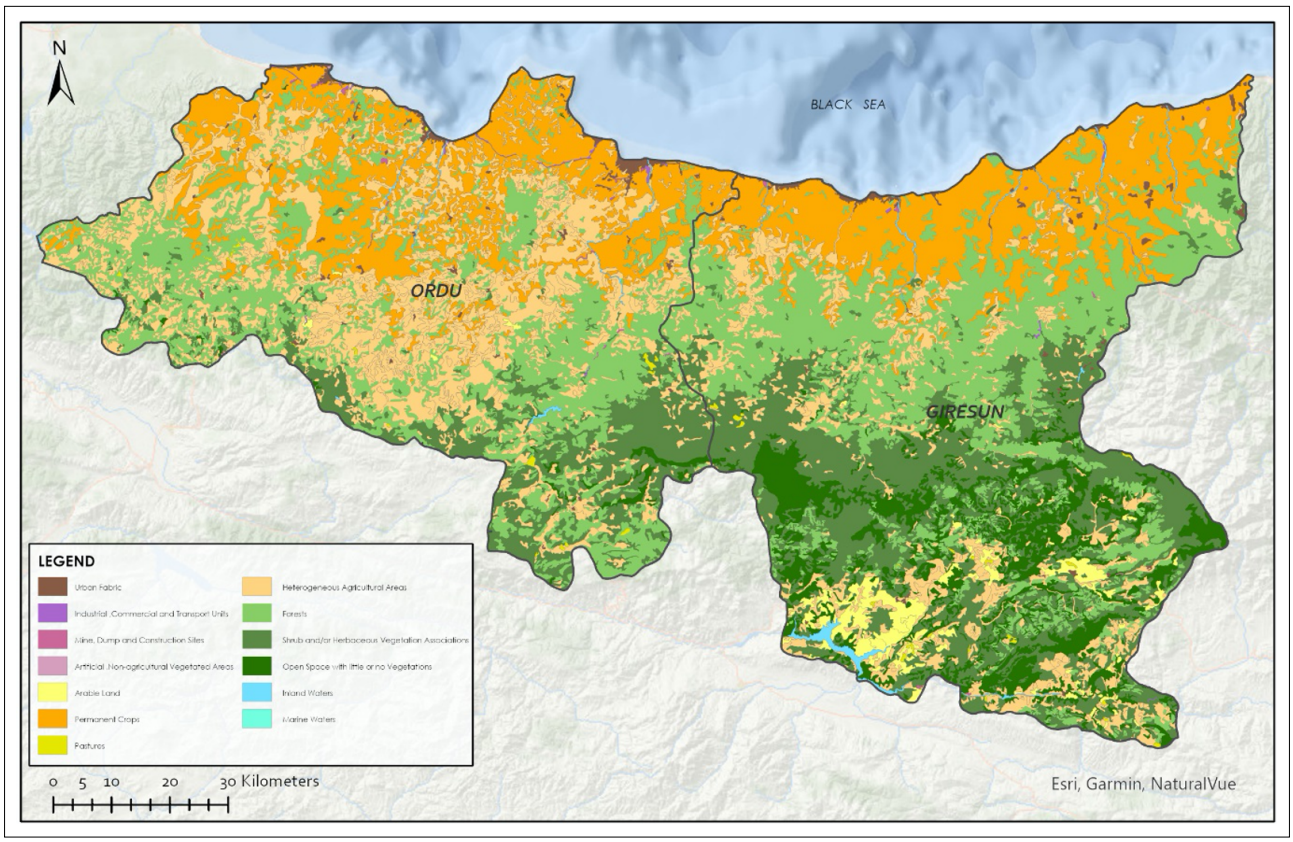

Figure 5. Land cover map of the Giresun- Ordu subregion in 2018, based on CORINE data.

DISCUSSION

In the period between 1950 and 1980, hazelnut became dominant in agricultural production and the economy in the region. The rural population increased due to hazelnut production. The areas of hazelnut production increased, and hazelnut production areas became the main element of land cover below 500m altitude. The most important reason for this increase in hazelnut production is the government's purchase guarantee for the hazelnuts produced. As a result of this subsidy, productivity in the existing hazelnut production areas in the region reached the highest level after the 1970s. The economic situation caused by the cessation of the increase in the amount of hazelnut production led to a decrease in corn production and livestock in areas above 500 meters of altitude. This has led to the migration of the rural population in the region to cities or out of the region. The traditional lifestyle changed, with a certain part of the population having to work abroad and coming to their hometown at certain times of the year. Guest workers have become common due to migration.

Between 1980 and 2000, hazelnut production areas in the region began to spread towards forested and pasture areas. Natural vegetation changed with the expansion of hazelnut planting areas. As a result, unsuitable forested areas were destroyed for hazelnut production, and hazelnut production areas expanded from 500m altitude to 1000m altitude. Hazelnuts began to be produced in an increasingly larger area, in parallel with the continuation of the purchase guarantee given by the state to the hazelnuts produced. The declaration of the region as a legal production zone during this period also legalized this situation.

With hazelnut becoming the dominant agricultural product in the region and almost all agricultural production being hazelnut, significant declines in item productivity occurred. The economic situation caused by this situation led to the migration of the rural population in the region. However, while the rural population migrated out of the region, they did not leave the region completely but retained the ownership of the inherited lands on which they produced hazelnut. This situation enabled hazelnut production to continue through sharecroppers/dividers or temporary agricultural workers. In this way, the ritual of the migrating population coming to the region during harvest time and contributing to the production by participating in the hazelnut harvest continued. This guest worker population, on the one hand, earns a basic living by working outside the region, and on the other hand, continues the traditions by participating in hazelnut production during the "harvest season" and contributes to the family budget with the "bulk money" they obtain from hazelnut production. Hazelnut production has become a seasonal activity due to migration. The region has become a geography where the population living abroad visits once a year, usually in August, that is, during harvest time.

Between 2001 and 2020, the expansion of hazelnut production areas towards forested areas continued, and hazelnut production increased to areas above 1000m altitude. In these years, the influence of neoliberal policies in the country gradually weakened the dominant and decisive role of the producer in hazelnut production. However, production continued at an increasing rate due to the fact that hazelnut was exported, in other words, due to the presence of a foreign market. The rural population continued to decrease due to the expansion of hazelnut production areas into areas that are not suitable for production and the ongoing low productivity over the years. In addition to the population that migrated during this period, the generation of the population that had previously migrated from the region, born and raised abroad, continued to produce hazelnut by cultivating their own land. Agricultural practices carried out through temporary agricultural workers have allowed hazelnut producers to continue production by going back and forth once a year. Migrations out of the region and the seasonal structure of hazelnut production have made guest workers permanent. Life in the region has taken a form where the population living abroad continues to produce hazelnut in a geography that they visit once a year during the harvest season.

CONCLUSION

In conclusion, when the events that took place in three areas, namely agricultural production style-method-economy, social structure-culture, and physical space, in three periods covering a 70-year period, are examined, it is possible to summarize the change and transformation of the RCL of the Giresun-Ordu Subregion in the following items:

- The regional economy continued its agriculture-based structure.
- Hazelnut is the only agricultural product produced for income generation.
- The encouraging role of the state, due to the purchase guarantee in hazelnut, has been decisive.
- With the spread of hazelnut production, corn production was abandoned, and corn production areas turned into forested areas.
- Hazelnut production areas have expanded towards forested areas, and the natural vegetation of the region has changed.
- Hazelnut production is carried out as a seasonal agricultural activity under the influence of the "guest worker" population.
- The migrating population plans their visits to the region according to the harvest season and thus continues hazelnut production in the region.

- The fact that hazelnut production can be carried out seasonally has ensured the continuity of rural life culture in the region.
- Land ownership has not changed hands. The fact that land is acquired through inheritance shows that there is a strong sense of belonging and attachment to the region.
- Due to division through inheritance, the size of agricultural enterprises has gradually decreased.
- Hazelnut production is an important tool in generating economic income.
- The power of Fiskobirlik, a local producer cooperative in hazelnut production, has weakened.
- The merchant continued his existence as a local actor in hazelnut production.

Hazelnut production has played a determinant role in the RCL of the Giresun-Ordu Subregion. Diversity in cultural landscapes is a source of resilience (Carpenter et al., 2001). Accordingly, what is accepted is that agricultural production and agriculture-based structures are not dependent on a single product. In addition, rural areas are abandoned, and agricultural production weakens (Rescia et al., 2010). However, the research results reveal that although the rural areas of the Giresun-Ordu Subregion are migrating, they continue the production style that defines the economic structure, space, and socio-cultural life by adapting to the unique conditions of hazelnut production, which is the only agricultural product. This supports the view that migration to areas where new economic opportunities are offered as a result of inadequate socio-economic conditions in rural areas is not always negative (Plieninger & Bieling, 2012). Of course, this does not mean that the economic, socio-cultural, and environmental effects of dependence on a single product and the change and transformation in land cover in favor of agricultural areas should be ignored. However, the fact that the RCL of the region maintains its basic structures and functions shows that it has the ability to cope with these impacts and make changes to this day. Migration in the subregion has brought about adaptations in the style, method, and economy of agricultural production. These adaptations have transformed the way of life by making migration permanent and continuous. Agricultural production continues through institutions and socio-cultural structures such as the migrating population not selling their land in the region, visiting the region during harvest time and participating in production, and this becoming a ritual repeated every year. In this way, it is possible to say that the RCL of the region, which can continue its traditional economic and social structure by adapting to all these changes and transformations, is resilient.

This change and transformation process in the rural cultural landscape of the Giresun-Ordu Subregion is an important reference point that should be taken into account in determining future agricultural, economic, and demographic trends. Preserving natural resources and adopting a sustainable agricultural policy will contribute to the region achieving an economically and ecologically balanced structure and increasing the welfare of the local community.

NOTES

[1]According to TUIK, agricultural employment in the Eastern Black Sea Region was 62% of total employment in 2004, 54.68% in 2010, and 41.3% in 2020. In 2020, agriculture constituted 17.6% of total employment in Türkiye, indicating that the Eastern Black Sea Region remains more agriculture-focused than the national average.

[2]See: Kutluata (2015), Güvemli (1997), Yılmaz (2014), Kaptangil (2005), Şentürk (2010), Kayalak & Özçelik (2012), Doğanay (2013), Kaynar (2018), Korkmaz (2021).

[3]In 2020, the GDP distribution in Giresun and Ordu shows that agriculture accounts for 13%, industry 27%, and services 60%. Nationwide, agriculture is 6%, industry 34%, and services 60%. The higher share of agriculture in Ordu-Giresun is due to hazelnut production, while the lower industrial share is because the region's industry is agriculture-based (TUIK, 2024; DOKAP, 2022).

[4]The average business size in 1975 was 15.55 in Giresun and 15.02 in Ordu.

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Article

Diverse geographies of urban crisis: A comparative analysis of Egypt, India and Türkiye

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ABSTRACT

The article concentrates on the reasons behind, and consequences of, the post-2008 urban crises experienced in the southern geographies of capitalism. It does so through a comparative analysis of three cases, namely India, Egypt, and Türkiye. The methodological approach in the article attempts to expand the scope of urban politics research to bring divergent cases into conversation. We argue that loosely defined, similar and different causes and/or repeated outcomes of urban crises across diverse cases could form an appropriate base for research in urban politics. The article brings the politics of redistribution in three cases/countries under the spotlight, focusing on four dimensions of the politics of redistribution: (dis)possession; exploitation; commons; and representation. While the last two dimensions dominated the scene in Egypt, in the case of Türkiye, it was about the politics of representation and exploitation. In India, the politics of (dis)possession and commons seem to constitute the center of urban politics. Furthermore, as the comparative analysis of the countries reveals, the role of the state and its historical and spatial configurations have played a strategic role in the formation of the politics of distribution. The comparative analysis also indicates that the variegated neoliberal urban policies have become successful or have failed in containing urban crises. The reasons for the success/failure in urban policies depend on three major factors: (1) the spatio-institutional design of the urban policy-making mechanisms; (2) the historical pattern of urbanization; (3) the role of the nation-state, especially the central government, in the politics of redistribution.

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INTRODUCTION

The Urban Crisis and Its Diverse Geographies Under Spotlight

The post-2008 waves of economic crises have mainly manifested themselves in major urban centers of different countries across the world. Various economic and social problems, such as unemployment, low wages, austerity policies, precarious work, and exclusion, observed dramatically in cities, gained an urban character in time and were called an "urban crisis" by many researchers (Bayırbağ & Penpecioğlu, 2017; Martí-Costa & Tomàs, 2017; Arampatzi, 2017; Barbehön & Münch, 2017; Hinkley, 2017).

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In our previous study (Bayırbağ & Penpecioğlu, 2017), we clearly defined "urban crisis" as the remarkable outcome of government policies. Urban crisis has become a political phenomenon when neoliberal policies ("containment strategies") fail to keep socio-economic inequalities under control; thus, there is a need to look at the relationship between two different dimensions of urban crises: (1) their root causes in the longer past and (2) the containment strategies employed by the governments to manage socio-economic inequalities. The purpose of the article is to briefly explicate these two dimensions of urban crisis within an initial and limited framework of comparative analysis.

The urban crisis has now become a global phenomenon and it has exploded in diverse urban geographies ranging from the global North to the global South. As a country having diverse characteristics from both the global North and South, Türkiye inevitably suffers from urban crisis, particularly as observed in the last decade. Regarding the diverse countries of urban crisis, there are key questions that remain to be answered: Are there any significant differences between the instances of urban crisis in diverse urban geographies across the world? What are the main characteristics of urban crises in the selected countries of the global South? Urban crisis in Türkiye manifests what kind of similarities and differences compared to the countries of the global South? What is the meaning of these similarities and differences in terms of comparative urban politics? In this article, we propose some initial and limited answers to these wide-comprehensive research questions by drawing on a comparative analysis of India, Egypt, and Türkiye.

Why is a comparative analysis of urban crisis regarding the geographies/countries of the global South significant for the purpose of this paper? There are mainly two reasons. Firstly, although the global economic crisis of 2008 hit almost every country across the world, it has been quite visible and deep in some less-developed southern geographies/countries of the world (including some countries of the global South, such as Brazil, Chile, Egypt, Morocco, etc., and some less-developed countries of the EU, like Greece and Spain). Moreover, most of the protests/riots in those countries have been violently repressed by the state. Secondly, the socio-economic transformation experienced in those southern geographies/countries has been fast-paced, and this transformation has come in the form of a new and rapid wave of neoliberal urbanization, which exacerbated dispossession, uneven development, and alienation. Therefore, concentrating on those southern cases of urban crisis could provide further insights into the geographical organization of global neoliberal capitalism.

The article puts forward a comparative research based on three country cases: India, Egypt, and Türkiye. Although the cases of India and Egypt draw on a comprehensive analysis of secondary resources (literature reviews), the case of Türkiye is based on an international academic research project completed in 2020 and funded by the British Academy. Diverse findings from the first and secondary resources were elaborated meticulously and gathered within a comparative analytical framework.

MATERIALS AND METHODS

Thinking Urban Policies with Elsewhere: An Initial Step for A Comparative Methodological Framework of Analysis

The urban could be theorized as a "concrete totality" by Lefebvre (2003; 1996) that could provide an essential base for comparative imagination and conceptual innovation. Following the main theoretical-methodological line of Lefebvre, Robinson (2022; 2016a; 2016b) recently put forward an alternative comparative methodological framework to investigate diverse cases in the field of urban politics. According to Robinson (2016a), many studies in urban politics have confronted challenging methodological problems. Some of these problems in comparative research could be summarized as follows: framing a case as a particular or pre-given entity, an over-focus on similar socio-economic causes of the cases, the ignorance of both the socio-cultural differences and the historical backgrounds in the cases, and limiting research to some similar cities having resembled socio-political contexts based on the global North.

Building an initial methodological step/framework for a comparative analysis in urban politics is a challenging scientific task. Robinson (2016b), Deville et al. (2016), and Jacobs (2012) have all attempted to provide an alternative framework for comparative analysis, which allows analytical reach across difference and diversity, expanding the scope of the research to bring divergent cases into conversation. We argue that loosely defined similar and different causes and/or repeated outcomes of urban crisis across diverse cases could form an appropriate base for research in urban policy. Robinson (2022), in her recent book, conceptualizes this "reformatted comparative methodological approach" as "thinking with elsewhere," meaning that starting to think about urban policy anywhere should be in conversation with the multiple elsewheres of any other urban policies in a different country/geography across the globe.

In other words, in diverse countries/geographies of neoliberal capitalism, there are prolific circulating processes and dramatic interconnections regarding the crisis of neoliberal urban policies. These processes and connections draw us to think across different cases of urban policies, which entail a comparative framework of analysis. Tracing these, the field of urban policies could be thought of as composed of a multiplicity of differentiated (repeated) outcomes of urban crisis, which are closely interconnected

through a range of transnational processes and are part of repeated-but-differentiated formations within wider circulations and circuits of urbanization and globalization (Robinson, 2022). To this end, based on Robinson's (2022; 2016a; 2016b) methodological formulation of "thinking with elsewhere," our article attempts to build an initial step for a comparative methodological approach to investigate diverse cases of urban crisis. In the article, we comparatively analyze three significant cases: Egypt and India from the global South and Türkiye as a geography/country of transition between the North and South.

There are five main reasons behind the selection of the three cases, Egypt, India, and Türkiye. First, in all cases, the nation-state has played a historical and central role in the construction of a capitalist market economy (Keyder, 2022; Bayırbağ, 2013a). Second, ethnic/religious diversity is a common ground for all three cases, and at least in the cases of Egypt and Türkiye, not only the historical paths of their political-economic development but also the cultural fabric of their societies (especially the role and place of religion in social life) are quite similar in many regards (Tuğal, 2012). Third, all these countries are characterized by deep social and geographical inequalities, which have worsened during their increasing integration with the global market economy. Revealing the reasons and consequences of inequalities in the urbanization processes requires an in-depth analysis of the role of informality in the context of neoliberal economic relations and politics (Roy, 2009; Roy, 2005; Alsayyad, 2004). Fourth, despite the above-mentioned similarities, the urban protests and social resistance movements in these countries have taken quite different forms. While the Egyptian case resulted in the downfall of the political establishment, the protests in Türkiye seem to have created an atmosphere of political alertness, without causing a major change in political balances (Bayırbağ & Penpecioğlu, 2017). The case of India, however, seems to portray a quite different picture. In India, one does not come across widespread urban protests targeting the political regime, even though there are stark social and geographical inequalities produced by the neoliberal urbanization processes (Roy, 2011). Thus, the containment strategies employed by the public authorities in India seem to work rather efficiently, keeping the political scene under control. Finally, regarding the depth and diversity of the relevant literature, these three cases have recently drawn the attention of the broader public and academics, fueling quite productive scholarly debates challenging the established interpretations of urban politics under neoliberalism.

Through a critical review of the key secondary sources (articles, chapters) on cities of the global South (Alsayyad & Roy, 2004; Roy, 2005; Roy, 2009; 2011; Schindler, 2013b; Schindler, 2017; Soliman, 2004; Sharp, 2022; Tuğal, 2012) and building on our previous theoretical arguments on urban politics in Türkiye (Bayırbağ, 2013a; Bayırbağ & Penpecioğlu, 2017; Bayırbağ et al., 2022), we have identified four main contested axes of urban politics to make a comparative analysis. These four main axes are: (1) Politics of Possession/Dispossession (resources exploited to produce material wealth, such as land, labor, and capital); (2) Politics of Exploitation (surplus value produced through the exploitation of these resources); (3) Politics of Commons (publicly owned, controlled, and redistributed common wealth); (4) Politics of Representation (sites of decision-making that shape the functioning of the above spheres of redistribution and political struggle).

These four dimensions are not ontologically isolated categories; rather, they constitute the main contours of the comparative analysis of urban crisis. These dimensions could also be seen as a framework of the key issues/concerns examined by the literature concentrating on the dramatic and fast-paced story of neoliberal urbanization in three cases. The article reveals that those different dimensions of urban politics come to the fore in different combinations in diverse countries and thus shape the form of urban crises in these countries/cases. To be more specific, while in the case of Egypt, the politics of commons and representation dominated the scene, in the case of Türkiye, it was about the politics of representation and exploitation. In the case of India, the politics of possession/dispossession and commons seem to constitute the core of the main conflicts and struggles in urban politics.

DISCUSSION I

The Role of The States in Crisis-Prone Neoliberal Urbanization Processes

To reiterate one of our key arguments, urban crises are publicly recognized when the strategies employed by the state fail to contain the structural dynamics that lay the grounds for urban protests and oppositional movements (Bayırbağ & Penpecioğlu, 2017). Hence, the scope of our research framework will remain incomplete if we do not ask questions about the role played by the state. By this, we mean explicating the relationship between the evolution of the spatio-political configuration of a state, as well as its intervention strategies to economy/society (Brenner, 2004; Jessop, 1990) and the historical pattern of urbanization in a country.

In the countries from the southern geographies of the world, it might be argued that nation-state building has been the major political concern shaping the institutionalization process of capitalism there, especially given that most of those countries are post-colonial. Nation-state building in the South is, no doubt, an unfinished business. This is especially so for the spatio-political configuration of the nation-states in the Middle East (Alsayyad & Roy, 2004). We think that this observation also resonates with the case of India, given its post-colonial history.

After colonial periods, when nation-building is a central concern, economic policies aiming to institute a national market economy had to be backed up by an official discourse of social cohesion (Türel & Altun, 2013), emphasizing the need for redistributive public policies (Bayırbağ, 2013a). The question of redistribution, thus, has always constituted an important axis of political struggles at the national and local scales for decades to come after independence (Tuğal, 2012; Veltmeyer, 2011; Sharma, 2011; Brumberg, 1992).

In the above regards, a transition to neoliberal policies would inevitably put the legitimacy and integrity of the national political regimes in those countries to the test. In the case of India, for example, Shatkin (2014) outlines the key tensions resulting from this transition: "Between the egalitarian ethos inherited from traditions of socialism and Gandhian thinking, and the hard-driving utilitarianism of a globalizing business class; between the pluralist nature of Indian democracy, and the allure of authoritarian models of urban governance; between the modernist vision of a globally connected class, and the daily incursions on the planned order of the city by the poor." While the cases of Egypt and Türkiye also suffer from the first and last tensions, the second one is not directly relevant to those two cases. This is mainly because of the history of authoritarianism in Egypt and Türkiye and the territorial configuration of their states.

The territorial configuration of the Indian state corresponds to its ethnic/religious/cultural/socio-economic diversity, finding its expression in its federal structure. For that reason, one is likely to come up with different modes of redistribution and different containment strategies across its territory, even if the country's transition to neoliberalism has been initiated by a strong central government (Sharma, 2011). The cases of Egypt and Türkiye display rather different characteristics. Being unitary states with relatively less heterogeneous populations, central governments in Egypt and Türkiye have dominated local governments and have tended to maintain direct control over urban policies.

In most cases of the global South, neoliberalization amounts to something different than the death of a past socio-political order that had provided its members with free, secure, and decent conditions for life. To the contrary, these conditions had already been missing (or incomplete) there. In that regard, for example, we find Roy's (2011) suggestion to employ the theoretical categories revolving around the notion of uncertainty ("peripheries," "urban informality," "zones of exception," and "gray spaces") to better examine urbanism practices. As Roy (2011) argues, the concept of informality is necessary to comprehend India's urbanization processes: "Urban informality is a heuristic device that uncovers the ever-shifting urban relationship between the legal and illegal, legitimate and illegitimate, authorized and unauthorized."

Following Roy's emphasis on the ever-shifting set of relationships (McFarlane, 2012), we further argue that such countries have offered a more suitable environment for neoliberalization to take root faster than it would happen in the countries/geographies of the global North, where capitalism originated and developed over a long historical process. In contrast, the contemporary processes of neoliberal urbanization in the South have operated through the institutionalization of uncertainty, the legalization/formalization of (previously) illegal/informal urban conditions, or vice versa. This institutionalization process, however, serves to further deepen the socio-economic contradictions and faultlines besetting the nation-states in the South (Bayat, 2000), while the future of socio-economic and political change increasingly gains an "indeterminate" character (Shatkin, 2014; Stadnicki et al., 2014; Simone, 2014; Simone & Rao, 2012).

The geographies of uncertainty created by these socio-economic transformations, especially the territorial patterns of urbanization instigated by neoliberal policies, tend to vary across the cases. In the case of India, the neoliberal urbanization process moves in two different directions: (1) In-migration from the rural areas to major urban centers (Roy, 2011) and (2) speculative urban growth towards the urban-rural periphery (Goldman, 2011; Balakrishnan, 2013; Sami, 2013). Here, it should be noted that the former movement is not new. Yet, the neoliberal turn in economic policy (Sharma, 2011) and the subsequent administrative reform in 1992 have increased in-migration while also triggering urban growth (Shatkin, 2014). As we shall discuss in detail later, the in-migration processes in the country have created visible inter-class tensions revolving around the politics of commons.

The rate of increase in migration from rural to urban in Türkiye and Egypt began to slow down by the end of the 1990s, compared to India. (For Egypt, see Bayat & Denis, 2000; for Türkiye, see Işık & Pınarcıoğlu, 2002). Moreover, in both countries, neoliberal policy turns took place earlier, around the 1980s, and the neoliberalization process gained further momentum during the 1990s and 2000s (For both cases, see Tuğal, 2012; for Egypt, see Brumberg, 1992; for Türkiye, see Bayırbağ, 2013a; Türkün, 2011). Thus, urban classes have constituted those sections of their respective societies hardest hit by neoliberal policies in those countries (Simone & Rao, 2012; Bayat, 2000).

Here, it should be noted that the Egyptian state's powerful role in the economy, especially its strong grip over the production and distribution of national wealth, has long made publicly owned and controlled resources the center of the national political struggles (Brumberg, 1992). Hence, the anti-authoritarian protests in Egypt between 2011 and 2013 could also be seen as the expression of a now unbearable political pressure on the central government, created by the

gap between: (1) the heightened expectations from the state by an urban population left to the mercy of an emergent market economy, and (2) its increasingly undermined capacity to deliver public benefits equally. Thus, the politics of commons and representation played a more central role in the case of Egypt, and the protests have had long-term effects on the political processes in the country.

The picture Bayat (2004) portrays for Egypt has certain similarities with the case of Türkiye. The Gezi protests first started as an individual protest in Istanbul but then became a country-wide social unrest. Moreover, the proletarianization and precarization processes of the middle class have played an important role in fueling the Gezi protests (Bürkev, 2013; Boratav, 2013). Although 10 years have passed, the Gezi protests were the first sign of a broader crisis of social reproduction. However, at the same time, they apparently revealed that an oppositional social movement could develop against the urban-rent-based policies of the authoritarian Turkish government (Eraydın & Taşan-Kok, 2013; Kuymulu, 2013). In Türkiye, since the 1980s, urban land has turned into an enormous source of wealth and capital accumulation (Şengül, 2012; Şengül, 2009). On the one side, key actors in politics and real estate markets like property owners and developers, political agents, and investors possess the urban land/housing, and because of this possession, they receive huge benefits from these urban-rent-based policies (Ünsal & Türkün, 2014; Türkün, 2011; Dinçer, 2011). On the other side, as the housing crisis in Türkiye indicates, the low-income middle classes, poor and unemployed people, students, and other vulnerable groups have gradually found it increasingly difficult to buy a house or to afford the rents (Işık, 2022; Uzun, 2022; Türkün, 2014). In those regards, as the Gezi protests embarked on the first signs of crisis, we argue that the unsustainable politics of exploitation (of labor and land) has played a key role in the Turkish case (Enlil & Dinçer, 2022; Bayırbağ, 2013a).

To summarize, just like the Egyptian case, the Gezi protesters targeted an authoritarian government, and the urban protests were also about the politics of representation. The reason, however, was rather different as there has been no state around that distributed public benefits directly. The distribution of wealth in Türkiye has taken place via authoritarian interventions of the state into the labor and land markets, deepening the processes of exploitation. Moreover, the sites of representation targeted by the protesters during the Gezi protests also involved the municipal governments, and concerns with local/bottom-up democracy and equity came to the forefront after the protests (Bayırbağ, 2013b). With the 2019 local elections, all these demands for democracy and equity led to the change of political parties controlling municipal governments in most of the metropolitan cities (Savaşkan, 2021; Penpecioğlu, 2019). So far, we have discussed the underlying currents preparing the grounds for (potential) urban crises in our cases. Below, we will discuss how the containment strategies have worked and/or failed across those different cases, concentrating on the four dimensions of urban politics.

DISCUSSION II

The Diversified Urban Policies to Contain Urban Crisis

In this part of the article, we elaborate on the main question: How have diversified urban policies been formulated and implemented to contain urban crisis? By focusing on three significant cases, the article indicates the success and/or failure of these policies in containing urban crisis. The findings from the cases are discussed respectively.

The Case of India

For the reasons discussed earlier, the politics of possession/dispossession and the politics of commons come to the fore as the key axes of urban political struggles in India. Yet, the containment strategies in these domains seem to work relatively well in India.[1] To reiterate another point we raised earlier, a dispersed institutional landscape of political representation emerges as a key factor containing the likely discontent with neoliberal urbanization processes (Sami, 2013).

In this political landscape, the most dangerous segments of society (in terms of their political mobilization capacity and the resources they possess), such as "the small-scale enterprise owners," "the new middle class," and "the salaried workers in public and private sector enterprises," are incorporated into the local governance structures, which have been institutionalized in cities like Delhi. This political empowerment of the middle class not only precludes any possibility of potential challenges to the neoliberal urban policies but also pits its membership against the expanding ranks of the urban poor in using the commons, especially in the use of public spaces, where the urban poor are forced to conduct their daily economic activities to earn their livelihood (Schindler, 2013a; Schindler, 2013b). This rivalry is not a zero-sum game, and there is a degree of interdependency between these two groups, where the former moves to regulate the presence (activities and circulation) of the latter, thereby performing a political control function over the urban poor (Schindler, 2013a).

Therefore, while the urban poor in India are also engaged with street politics via strategies of "silent encroachment" (in the form of social nonmovement) as in the case of Egypt (Bayat, 2010), this time their potential enemy and the target of their potential discontent with neoliberalism would not be the public institutions, but those different elements of the middle class. Yet, there is an interdependency, and the conflicts with the middle class are resolved, though

temporarily, via the informal negotiations between the citizens from the middle classes and the state. Besides, Schindler (2013a) also notes that members of the middle class do not always act as a common front, because part of its membership is cognizant of that interdependency.

Second, the dispersed institutional landscape of urban governance also opens some room for the urban poor to have access to public benefits, albeit via clientelist channels of representation. Here, the dispersed institutional landscape of urban governance also helps in containing the tensions generated by struggles revolving around access to public benefits. In this context, "the struggles and negotiations among these actors serve to establish the boundary between formal/informal, and this boundary is never permanently fixed, it is perpetually contested" (Schindler, 2013b). The blurred—and always changing—boundaries between the formal and the informal provide leverage to the powerful in containing the weak in the politics of commons (McFarlane, 2012; Roy, 2011; Roy, 2004; Schindler, 2013b). Yet, Bawa (2011) also notes that these blurred boundaries keep the poor's hopes alive, allowing them, albeit negotiated, access to commons.

Our discussion on the politics of commons sheds light on the politics of possession/dispossession, too. The dispersed landscape of decision-making and the role played by informal channels of representation in urban governance are key to understanding the politics of possession/dispossession. The processes of dispossession of peasants/farmers in rural areas in India do not always occur by a top-down imposition of the capitalist forces (Doshi, 2011; Solomon, 2007). Peasants/farmers could engage in informal negotiations with state/public authorities, and these negotiations occur in three ways: personal networks of entrepreneurs (Sami, 2013), social networks/organizations (Balakrishnan, 2013), and political parties (Roy, 2004). As a result of these informal channels of representation/negotiations, the peasants/farmers could attempt to find opportunities to resist the process of dispossession or to receive some economic benefits from the state/public authorities.

To explain how uncertainty is institutionalized in the case of India's urban politics, Solomon (2007; 2008) proposes the concept of "occupancy urbanism." This atmosphere of uncertainty gives the urban poor political leverage in advancing their claims to possession and exploitation of land. His emphasis on "the plurality of land and law" and "the negotiated boundaries between the formal and the informal" (and between the legal and the illegal) is based upon a conception of "cities as open-ended spaces of politics," where the public authorities seem to lose their central place in the analysis and the poor gain, by default, the status of agency (Roy, 2011). If we follow this line of reasoning, we could conclude that the poor could indeed reap the benefits of neoliberal processes of urbanization. However, we should also note that urban politics in all developing countries do not always revolve around a "land-based economy." Hence, this conclusion cannot be stretched to all developing countries and even to all Indian cities, given the uneven nature of capitalist economic development.

Regarding the politics of commons, it could be argued that contemporary urban policies of "climate change mitigation," "waste management," and "green policies of resilience" have been developed as a strategy of neoliberal crisis management. For instance, as both the cases of waste management in West Bengal (Blok, 2016) and urban resilience building in Surat (Cornea et al., 2016) indicate, large-scale urban change in India is not an easy business and is mostly challenged by the politics of urban commons. There are situated tools, practices, and knowledge in the government of such urban commons, and the resultant forms of urban crisis (like unjust urban transformation, climate injustice, and unsustainable forms of urban metabolism) have been shaped and contested around specific places, spaces, and cities in the country (Demaria & Schidler, 2016).

The dispersed scene of urban governance in India has been going through a process of centralization, where more power is now invested in the hands of the public authorities and bureaucrats. Those authorities could execute the urban development projects using different tactics, articulating with "class, gender, and ethno-religious identity" in different cases, with different results (Doshi, 2011). Besides, the politico-institutional infrastructure of urban governance is not that dispersed in every Indian city, as in the case of Calcutta under the rule of the Communist Party. Such coordinated/centralized urban governance scenes could make use of the informality of the status of land, both to give the poor increased access to land and to evict them from these lands as a result of neoliberal urban development practices (Roy, 2004; Yiftachel & Yakobi, 2004).

The Case of Egypt

As we argued earlier, the politics of commons and representation have constituted the major axes of political struggles leading to the urban crisis in Egypt. Below, we will further concentrate on the reasons why these two fields have come to the fore.

To reiterate, unlike the Indian case, the Egyptian state enjoys a monopoly over the policy-making process. Of course, this does not mean that it has developed a clear and consistent urban policy framework and did not directly regulate the processes of urbanization. Nevertheless, given the state's central role in regulating the economy and in the production/distribution of socially produced wealth, the political regime constituted the target of the urban protests in 2011.

Just like India, uncertainty is the rule as long as one is concerned with the legal status of urban land, and the production process of housing is mostly informal in the Egyptian cities, where most of the population inhabits informally developed neighborhoods (called "Ashwaiyyat"). Soliman (2004) detects 22 different patterns of informal housing production (built on agricultural land, desert land, and public/private land) and identifies a diverse set of actors involved in this informal housing production. It could be argued that those negotiated boundaries between the informal and the formal, and between the legal and the illegal, have facilitated the housing production process. However, more importantly, this diversified pattern of housing production (and the range of actors involved) also suggests that it is hard to define one single axis/theme of confrontation between the suppliers and those who demand housing. In fact, as Soliman (2004) indicates, in certain instances, self-control mechanisms emerge among the poor, where the first wave of immigrants would move to establish controls over the late-comers, as the latter have settled on the lands occupied by the former first.

What is more, it is also hard to argue that, in Egypt, the neoliberal policies of the central government did have a clear reference to the urban space as the focus/locus of the capital accumulation process (unlike the cases of India and Türkiye), which would otherwise bring the dispossession process to the center of urban politics/governance.[2] In addition, just like the Indian case, we could talk about the existence of a dispersed scene of urban governance. Hence, at least, the discontent with neoliberalism could not be directed against a single local public institution. Nevertheless, the processes of neoliberal urbanization have definitely laid the grounds for urban protests, mainly around the politics of commons. As Bayat (2013) puts forward: "the Egyptian urban poor protested against the high price of food, especially bread, against the demolition of illegal homes, and the shortage of drinking water; Cairo's garbage collectors waged a series of unprecedented collective protests, and the young got involved in civic activism and voluntary work on a scale seen never before" (Bayat, 2013). Stadnicki, et al. (2014) argues that the financial toll the neoliberal urbanization process took on the urban masses, and the public authorities' capacity to deliver the services needed, contributed to fueling the protests in 2011.

The politics of representation constitute the second key dimension of the urban crisis in Egypt. Here, one may rush to conclude that the urban poor would constitute the natural riverbed for the formation of explosive political demands in that regard. The urban poor, however, have subscribed to the strategy of "silent encroachment" (Bayat, 2004; Bayat, 2000). If there has been a potential for political mobilization, this has been due to the organizational capacity of the religious groups, whose organizational base, according to Bayat (2007), was drawn from the "middle-class over-achievers who have felt marginalized by the dominant economic, political, or cultural processes in their societies, those for whom the failure of both capitalist modernity and socialist utopia has made the language of morality (religion) a substitute for politics." In other words, unlike the Indian case, this time, it was the middle class that confronted the state and challenged the neoliberal processes of urbanization. Bayat (2013), however, urges us not to over-emphasize the role of religion in the country-wide protests in 2011 while labeling it a non-religious and civil one.

After the military coup in 2013, military forces suppressed urban revolts and uprisings in Egypt. The new political regime has introduced new urban policies to contain urban crises in the last 10 years, and it has identified informally developed neighborhoods as a "threat" to the nation. However, as Sharp (2022) thoroughly explains in his article on Egypt's urbanization, the new political regime's attempt to eliminate informality has not resulted in greater control over the root causes and consequences of urban informality. Contrary to its aim, the new regime deepened the hazardization of urban life that exacerbates socio-spatial injustice and unsustainable development in the country.

The Case of Türkiye

The historical development of urban policies in Türkiye has varied over different periods. As urban crisis containment strategies, we propose to analyze these policies in line with four successive periods: (1) the background and the first rise of neoliberal urban policies (1950–1993); (2) local government policies as the base of urban crisis containment strategies (1994–2001); (3) the urban rent-based policies institutionalized as the driving force of urban crisis containment by the central government (2002–2012); and (4) the limits to neoliberal urbanization and the signs of the collapse in urban crisis containment (since 2013 and continuing).

In this article, we argue that the politics of representation and the politics of exploitation have constituted two key domains of political tensions in the case of Türkiye, which led to serious urban protests (known as the Gezi Park Protests that became countrywide events in 2013) and resurrected reactions and criticism (after the devastating Kahramanmaraş Earthquakes in 2023) against neoliberal urban policies in the last decade. Although the politics of commons and the politics of dispossession equally influenced both national and local politics (Fırat, 2022; Hazar-Kalonya, 2021; Kuymulu, 2013), the findings in this article indicate that they have been contained through the operation of key neoliberal urban policies since 1994 (a key turning point after the local elections). However, in the last decade in Türkiye, there are urban protests, oppositional movements, and devastating disasters that are serious signs showing the collapse of these policies.

In Türkiye, policies of the post-1950 governments initiated the urbanization process, deepening the uneven development in the country while pouring labor power into the emerging metropolitan centers (emergence of urban poverty and squatter settlements). Coupled with the post-1960 Keynesian policies and especially during the 1970s, class-based political tensions began to dominate the scene. Alienation then was under check via social networks of the immigrants and the sense of rising class solidarity among the urban masses. Just before the military coup of 1980, a new neoliberal economic program (January 24 Decisions) was introduced to end Keynesianism. The subsequent neoliberal policies, especially during the 1980s and the associated state reforms, increasingly targeted the metropolitan areas through the "urbanization of capital," while the associated economic policies and the political discourses promoted began to dissolve the solidarity networks, promoting individualization (Şengül, 2012).

The 1994 local elections were a turning point in the history of urban policies, not only because they changed the political parties controlling Metropolitan Municipalities (like Istanbul and Ankara), but also because it was a fundamental shift in the logic of urban crisis containment strategies. The new municipal governments ruled in Istanbul and Ankara between 1994 and 2002 introduced local social aid programs, stimulated urban transformation schemes, and developed mechanisms of generating and distributing urban rent (Bayırbağ, 2013a; Şengül, 2011). Via such policies, both in the formal and informal spheres, they sought to retain control of the rent/surplus generated by profit-driven urban transformation, which was distributed to a range of actors to engender broad-based political support. As one of the chief city planners who worked in this period explains, "Municipality increases building densities, politicians take their share, investors win more money, and the residents own new flats" (Bayırbağ et al., 2022). This is a typical neoliberal win-win game that took its roots from the municipal policies of the 1990s. While this neoliberal logic made urban rent a dominant phenomenon in the containment of the urban crisis, it also created temporary influences that kept social and class-based inequalities under control.[3]

The urban rent-based policies became the driving force of urban crisis containment between 2002 and 2012. In this period, the central government triggered a series of comprehensive policy reforms to recover from the economic crisis of 2001 and continued to further strengthen the local governments while enhancing its political grip over them. Yet, the labor market policies pursued (including precarization of the middle classes), along with the urban rent-based economic recovery program, exacerbated social and spatial inequalities, furthering the alienation process of the populations living in metropolitan Turkish cities (Penpecioğlu et al., 2022; Türkün, 2014).

However, the central government in this period relied on effective political discourse, such as "majority," "stability," and "growth." These discourses, in fact, reflect the concerns of and target an urban population suffering from the institutionalized uncertainty of neoliberalism. Hence, on the part of the electorate from different class backgrounds, a pure pragmatic concern with saving the day and thus their need for stability to survive under the uncertainties of neoliberalism (Simone & Rao, 2012) could be seen as a key factor in throwing their support behind the central government.

As a crisis containment strategy suppressing class conflicts and radical political mobilizations, some "divide and rule tactics" (through selective employment of consent-coercion mechanisms and through the redefinition of the formal-informal divide) have been used by the central government in the formation and implementation of neoliberal urban policies/projects (Penpecioğlu, 2013). For instance, in the implementation of urban transformation projects, "growth"-oriented neoliberal hegemonic discourses are used to mobilize the consent of large sections of civil society. Most politicians and mayors, investors, and property developers subscribe to "development" and "investment"-based discourses. These discursive practices help them institutionalize a neoliberal hegemonic power over the formation of urban policies between 2002 and 2012 (Penpecioğlu, 2013; Türkün, 2011).

What is more, several new laws and changes to existing laws are also used as coercive instruments of state power to bypass and overcome opposition against these projects. These laws included, but were not limited to, Law No. 5216 (Metropolitan Municipalities), Law No. 5393 (Municipalities, 2005), Law No. 5366 (Transformation of Dilapidated Real Estate of Historical and Cultural Value), and Law No. 5104 (North Ankara Urban Transformation Law), as well as various changes to Law No. 3194 (Development Law) and Law No. 6385 (Mass Housing Administration Law).

This selective use of legal coercive instruments, in fact, has been made possible and indeed amounted to redefining the boundaries between the legal and the illegal and between the formal and the informal. For example, the law on the transformation of the areas under disaster risk (Law No. 6306) passed to facilitate urban transformation projects creates a formal/legal pressure on those unwilling to vacate their apartments, stating that securing the approval of two-thirds of the apartment owners would suffice to demolish the building. Moreover, only to bypass the resistance from the district municipality in the implementation of a specific urban transformation project, Article 73 in the municipality law was amended. In yet another case, the master plan of Istanbul was ignored altogether to build the third bridge over the Bosporus (while such an intervention inevitably

renders the plan—as an official document—dead). Such instances indicate how formal/legal frameworks (laws, master plans, etc.) are quickly bypassed and labeled as ex-legal conditions (having no validity) by the central government to sustain neoliberal urbanization in this period (Kahraman, 2021).

This period between 2002 and 2010 witnessed great changes in Turkish cities. However, towards the end of the period, it became obvious that not all ordinary people would benefit from neoliberal urbanization processes and that there would be losers as well as winners. Profit-driven urban transformation projects failed in most of the metropolitan cities, and it became difficult to generate rent as development extended further into the urban periphery (Bayırbağ et al., 2022). The limits of neoliberal urbanization were apparent in Türkiye, especially after the Gezi protests became a countrywide social unrest in 2013. Although it did not completely change the existing/dominant politics of representation, it became a serious and first sign of the collapse in urban crisis containment strategies (Bayırbağ & Penpecioğlu, 2017).

The last signs indicating the total collapse of neoliberal urbanization were the Kahramanmaraş earthquakes in 2023. This devastating earthquake added physical destruction to the multiple (economic, social, political) crises of Türkiye. This huge disaster, unprecedented in the history of the country, is likely to have long-term consequences that deepen the already existing multiple crises. Contrary to the expectations that were created by oppositional political actors, the authoritarian political power holders-networks won the 2023 general elections, and they continue to dominate the operation of the central government in Türkiye. Although it seems that there is political stability in the country currently, it is very difficult to argue that the multiple forms of urban crises are contained. The remarkable results of the 2024 local elections revealed the central government's failure of neoliberal crisis containment strategies and marked the success of the main opposition party. In the upcoming years, it might be possible to observe renewed social policies and poverty alleviation strategies by some municipalities to cope with the destructive effects of the urban crisis.

CONCLUSION

Concluding Remarks and The Future Lines of Comparative Urban Studies

The article has two aims: (1) to discuss the reasons behind and consequences of the urban crises experienced in the two cases of the global South and Türkiye, and in that regard, (2) to investigate the logic(s) of variation across different instances of urban crises in the cases examined. We elaborated on these issues through a comparative analysis of the cases of Egypt, India, and Türkiye. The article draws on Robinson's (2022) comparative methodological approach ("thinking with elsewhere") in urban policy, and the cases were selected on the bases/nature of the urban crises experienced.

Regarding the former aim, we emphasized that the political-economic development and urbanization processes of such countries have been shaped around a major political project, that of nation-state building. This unfinished project, which has involved the hard task of constructing social and territorial cohesion, was caught off-guard by the destabilizing effects of economic globalization in socio-political terms. The neoliberal policies introduced and the resultant processes of urbanization have further deepened the social and territorial divides while capitalizing upon and institutionalizing the uncertainties inherent in this unfinished project. This institutionalization process, across all three cases, has worked through a constant effort to redraw the boundaries between the formal and the informal, and between the legal and the illegal. This effort could be seen as the underlying logic of the containment strategies employed by the public authorities to keep potential unrest/dissent produced by the processes of neoliberal urbanization in check. This process, we argue, has been coupled with the selective employment of consent and coercion strategies, addressing different classes (or class fractions)/social groups differently through divide-and-rule tactics.

In certain contexts, those tactics have been more effective than in others. The degree of effectiveness of the containment strategies in general, and the divide-and-rule tactics in particular, have been determined by three factors: (1) the spatio-institutional design of the urban policy-making mechanisms; (2) the historical pattern of urbanization; and (3) the role of the nation-state (especially the central government) in the politics of (re)distribution, i.e., the struggles among different social classes/groups about access to (or exclusion from) resources needed in the production of material wealth and socially produced (surplus) value. These three factors also constitute a powerful analytical framework for the future lines of comparative urban studies.

We identified four different axes of struggle (possession/dispossession, exploitation, commons, representation) and indicated that the logic of variation across our cases has been determined by the public authorities' success/failure in managing these different domains of struggle, which have gotten increasingly tense under neoliberal policies and processes of urbanization. Especially in that regard, the public authorities' success/failure in pitting the middle class against the urban poor (and in pitting different sections of the middle class against each other) in these domains has emerged as the distinguishing aspect of those different cases.

NOTES

[1]India's central and local policy-making processes and their inherited historical and ideological-cultural dynamics have some remarkable differences when compared to other two countries elaborated in the article. Although the years between 1951 and 1977, Indian National Congress Party ruled the country, the 1990s saw the end of single-party domination and the rise of coalition governments, which was quite similar to Türkiye. After the elections in 2019, the Hindu Nationalist Party (Bharatiya Janata Party) forms the government currently in the country. The widening support behind this party has its roots, partly in the public's discontent with the destructive consequences of past neoliberal policies in the country.

[2]After the military coup in 2013, the political power has changed dramatically in Egypt and a republican semi-presidential system was created under the dominance of Morsi government. Despite a political-ideological change in government, it is possible to observe striking continuities in the key urban policy-making processes of Morsi (current) and Mubarak (previous) governments. Morsi government does not adopt an aggressive policy towards to the elimination of informal urbanization. Despite the significant change in the national politics, Morsi government's does not implement an aggressive policy to eliminate informal urbanization.

[3]The dominant political trends in Türkiye indicate a unique combination of conservative identity politics and neoliberal economic programs took its roots from this period in the second part of 1990s. It should be noted that Welfare Party and its municipal power and practices in the 1990s provided a key government logic for Justice and Development Party in the upcoming years of Türkiye.

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Article

Spatial transformation of agriculture in urban-rural relations: Torbalı district (İzmir)

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ABSTRACT

In the 19th century, with the development of industrialisation, there has been a process of change and transformation from rural to urban areas. In fact, with industrialisation, the employment opportunities of the city in the fight against poverty have taken their place as one of the main factors accelerating rural-urban migration. Increasing migration and the fact that the city has exceeded its current carrying capacity have created the need for spatial expansion towards the periphery. Globalisation and competition in world markets, which became dominant in the 1980s, have been identified as another important factor that has increased urban-rural occupation.

The aim of this study is to prevent the destruction of agricultural areas, which are of primary importance for vital activities, in the urban-rural relationship and to raise awareness on this issue. Within the scope of the study, Torbalı district of Izmir was selected as the sample area. Geographical Information Systems and plans of Torbalı district at different scales were used as a method. In this direction, the aim is to monitor the impact of urban development trends in Torbalı on agricultural areas in temporal (1990, 2000, 2012, and 2022) and spatial terms. Consequently, it has been established how much of the urban settlement areas in the Torbalı district, particularly the development and pressure on agriculturally important areas, and how much of the agricultural lands have been destroyed by this urbanisation pressure and what kind of land use type they have transformed into. In addition, in light of the data obtained, strategies have been developed to prevent this urbanisation pressure on agricultural land.

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INTRODUCTION

Urbanisation is an important concept that has been on the global agenda in recent years. Although it has many definitions, according to Masek et al. (2000), urbanisation is only one of the many ways in which humans have changed the world's land cover. According to Weber & Puissant (2003), it is defined as a territorial and socio-economic process that causes a transformation in land cover or land use categories. The process of urbanisation, which is directly related to the concentration of population and activities, leads to the formation of urban areas with hundreds of thousands of inhabitants. Urbanisation has an impact on

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the rural and natural environment and increases its impact with rapid population growth, especially in developing countries (Weber & Puissant, 2003). This population increase necessitates change and transformation in existing and new settlement areas together with urban development trends. However, in this process, rural areas are consumed as a solution to the need for urban areas, and production areas that are critical for urban nutrition or food security are destroyed (Yenigül, 2016).

Comparing the urban-rural population ratios in Türkiye over the years: While in the pre-1950 period the population was higher in rural areas, in 1985 the urban-rural population ratio was equal. Looking at the post-1950 population ratios, the fact that the current urban population ratio is around 93.4% is an important indicator that the rural population will disappear in the coming years due to the pressure of urbanisation. In this context, it is inevitable to experience a serious change and transformation process in agricultural areas, which can also be described as rural agriculture in urban-rural integration (Alğın, 2021). In fact, according to TURKSTAT data, the total agricultural area of Türkiye, which was 27,856 thousand hectares in 1990, will decrease to 23,136 thousand hectares in 2020 (BUGEM, 2020), which shows the importance of the situation in question.

Agricultural areas, which have a high return for the performance of vital activities and the national economy (Karataş, 2023), have an important place in the Torbalı district of Izmir, which has fertile soils. In fact, the economy of the Torbalı district is dominated by agriculture and agriculture-based industries. In addition to its fertile agricultural areas, Torbalı is considered to be a district with high potential in terms of agricultural production diversity and quantity (agricultural and animal production) due to its climate, geopolitical location, and industry. The main agricultural products grown in the district, which can produce three crops a year, are tomatoes, leeks, cauliflower, olives, grapes, figs, peaches, and maize (Torbalı Kaymakamlığı, 2023).

In this context, the aim of this study is to address the change-transformation process experienced by agricultural areas, which are of vital importance in the urbanising countryside, after urban growth in a temporal hierarchy, to reveal the spatial and visual results of spatial losses by comparing them with the previous ones, and to infer the basic factors underlying this change and transformation process.

The scope of this study, which deals with agriculture in the urban-rural relationship, is to determine the variables that direct the urban development of the Torbalı district, which is the research sample area, and, in this context, the changes in the agricultural areas of the district between 1990, 2000, 2012, and 2022.

THE PLACE AND IMPORTANCE OF AGRICULTURE IN URBAN-RURAL RELATIONS

Cities are mostly defined as places that are shaped in different time periods, especially in accordance with increasing needs and aspirations. Demographic structure, natural structure, climate, and socio-economic conditions are accepted as variables that direct urban development (Alğın, 2021).

The period dominated by rural areas before industrialisation changed its course with the impact of industrialisation in the 19th century. The industrialisation process that started especially in 1950 led to the dissolution of the rural population and the increase of the urban population (Alğın, 2021). Therefore, the 1950s are accepted as the starting point of rural dissolution in the history of urbanisation and settlement in Türkiye (Özdemir, 2012).

Since the twentieth century, there have been many developments in production, transportation, and communication with the development of technology. As a result of these developments, different forms of spatial organisation have emerged and the existing boundaries of settlement areas have been crossed. This situation has manifested itself in the form of sprawling growth on metropolitan peripheries (Karataş, 2007).

The development of cities over rural areas is an important indicator that cities have chosen the countryside as an expansion (urban development) area (Ceylan & Somuncu, 2018). The development process of urban areas on rural areas is mostly concentrated on agricultural areas, which can also be described as the agriculture of the countryside. This situation not only creates a de-identification of the urban-rural distinction but also causes a serious change and transformation process in agricultural areas.

As part of the study, a number of national and international studies were reviewed in order to understand the process of change and transformation experienced by agricultural areas, which are particularly important in urbanising rural areas, following urban growth. Among these studies:

Gidey et al. (2023) investigated the spatial and temporal patterns of urban and peri-urban spatial growth and its impact on arable land in Shire Indaselassie, Northwest Tigray. Multi-temporal and spectral Landsat satellite imagery was used as input. In addition, a Cellular Automata Markov Chain Model was used to predict the future. At the end of the study, it was found that the arable land decreased by -0.1 km^2 from 1976 to 2019, as well as the areal growth of the city and its surroundings.

Iddrisu et al. (2023) investigated the pressure of the horizontal expansion of the city of Tamale, Ghana, on the agricultural lands around the city, which are an important source of livelihoods in the region, according to the Sustainable Livelihoods Framework. Household data, Landsat Thematic

Mapper (TM) for 1986, Enhanced Thematic Mapper Plus (ETM+) for 2004, and Landsat 8 Operational Land Imager/ Thermal Infrared Sensor (OLIS/TIRS) for 2019 were used as methods. At the end of the study, it was found that urban expansion provides new employment opportunities in trade and services, but also poses some threats to the main livelihoods of the people living in the region, as it causes a decrease in agricultural land.

In a study by Karaman et al. (2022), which analysed the pressure of urban growth on agricultural land between 2001 and 2021, the Selçuk district of Konya province in Türkiye was selected as the study area. The methods used in the study were remote sensing (RS) and geographic information systems (GIS). The geology and land use capability classes of Selçuklu district were analysed, and it was found that the settlement areas were mainly spread on alluvial and agricultural production areas.

The aim of the study by Martellozzo et al. (2018), which investigates the loss of natural and agricultural areas in Italy, is to redefine planning priorities and create policies that support ecological conservation. To this end, a comparison of land use/cover change (LUCC) projections corresponding to different policy-oriented scenarios was carried out using a combination of multi-criteria analysis and cellular automata modelling (SLEUTH). The results show that the amount of vegetation lost due to urbanisation and agricultural substitution is of high ecological and sustainability value. It was also found that the areas converted to agriculture are of much lower quality and suitability. At the same time, it was found that the planning policies of the past and present do not provide adequate protection for natural landscapes and are inadequate in this respect.

Partigöç (2018) investigates the "spatial changes and transformations of rural areas in the process of urbanisation" through the city of Denizli (Pamukkale and Merkezefendi districts). The research criterion was the "Metropolitanisation Law" numbered 6360, which came into force in 2012. The study, which examines the impact of the law on settlements before and after the law, finds that rural areas (agricultural land, forests, pastures, etc.) in particular are negatively affected after the law.

Masek et al. (2000) analysed urban growth projections in relation to economic and demographic factors. The study used Landsat satellite imagery (1973-1996) and was tested on the Washington DC region. At the end of the study, it was found that the metropolitan area of Washington DC was expanding at a rate of about 22 km² per year. At the same time, comparisons with census data suggest that the physical growth of the urban plan as observed from space can be reasonably related to regional and national economic patterns.

Agriculture is defined as the endeavour/activity undertaken to obtain animal and plant products through the use of soil and seeds (Uzundumlu, 2012). The uncontrolled growth of cities with urbanisation has a negative impact on agricultural livelihoods and disrupts the balance between food supply and demand. Agriculture is a sector that meets the basic nutritional needs necessary for the continuity of people's vital activities, provides resources for industry, and contributes to economic returns and the development process. Therefore, ensuring social food security and agricultural supply security (Tokatlıoğlu et al., 2018) is considered an essential necessity.

Therefore, this study agrees with the research that urban growth/development trends are increasing and that these development trends put pressure on agricultural areas in particular. In addition, it has common features with some of the national and international studies mentioned above on the pressure of urban growth on agricultural areas in terms of spatial comparison. However, it differs from these studies in terms of its approach to the subject, the methodology used, and its original content.

The studies analysed mostly examine the spatial change/ transformation of agricultural areas as a result of urban growth using remote sensing methods and geographical information systems. However, in this study, in addition to geographical information systems, the effects of planning decisions at different scales on agricultural areas are analysed both temporally and spatially. The factors that influence the changes and transformations that occur in agricultural areas, or the variables that are effective in the development of the district, are also analysed. In addition, it is noted that the laws and regulations enacted to protect agricultural areas do not provide sufficient protection in the name of "public interest."

Some Laws and Regulations on Agriculture

In order to make sense of the legal process for the protection of agricultural areas in the urban-rural relationship, this section of the study examines some of the laws and regulations enacted for the protection of agricultural areas and adaptation to the rapid urbanisation process after 1950. The period covering the 1950s and after is the period of the fastest agricultural transformation (Oyan, 2004). Some of the laws and regulations enacted in this period and some important developments related to the period are briefly summarised below.

The period between 1950 and 1960 saw the beginning of the process of adaptation to rapid urbanisation in Turkey. One of the important developments in this period was the establishment of the Ministry of Housing and Settlement in 1958 with Law No. 7116, which was enacted to find solutions to the problems created by rapid and unhealthy urbanisation (Efe, 2003).

In the period 1960-1980, a planning period was adopted to ensure economic and social balance.

- In 1960, the State Planning Organisation (SPO) was established and the preparation of five-year development plans began. Since 1963, attempts have been made to secure agriculture through state intervention through development plans (Eştürk & Ören, 2014).
- The "Gecekondu Law" of 30 July 1966, numbered 775, is the most comprehensive law enacted in the field of gecekondu in order to prevent reconstruction by rehabilitating and liquidating gecekondu and to protect agricultural and public lands (T.C. Resmi Gazete, 1966). This law paved the way for a new construction phenomenon by introducing new concepts such as "local development plan" and "rehabilitation plan" into planning literature (Efe, 2003).
- The "Land Office Law" numbered 1164, which came into force in 1969, created the "General Directorate of Land Office" within the Ministry of Housing and Settlement, in order to allocate land and plots to meet the needs of the State in the areas of housing, industry, tourism, and public spaces, when necessary. However, the content of this law does not include any provision to prevent the misuse of agricultural land (Efe, 2003).
- The "Land and Agrarian Reform Law" No. 1757, passed on 25 June 1973, aimed to "use, protect, improve, develop and maintain the productivity of land and water resources in agriculture according to technical and economic requirements" (T.C. Resmi Gazete, 1973). According to the law, expropriation is based on the "public interest."

In the post-1980 period, the urban-rural opposition began to lose its significance (Tekeli, 2019). In addition, the liberal trend aimed at minimising state intervention in agriculture came to the fore (Eştürk & Ören, 2014). Important developments in this period include the first strategic approach to agriculture in 2004 and the preparation of the Law on Agriculture.

- The "Mass Housing Law" No. 2985, which came into force on 2 March 1984, decided that the areas where mass housing was to be built were to be determined by the governorships in order to meet housing needs (T.C. Resmi Gazete, 1984a). However, there is no provision to prevent the misuse of agricultural land.
- On 22 November 1984, the "Agricultural Reform Law No. 3083 on Land Regulation in Irrigation Areas" was enacted. Article 19 of this law states that agricultural land cannot be used for other purposes unless there are compelling reasons (T.C. Resmi Gazete, 1984b). However, in addition to this, Article 65 (Amended: 12/3/2018-2018/11519 K.) of the implementing regulation of the said Law states that the provisions of the "Soil Conservation and Land Use Law dated 3/7/2005 and numbered 5403" shall be applied to the misuse of agricultural lands in necessary cases (T.C. Resmi Gazete, 1985).
- In 2005, the "Law on Soil Protection and Land Use" No. 5403 came into force. The purpose of the law is to "establish the procedures and principles to ensure the protection and development of soil by preventing its loss and deterioration by natural or artificial means, and to ensure planned land use in accordance with the principle of environmentally sustainable development" (T.C. Resmi Gazete, 2005). The phrase "absolute agricultural land, special crop land, planted agricultural land and irrigated agricultural land cannot be used for purposes other than agricultural production" (Article 13) in the relevant law has a preventive character against the misuse of agricultural land. However, in the continuation of Article 13 of the relevant law:

Provided that there is no alternative area and the Board deems it appropriate:

(a) strategic defence requirements,

(b) temporary settlement needs following natural disasters,

(c) exploration and exploitation of oil and natural gas,

(ç) mining activities for which a decision of public interest has been taken by the competent Ministry,

(d) for plans and investments for which a decision of public interest has been taken by the ministries, the Ministry may approve the applications for non-purpose use of these lands, provided that soil conservation projects are complied with.

The inclusion of this sentence indicates that there may be some exceptions to the off-purpose use of agricultural land. On 31 January 2007, with the entry into force of the "Law on Amendments to the Law on Soil Conservation and Land Use" No. 5578, an additional sentence was added to Article 13 of the said Law No. 5403: "e) Investments in road infrastructure and superstructure activities in the public interest" and the sentence "The Ministry may delegate this authority to the Governorates" (T.C. Resmi Gazete, 2007) was added to the end of the 1st paragraph.

- On 12 November 2012, Law No. 6360 on the Establishment of Metropolitan Municipalities and Twenty-Six Districts in Thirteen Provinces and Amendments to Certain Laws and Decree Laws came into force (T.C. Resmi Gazete, 2012). With this law, the legal personality of approximately 16,500 villages was abolished, and the authority to make decisions regarding agricultural lands, pastures, and coastal areas belonging to these villages was given to metropolitan municipalities (Yenigül, 2016). This situation has led to a blurring of the urban-rural distinction (Tekeli, 2016) and concerns that municipalities focusing on urban development will encourage rural areas to urbanise

(Yenigül, 2016).

- The purpose of the "Regulation on the Protection, Use and Planning of Agricultural Lands" published in the Official Gazette No. 30265 on 9 December 2017, is to determine the procedures and principles for the determination of soil and land assets, classification and development of agricultural lands, permitting off-purpose use in mandatory cases, protection of soil and large plains with high agricultural production power, preparation and implementation of soil protection plans and projects, determination of erosion-sensitive areas, formation, duties and activities of the soil protection board, and planned use of lands in accordance with the principle of environment-first sustainable development (T.C. Resmi Gazete, 2017). In the relevant regulation, in addition to the protection of agricultural lands, it is stated that agricultural lands can be opened to misuse in mandatory cases.

As a result, as seen above, many laws and regulations have been enacted for agriculture. However, when the loss of agricultural land in the urban-rural dichotomy is taken into account, it becomes clear that these laws and regulations are not sufficient to protect agricultural land. In fact, one of the most important planning problems to date is rapid and unhealthy urbanisation.

Law No. 6360, which is particularly important in terms of institutional and administrative structuring and spatial planning processes, has significantly increased the rate of urbanisation throughout Türkiye. Another change with the entry into force of the law is the abolition of the legal personality of towns and villages and the beginning of the characterisation of all settlement units as "cities" (Partigöç, 2018). In this new order, which caused a confusion of meaning between urban and rural, what constitutes the countryside and the future of agricultural areas, characterised as rural agriculture, became a matter of debate.

MATERIAL AND METHODS

Study Area

This study examines the spatial transformation of agriculture in the urban-rural relationship through the Torbalı district of İzmir province.

Torbalı is a district of İzmir province in the Aegean region of Türkiye, built on the Küçük Menderes basin and has very fertile soils. It is bordered by Kemalpaşa to the north, Bayındır to the east, Menderes to the west, and Selçuk to the south (Figure 1).

According to Turkish Statistical Institute (TUIK) data, the population of the district in 2022 is 207,840 people (Figure 2). Its total area is 577 km². The total number of municipalities connected to the district is 60.

The economy of the district is mainly based on agriculture and industry. Torbalı District, which is located on the Izmir-Aydın motorway, is also connected to Ankara via Kemalpaşa Road. It is also a point of attraction for industrial investments due to its easy access to Menderes Airport and Izmir Port.

The Torbalı district has a Mediterranean climate. Summers are hot and dry, and winters are mild and rainy. The fertile soil structure is suitable for growing all kinds of cereals

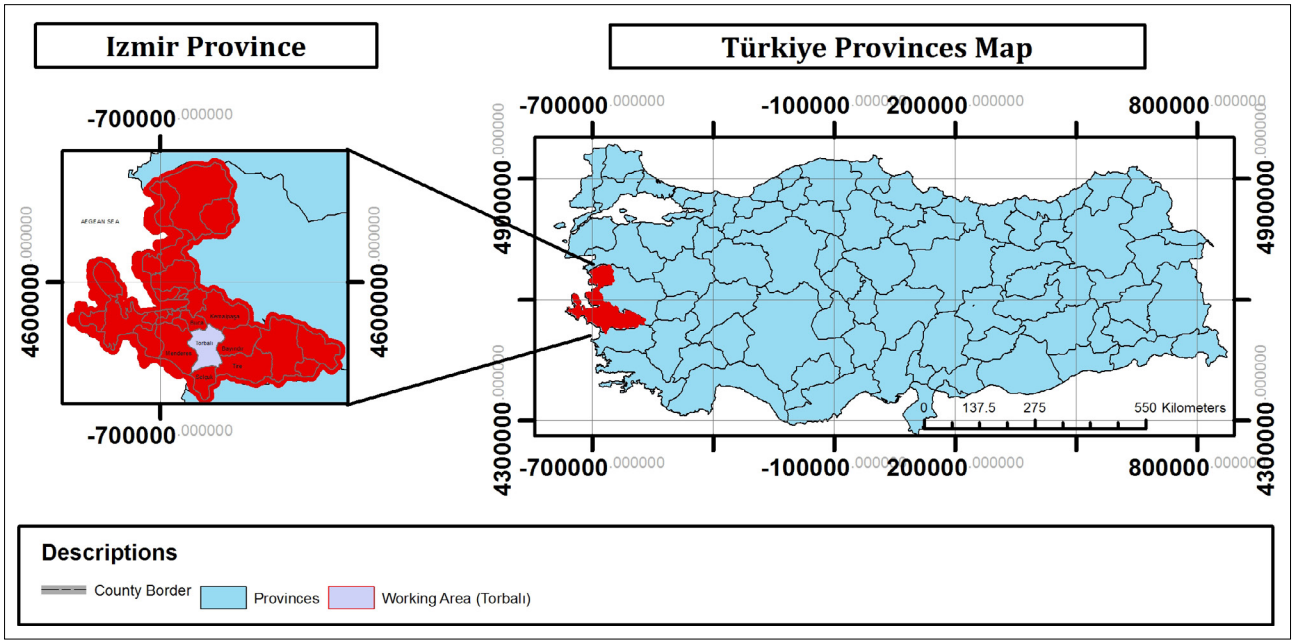

Figure 1. Map of the study area.

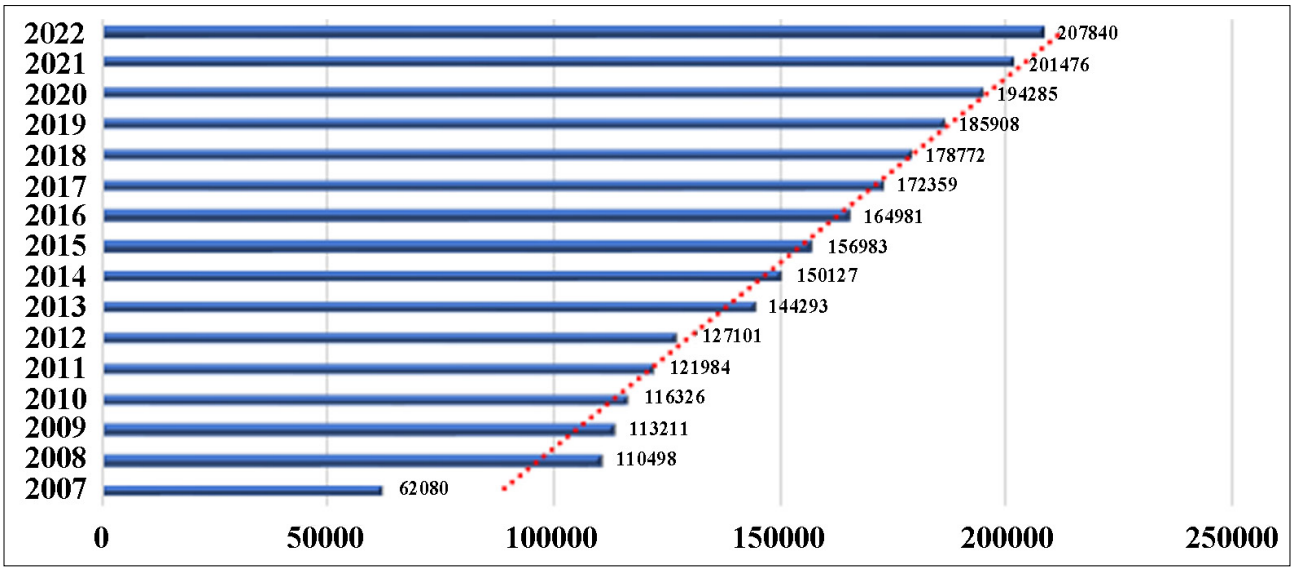

Figure 2. Population growth of Torbalı district by years (TUIK, 2023).

and industrial crops (tobacco, cotton, etc.), vegetables, and fruits.

Methodology

In this study, the pressure of urban development trends on agricultural areas was analysed using both geographic information systems and plans of Torbalı at different scales. Within the scope of the study, firstly, CORINE (Coordination of Information on the Environment) land use data from 1990, 2000, and 2012 and Dynamic World sourced land use data from 2022 were used in order to monitor the direction in which the urban development of the district continues and the areal examination of agriculture in this development in the historical process. These data were re-digitised using ArcGIS software. Thus, a new land use map consisting of four categories—artificial areas, agricultural areas, forest areas, and semi-natural areas—was created. For this four-category land use classification, CORINE land use descriptions were taken into consideration (Figure 3).

These land use data were used to carry out a spatial analysis of the change and transformation process of agricultural areas by comparing the land use capacity produced in the study within the framework of agricultural and forest areas. Finally, all the analyses were overlapped, and a synthesis map of the sample area was produced in order to make temporal and spatial inferences and to discuss the impact of different scales of planning decisions taken for urban development in Torbalı on agricultural areas.

FINDINGS

In the last 35 years, Turkish cities have experienced a great change in the spatial dimension of urban development. As in all cities of the country, İzmir has also experienced this process of change and transformation. The Torbalı district in particular has the most fertile land in the Aegean region. However, in recent years, agricultural land has been opened up for misuse due to unplanned urbanisation and industry (Kurucu & Küçükyılmaz, 2008).

Since 1989, Torbalı has become the largest industrial centre in Izmir. In particular, the fact that Torbalı is located on the İzmir-Aydın motorway and the 45 km double-track railway connecting İzmir and the neighbouring provinces has made the district an important point of attraction for industry. This situation has reached a dimension that increases unemployment and employment deficit as a factor that increases migration to the district over time (Torbalı Ticaret Odası, 2020).

When analysing the urban-rural and total population of Torbalı district for the years 1990, 2000, 2012, and 2022 within the framework of TUIK data, it can be seen that although there has been a decrease in the rural population rate over the years, the rural population rate in 1990 and 2000 is higher than the urban population rate. With Law No. 6360, villages were transformed into districts, and all settlement units were defined as urban, resulting in a significant increase in urban population rates in 2012 and 2022 (Table 1).

One of the reasons for this increase in the district's population is the intensive migration to the district. As a result of the intensive migration to the district, the existing carrying capacity has been exceeded over time, and the demand for new housing has increased. This situation has manifested itself in rapid urbanisation, and the district has continued its urban development by showing an uncontrolled growth trend on agricultural land.

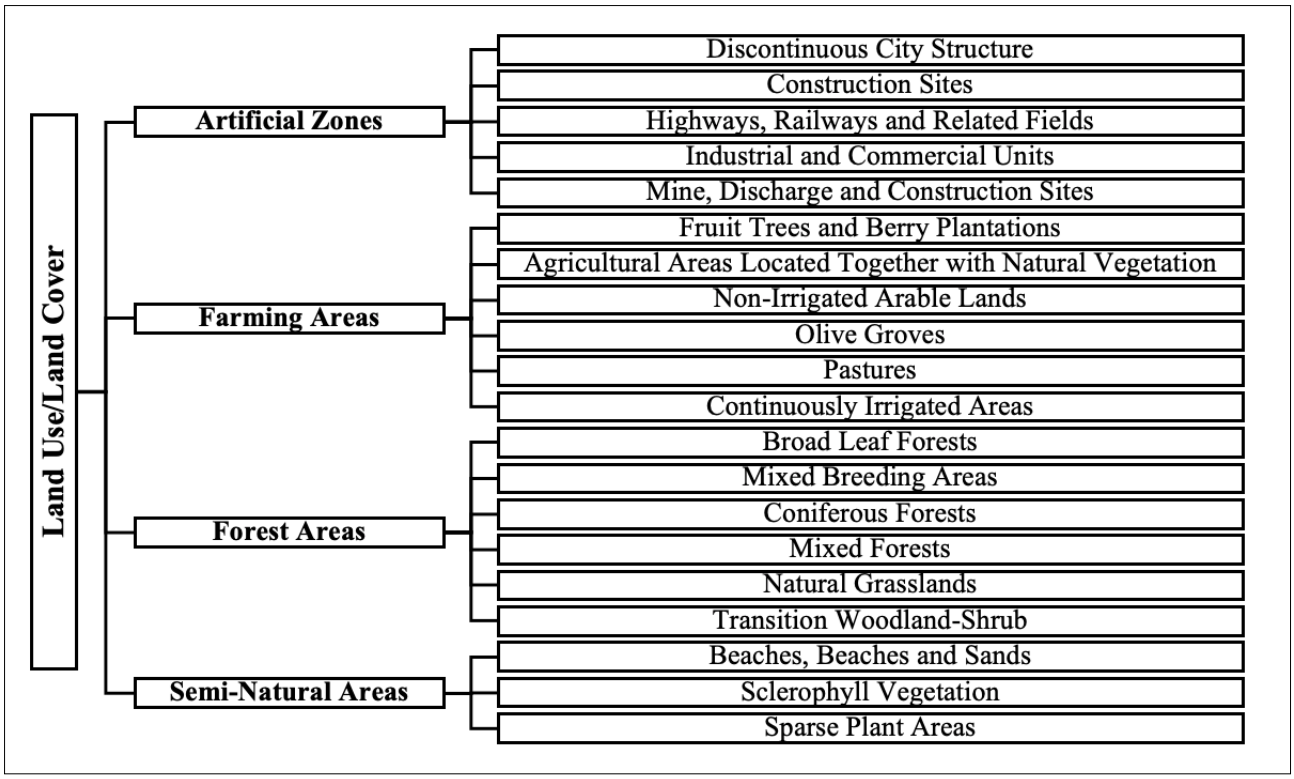

Figure 3. CORINE land cover classes.

Table 1. Urban-Rural and total population of Torbalı district by years (TUIK, 2023)

County Population	1990			2000			2012	2022
	Urban (%)	Rural (%)	Total (Person)	Urban (%)	Rural (%)	Total (Person)	Total (Person)	Total (Person)
Torbalı	29,74	70,26	71.172	40,87	59,13	93.216	138.040	207.840

Torbalı District is located on the alluvial land of the Fetrek River in a rift valley (graben) formed as a result of tectonic activity. Developed on a flat plain, the Torbalı district has suitable conditions for all kinds of agricultural activities. However, the intensive demand for housing in parallel with industrialisation and population growth poses a serious threat to agricultural areas (Kurucu & Küçükyılmaz, 2008).

When analysing the land use change of Torbalı district between 1990 and 2000, it can be observed that Torbalı has continued its urban development mainly towards the periphery and north-west, especially on agricultural areas, as shown in Figure 4.

When analysing the land use change of Torbalı district between 2012 and 2022, it can be seen that Torbalı has continued its urban development in the same direction from the past to the present, as shown in Figure 5. In the historical process, there is a significant decrease in forest areas. In addition to the existing settlements along the transport axis, the tendency of small settlements in agricultural areas to grow over time has reached a dimension that threatens the integrity of agricultural areas.

The settlement area, which was 1,152 ha in 1990, reached 7,247 ha in 2022. In other words, between 1990 and 2022, there was an increase of 84.1% in the settlement areas. At the same time, it should be noted that the agricultural area has decreased over the years. The agricultural area, which amounted to 36,721 hectares in 1990, decreased to 25,593 hectares in 2022. This situation shows that between 1990 and 2022 there was an areal reduction of 43.5% in agricultural areas. In addition to agricultural areas, there was a 6.3% decrease in forest areas between 1990 and 2022. The area of semi-natural areas increased by 49.3% between 1990 and 2022 (Table 2).

When analysing the land use capability of Torbalı District, it can be seen that the existing urban structure is mostly developed on land with I and II class land use capability, i.e. land suitable for tillage agriculture (Figure 6).

If we look at the development of urban settlements on

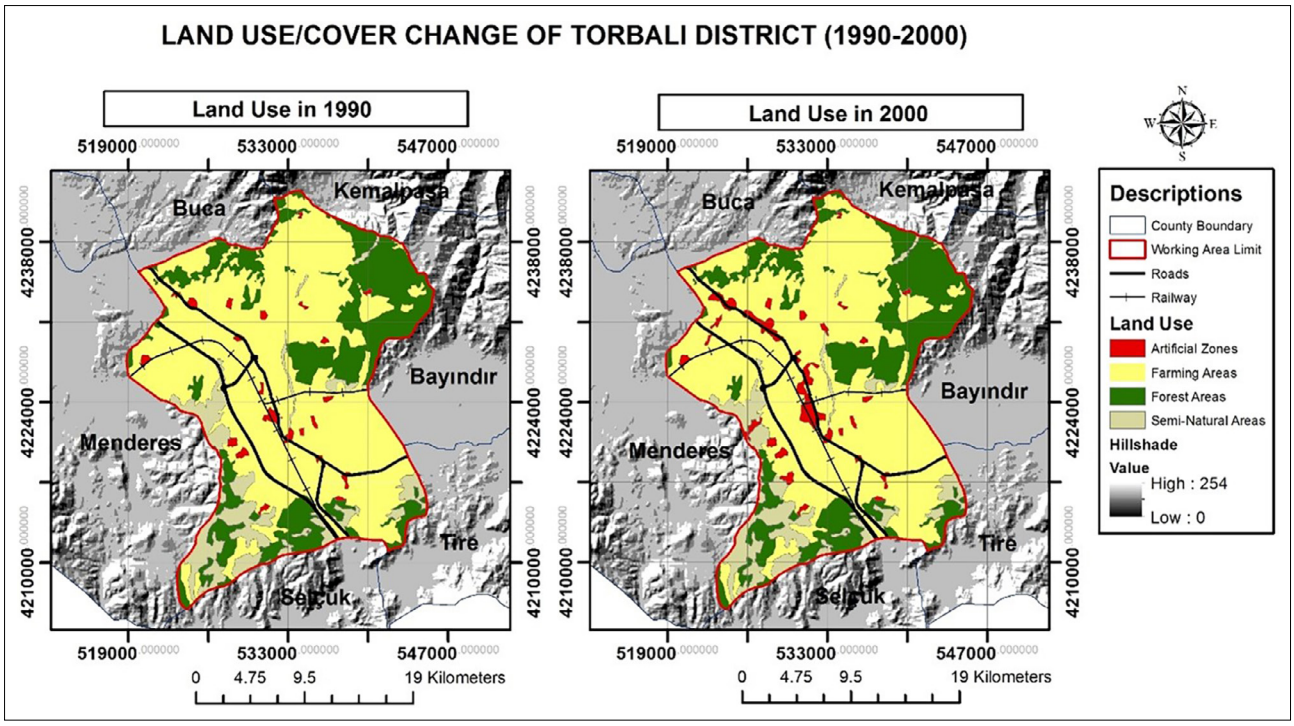

Figure 4. Land use/cover change in Torbalı district (1990-2000).

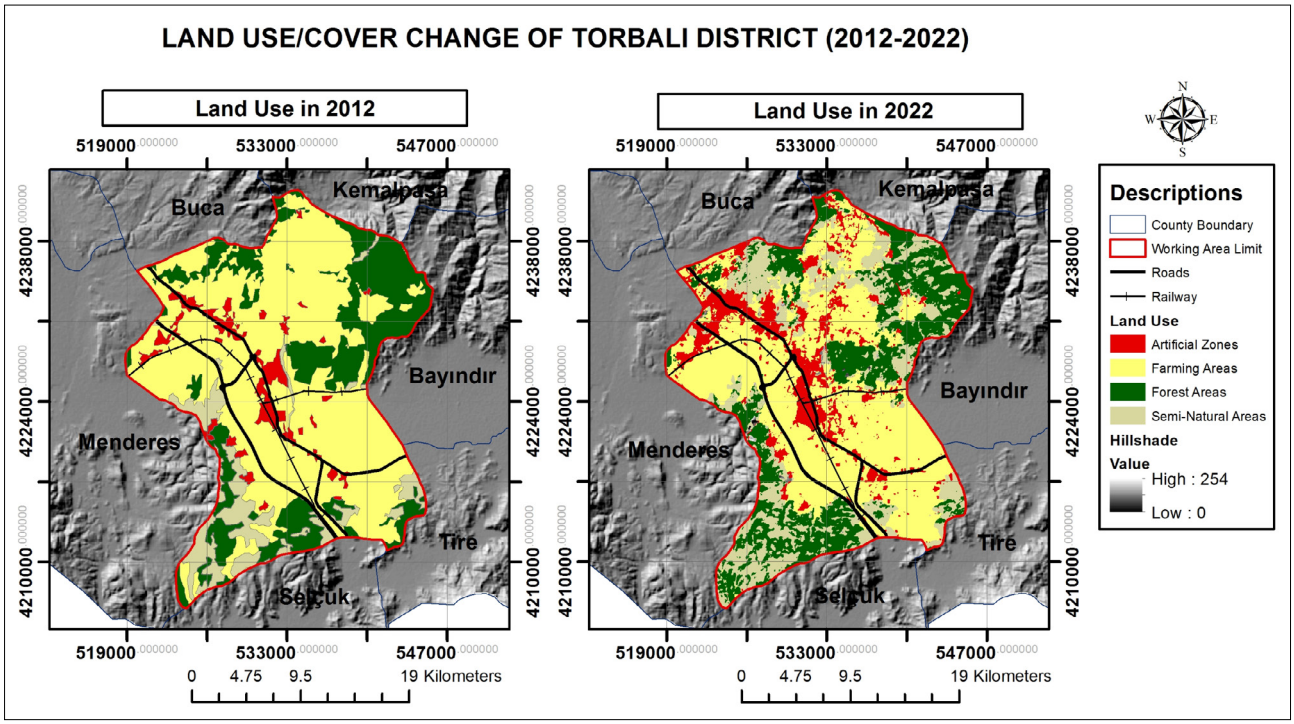

Figure 5. Land use/cover change for Torbalı district (2012-2022).

agricultural and forest areas in Torbalı district according to years, it can be seen that the urban texture that emerged in 1990 and 2000 developed mainly on irrigated agricultural areas in the centre and on dry agricultural areas in the north and northwest. It can be observed that in 2012 and 2022, the urban texture shows a significant increase in area compared to previous years. In this process, the tendency of urban settlement areas to develop on irrigated and dry agricultural areas continues. In addition, the emergence of new settlement areas, as well as the areal growth of existing

Table 2. Land use change in Torbalı district by years

Land Use	1990	2000	2012	2022	1990-2022 Rate of Change (%)
	Area (hectares)				
Artificial Zones	1.152	2.494	3.562	7.247	84,1
Farming areas	36.721	35.673	34.534	25.593	-43,5
Forest Areas	13.734	13.646	13.963	12.921	-6,3
Semi-Natural Areas	5.993	5.787	5.541	11.839	49,3
Total	57.600	57.600	57.600	57.600	---

settlements, is noteworthy (Figure 7).

As can be seen in Figure 8, Class I and II land is mostly used for irrigated agriculture, and Class I and II land in the north and northwest, close to the settlement boundary, is used for dry agriculture. It can be observed that the areas with Class I and II land use capability, which are located along the transport axis from the centre towards Kemalpaşa, are used as olive groves. Olive groves, other orchards, and greenhouses are used on the land with Class III and IV land use capability. Although Class VI, VII, and VIII areas on the map are unsuitable for arable farming, they are mostly used as woodland in the northeast and as woods, bushes, and shrubs in the southwest. The urban development trends in the county from 1990 to 2022 will mainly affect agricultural areas with Class I and II land capability.

When analysing the Ministry of Agriculture and Forestry's CORINE land use data for Torbalı (Figure 9), it can be seen that in addition to the increase in settlement areas, especially since 1990, the industrial areas, especially in the northeast of the settlement areas, tend to develop towards the northwest. As a result of the joint growth of settlements (discontinuous urban structure) and industrial areas (industrial and commercial units, quarry discharge, and construction areas), especially since 2000, there has been a reduction in the area of agricultural land. An analysis of the 2012 land use data shows that irrigated agricultural areas have increased under pressure from housing and industry, especially in the southwest compared to previous years. In other words, it can be observed that the non-irrigated agricultural areas in the southwestern direction of Torbalı district have been replaced by continuously irrigated areas in 2012.

It can be observed that the increasing population, the existing transport axis, and the topography of Torbalı, which tends to continue urban development on agricultural areas, are the guiding factors for this urban growth.

When the İzmir-Manisa Planning Region 1/100,000 Scale

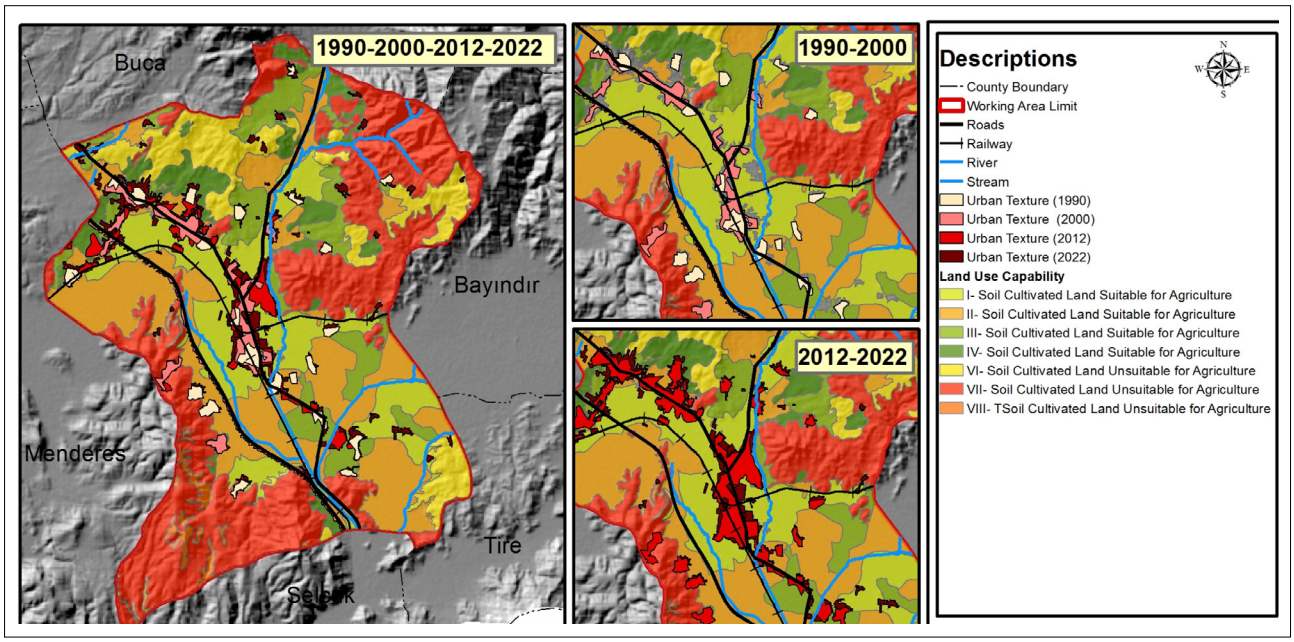

Figure 6. Land Use Capability (LUC) of Torbalı district.

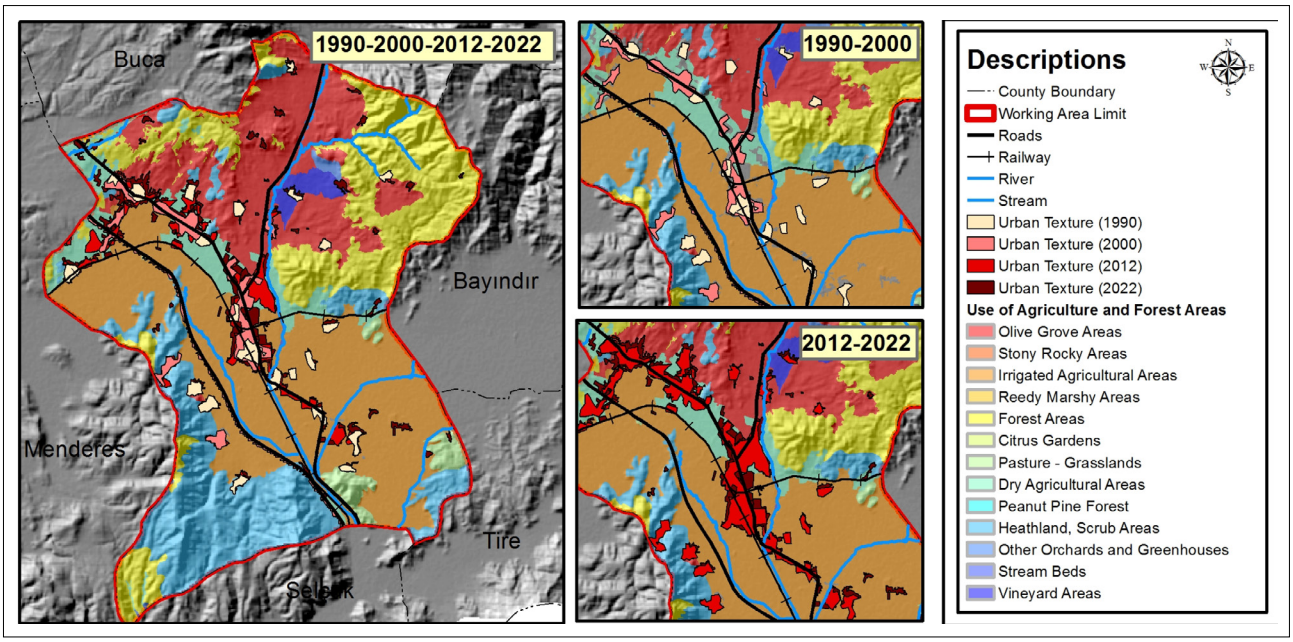

Figure 7. Development of urban settlement areas on agricultural and forest land in Torbalı district by year.

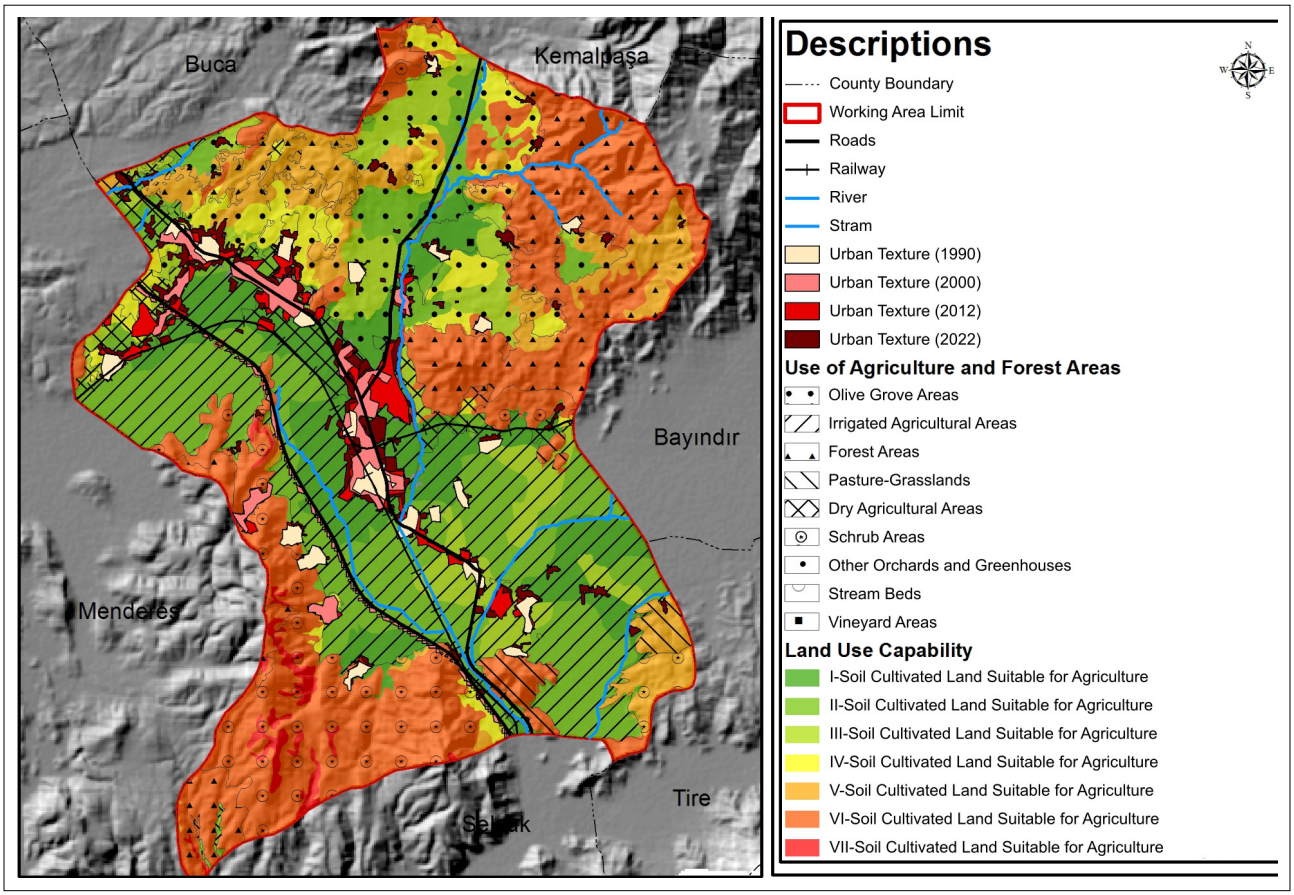

Figure 8. Synthesis map of Torbalı district.

Regional Master Plan, which was approved with the Ministry's approval No. 9948 of 23/06/2014, is analysed within the boundaries of the study area, it is seen that the areas suitable for settlement in the planning decisions made for Torbalı and its surroundings do not have a protective/preventive function for the integrity of agricultural areas. In other words, it can be

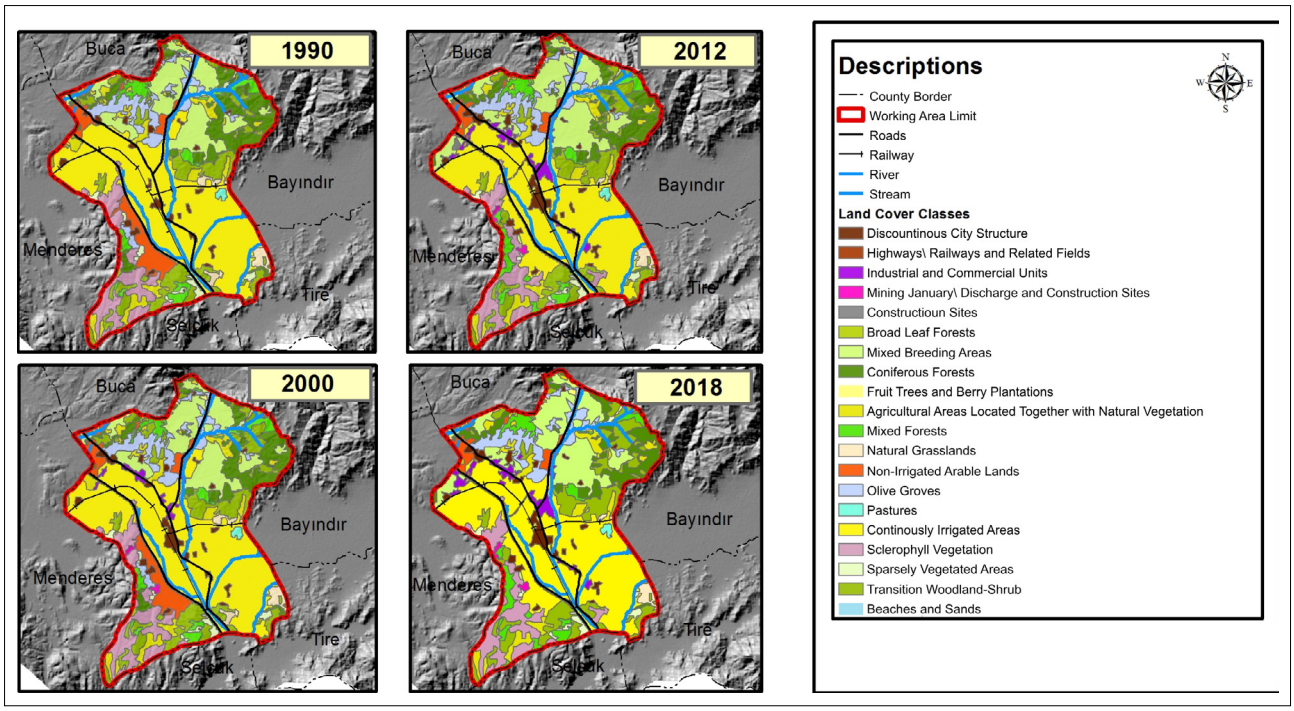

Figure 9. Land use/cover change in Torbalı district (1990, 2000, 2012 and 2018).

seen that the industrial areas, which have an important place in the development of the city, and the new settlement areas opened in this context have a disruptive effect on the integrity of the agricultural areas (Figure 10).

If one examines the master development plan of the Torbalı district centre on a scale of 1:5,000 from 1983, it seems that the planning decisions taken were mainly agricultural-oriented. While agricultural areas are located to the north of the settlement areas, industrial areas are located to the northeast. In addition to the existing settlement areas, new development areas are oriented east-west and north-south. When examining the master plan revision on a scale of 1:5,000, dated 13.03.2017, it can be seen that the planning decisions made are industry-oriented. It can be seen that the settlement areas have increased in size compared to 1983, and that the new development areas have been treated

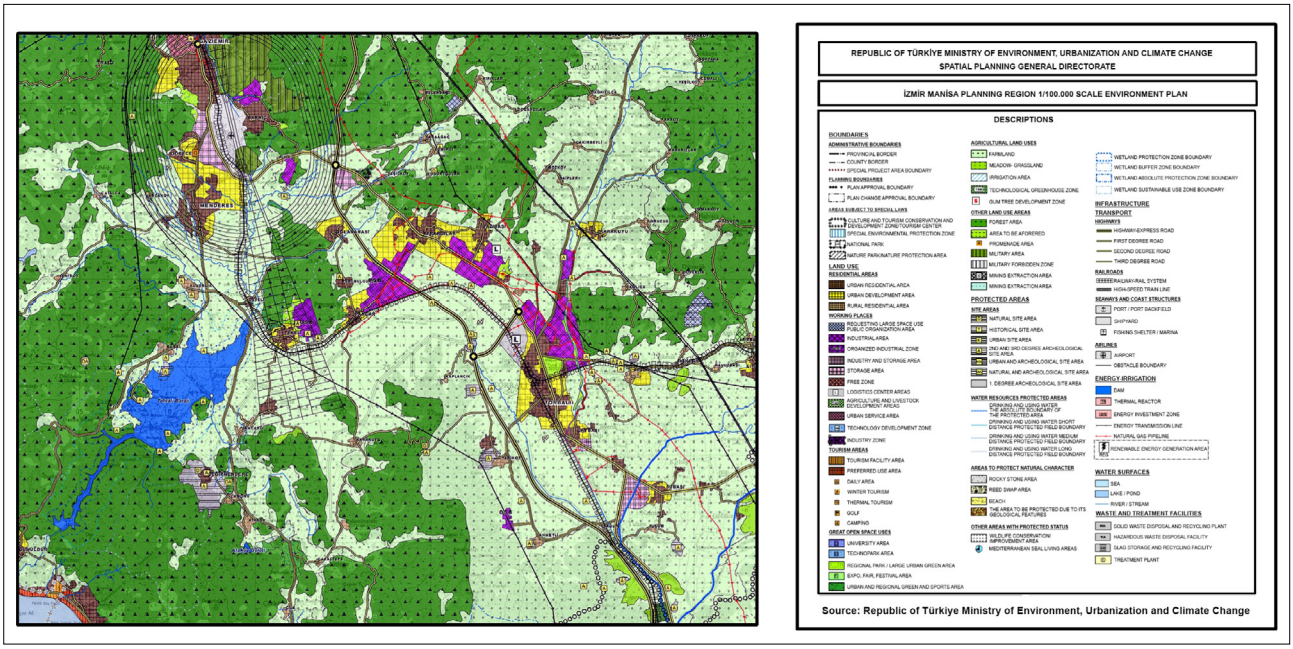

Figure 10. 1/100.000 Scale Regional Master Plan of Torbalı District.

in such a way that they surround the existing residential areas. In this process, it can be said that agricultural areas are being used as residential and industrial areas. The industrial areas, which tend to develop in a north-easterly direction, have increased compared to 1983 and have been integrated with the residential areas (Figure 11).

EVALUATION AND CONCLUSION

Since 1950, due to developments (opportunities brought by the industrial revolution), urban areas have shown a tendency to spread/agglomerate over rural areas. This situation has, over time, caused a serious process of change/transformation in agricultural areas and has reached a dimension that threatens the future of agricultural areas. This situation has been clearly demonstrated in many studies. In the above-mentioned studies, the transformation of agricultural areas was revealed using geographic information systems and remote sensing methods. In this study, in addition to identifying this change, the impact of plans drawn up at different scales on this process has been evaluated in terms of both time and space. In addition, other variables related to settlement (industrialisation, development of transport, etc.) were studied together with the planning process, taking into account the change in agricultural areas.

In this context, when the historical change of land use in Torbalı District is analysed within the framework of the study, it is found that in 2022, compared to 1990, artificial areas increased by 84.1%, agricultural areas decreased by 43.5%, forest areas decreased by 6.3%, and semi-natural areas increased by 49.3%. It is an undeniable fact that the increase in artificial areas is directly related to the increase in population. Developed industry and transport facilities are the main factors that are effective in the population increase of Torbalı district.

It has been observed that the existing urban fabric in Torbalı has developed on first and second class land, which is suitable for agriculture in terms of land use capacity. In addition, it has been observed that in the plans made specifically for Torbalı, decisions were made to support this situation, the settlement was planned on agricultural land, and no planning decisions were made to protect these areas.

The urban growth trend of Torbalı since 1990 has been on irrigated agricultural land in the centre and partly on dry agricultural land in the north and northwest. Therefore, it can be said that the urban developments from 1990 to 2022 will be mainly on irrigated agricultural areas.

In the land-use plans for the future, urban development is spreading in an uncontrolled and unplanned manner to meet the growing population and its needs. In this process, agricultural areas, which are of primary importance for human life, are neglected due to increasing needs, demands, economic interests, and concerns. As in the case of Torbalı, as a result of urbanisation and industrialisation, fertile agricultural land is being used for purposes other than those for which it was intended, and the relevant laws and regulations are providing a suitable environment for this to happen. For this reason, the protection of agricultural areas through planning decisions is a priority. In order to prevent the sprawling and rapid growth of residential areas of high agricultural quality, such as Torbalı, a planning and

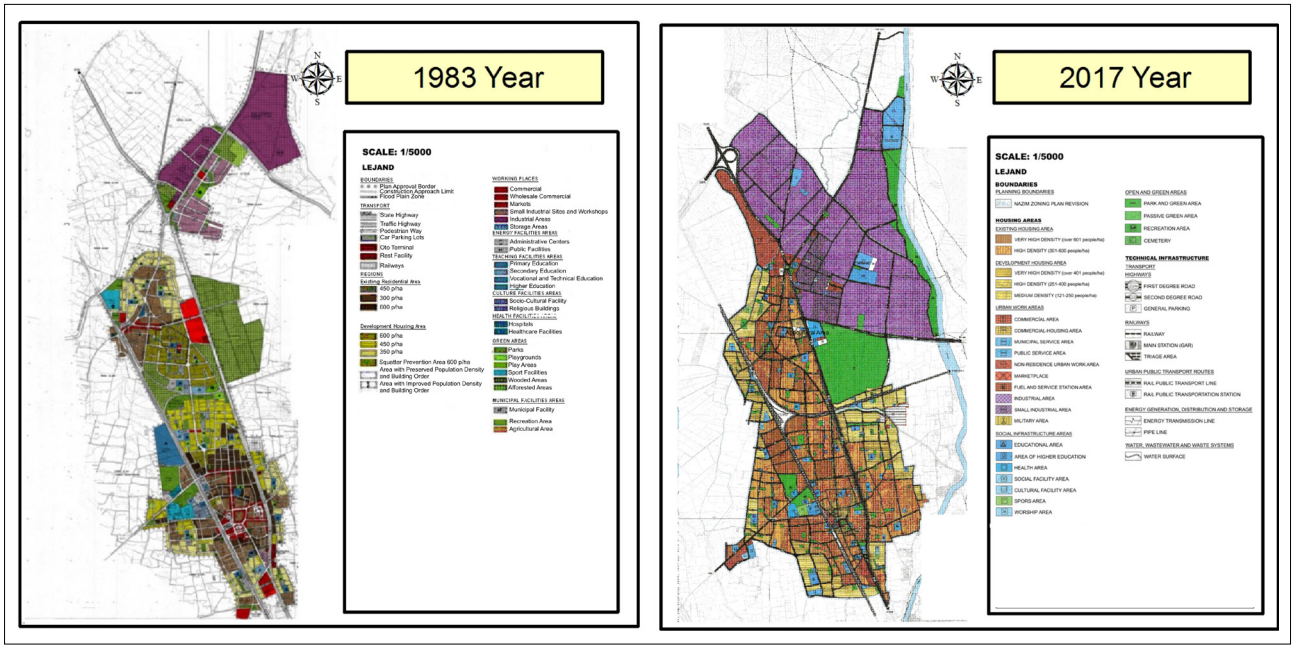

Figure 11. Torbalı District Centre Master Plan on A Scale of 1:5000 from 1983 and 13.03.2017.

zoning scheme should be proposed to ensure more compact development. In addition, in order to protect agricultural land and prevent it from being used for purposes other than those for which it was intended, construction decisions, especially in agricultural areas, should be avoided as much as possible, or the minimum construction conditions should be prepared in such a way as to prevent misuse (housing, etc.).

A study has simulated the urban growth of Izmir in 2050. According to the simulation results, the urban growth of Izmir is expected to reach 126,422 hectares in 2050. Another study for 2050 shows that the population of Izmir will reach 8.1 million in 2050, according to the population projection of the Izmir Water Master Plan for 2050. In this context, the agricultural area per capita is predicted to decrease to about 0.0268 ha in 2050 (Alğın, 2021).

As in many settlements, producers in Torbalı focus more on the economic aspect of farming than on the environmental and social aspects. Moreover, 50.82 percent of the producers do not plan to continue agricultural production in the future (Çukur & Işın, 2008). It is predicted that this situation will lead to a possible food crisis in the future. For this reason, it is necessary to take measures not only to protect agricultural land but also to protect the quality and ecological structure of the agricultural area. For this purpose, it is important to determine the building plans for the protection of the rural quality and the social structure of rural settlements where productive agricultural areas are located. Determining the incentives and legal restrictions to protect the quality of agricultural areas will also be effective in protecting the quality of the soil, the continuity of agricultural use of the area, the unique agricultural product pattern, and the socio-economic structure of the area.

Agricultural areas are of great importance for the continuity of vital activities and the national economy. For this reason, the development of settlements on agricultural land should be prevented within the framework of relevant laws and regulations. Decisions taken during the transition between plans should be monitored by the relevant institutions. Discouraging provisions should be introduced for those who pursue economic interests in the decisions taken. When the existing carrying capacity is exceeded, or in cases of necessity, the most appropriate site should be selected in the context of the analyses to be carried out for the region concerned, in such a way as not to disturb the integrity of the agricultural area, and the development layout should be rearranged in such a way as to protect the agricultural integrity.

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Article

A method proposal for determining bicycle paths in cities: The case of Denizli (Türkiye)

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ABSTRACT

Despite technological advancements, bicycle transportation has a historical role that has endured and shaped human transportation history. For effective transportation with non-motorized vehicles, it is essential to identify infrastructure opportunities and understand the impacts of the current situation on transportation behaviors. The study area includes the Merkezefendi and Pamukkale districts of Denizli city center. Four different interrelated methods were used in the research: Landscape Analysis, Delphi Technique, Questionnaire Application, and AHP (Multi-Criteria Factor and Weighting). The research consists of four main parts: data collection, evaluation, analysis, and results. Thus, a method proposal allowing for a comprehensive evaluation for establishing a bicycle lane network in the city center of Denizli was aimed. To achieve this, the natural, cultural, and socio-economic characteristics of the selected districts of Merkezefendi and Pamukkale, chosen as the research area, were highlighted. Opinions of employees in various institutions, individuals volunteering in relevant non-governmental organizations (to use the Delphi Technique with 15 experts), and the public (by questionnaire with 863 people) were gathered to develop a bicycle lane network proposal using a holistic planning approach. As a result, a comprehensive set of criteria was evaluated, and inclusiveness was applied extensively. In contrast to other studies, the factors influencing bicycle use in Denizli city center were not limited to literature reviews only but involved a Delphi technique with expert opinions, a survey with the views of bicycle users in the city center, and the researcher's experience and observations. The results obtained through versatile decision-making processes forming the basis of landscape planning studies were evaluated together. Consequently, a method proposal that can be used in planning studies in our country's cities in this regard was developed.

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INTRODUCTION

Despite technological advancements, bicycle transportation has a historical role that has endured and shaped human transportation history. In urban and rural centers where daily travel is short (less than 5 km), bicycles are a suitable means of reducing traffic congestion. Additionally, bicycles offer advantages such as safety, efficiency, low cost, health benefits, and environmental friendliness. Due to these advantages, bicycles can

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play a significant role in sustainable land use planning, transportation, recreation, and economic development initiatives. For effective transportation with non-motorized vehicles, it is essential to identify infrastructure opportunities and understand the impacts of the current situation on transportation behaviors. The suitability of bicycle infrastructure systems (bicycle lanes, corridors, boulevards, and traffic-free streets) has a significant impact on promoting bicycle usage (Moudon et al., 2005; Krizek & Johnson, 2006; Dill, 2009; Schepers et al., 2017). The expansion of bicycle and pedestrian paths plays an active role in encouraging non-motorized travel, contributing not only to attracting new users but also fostering a perception of high safety and secure riding (Kellstedt et al., 2021; Larsen & El-Geneidy, 2011; TEAC, 2011). Studies on this subject have observed an increase in bicycle users in areas where physically separated bicycle paths were created (Li et al., 2012; Frondel & Vance, 2017), or bicycle infrastructure was developed (Iacono et al., 2010; Emond & Handy, 2012; Konstantinidou & Spyropoulou, 2017; Le et al., 2019). The idea of assessing the suitability of an area for bicycle use is a product of studies aiming to explain mobility models based on structural features (Cervero & Kockelman, 1997; Ewing & Cervero, 2010). To develop and evaluate future scenarios of bicycle transportation, compiling data on current bicycle trends in different regions worldwide, analyzing the current state of bicycle transportation, and presenting the existing picture of urban bicycle use is crucial. Therefore, in the literature, specific routes for bicycle paths (or bicycle usage) have been assessed in studies encountered (Altunkasa et al., 2006; Milakis & Athanasopoulos, 2014; Sönmez, 2019; Alkılınç et al., 2021). This is a significant issue in urban bicycle transportation because cyclists do not travel on just one route. Users have requirements for selecting routes at different levels. Therefore, there is a need to determine the suitability of used paths in a few studies (Hsu & Lin, 2011; Alkılınç et al., 2021) rather than conducting studies for appropriate route determination for a single route, as pointed out by Sener et al. (2009). The researcher should initially evaluate all alternative routes between the starting and destination points for cyclists. Criteria used for determining bicycle routes vary depending on the natural, economic, social, and cultural structure. Therefore, planning and designing bicycle paths require specific evaluation criteria tailored to the study area. Many studies have focused on limited evaluations, considering only criteria such as road width (Altunkasa et al., 2006; Küçükpehlivan, 2015; Cengiz & Kahvecioğlu, 2016; Sönmez, 2019), road usage status (Altunkasa et al., 2006; Sener et al., 2009; Hsu & Lin, 2011; Milakis & Athanasopoulos, 2014; Yılmaz, 2014; Cengiz & Kahvecioğlu, 2016; Saplıoğlu & Aydın, 2018; Sönmez, 2019; Mansuroğlu & Dağ, 2020), traffic (flow) speed (Sener et al., 2009; Hsu & Lin, 2011; Milakis & Athanasopoulos, 2014; Yılmaz, 2014), relationship with parks and green areas (Altunkasa et al., 2006; Milakis & Athanasopoulos, 2014; Küçükpehlivan, 2015; Cengiz & Kahvecioğlu, 2016; Sönmez, 2019; Özkan et al., 2020; Alkılınç et al., 2021), relationship with public transport (bus) stops (Cui et al., 2014; Milakis & Athanasopoulos, 2014; Yılmaz, 2014; Küçükpehlivan, 2015; Saplıoğlu & Aydın, 2018; Alkılınç et al., 2021), which allows limited evaluations. In addition to these criteria, some studies have used criteria such as parking conditions on roads (Sener et al., 2009; Yılmaz, 2014; Saplıoğlu & Aydın, 2018), presence of signalization on roads (Sener et al., 2009; Yılmaz, 2014; Saplıoğlu & Aydın, 2018), road/sidewalk landscaping (Mansuroğlu et al., 2019; Sönmez, 2019), relationship with existing bicycle paths (Sener et al., 2009; Yılmaz, 2014; Saplıoğlu & Aydın, 2018; Özkan et al., 2020), relationship with existing bicycle parking areas (Yılmaz, 2014; Saplıoğlu & Aydın, 2018), slope-distance relationship (Milakis & Athanasopoulos, 2014), sidewalk width (Hsu & Lin, 2011). Criteria such as the relationship with bicycle maintenance places and the relationship with existing bike share stations were evaluated for the first time within the framework of comprehensive planning methodology in this study. In this study, considering the impact of recent economic issues in our country and the shift of users towards bicycle use, especially in Denizli due to its completed urban development, the suitability levels of roads for bicycle use in urbanized areas of Denizli were determined by considering all alternative routes within the study area boundaries. Thus, a method proposal allowing for a comprehensive evaluation for establishing a bicycle lane network in the city center of Denizli was aimed. To achieve this, the natural, cultural, and socio-economic characteristics of the selected districts of Merkezefendi and Pamukkale, chosen as the research area, were highlighted. Opinions of employees in various institutions, individuals volunteering in relevant non-governmental organizations, and the public were gathered to develop a bicycle lane network proposal using a holistic planning approach. As a result, a comprehensive set of criteria was evaluated, and inclusiveness was applied extensively. In contrast to other studies, the factors influencing bicycle use in Denizli city center were not limited to literature reviews only but involved a Delphi technique with expert opinions, a survey with the views of bicycle users in the city center, and the researcher's experience and observations. The results obtained through versatile decision-making processes forming the basis of landscape planning studies were evaluated together. Consequently, a method proposal that can be used in planning studies in our country's cities in this regard was developed.

MATERIAL AND METHODS

Material

The study area includes the Merkezefendi and Pamukkale districts of Denizli city center (Figure 1). Despite being recognized primarily as an industrial city, Denizli is also a significant tourism destination. In Denizli, there are 22 ancient cities, including the Pamukkale-Hierapolis World Heritage Site and the Laodikea Archaeological Site, both listed on the World Heritage Tentative List. The increasing use of transportation, mainly by road, in the developing industrial and tourism sectors exacerbates transportation issues in the city. The transportation issues in the Merkezefendi and Pamukkale districts, which form the city center of Denizli, and the associated problems such as environmental pollution, noise pollution, and various health issues have been decisive factors in selecting these two districts as the study area (Figure 1). The boundary of the study area was selected to include the area within 4 km of the centers (Çamlık Park and Pamukkale University), determined by considering the average cycling distances of the public (3-5 km) and literature reviews.

To determine the suitability of the city for bicycle use, various numerical, vector, qualitative, and quantitative research materials were utilized. This includes data from ASTER GDEM (ASTER Global Digital Elevation Map) for creating slope and aspect maps (United States Geological Survey, 2021), Open Street Map data (Open Street Map, 2020) for digitizing transportation infrastructure systems, Denizli Meteorology Provincial Directorate (2019) data for evaluating the city's bioclimatic comfort, Turkish Statistical Institute (2023) data for assessing the population and other socio-economic characteristics, KGM (General Directorate of Highways, 2023) statistics for analyzing and evaluating the city's transportation system, and various reports (Denizli Provincial Directorate of Culture and Tourism, 2023; General Directorate of Forestry, 2023;) for evaluating natural and cultural features. Additionally, efforts toward promoting bicycle transportation in Denizli were examined. Furthermore, ArcGIS 10.0 and IBM Statistics SPSS Version 20.0 programs were used in the evaluation and interpretation of data obtained from the components of bicycle transportation systems, regulations, standards, and literature reviews for the planning of bicycle transportation systems.

Method

Four different interrelated methods (Landscape Analysis, Delphi Technique, Questionnaire Application, and AHP; Multi-Criteria Factor and Weighting) were used in the research. The research consists of four main parts: data collection, evaluation, analysis, and results (Figure 2). All methods used in the research and their stages are interconnected. Therefore, using multiple methods in different sections is believed to validate and increase the reliability of the obtained data.

The first phase of the study covers all kinds of data collection. At this stage, information on national and international standards and national legislation related to the creation of bicycle lanes (construction techniques, routes, and networking) and the dissemination of cycling (training activities and other activities, user characteristics) were presented. In this context, the

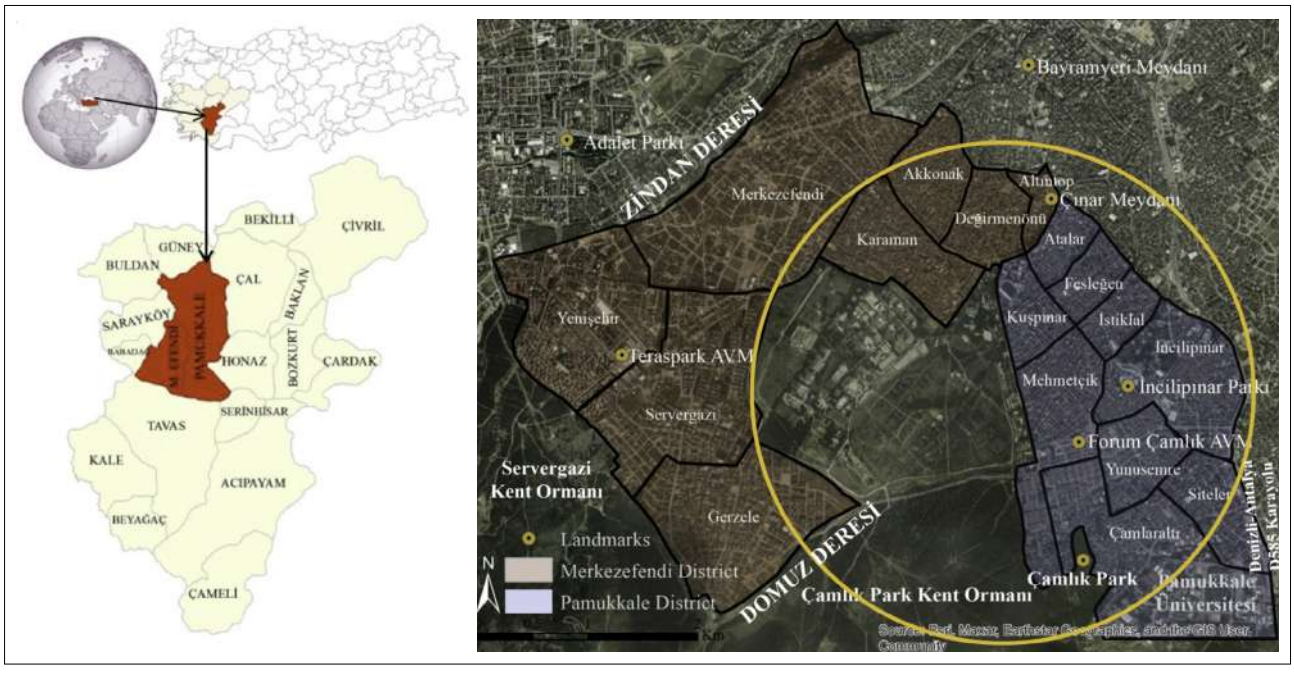

Figure 1. Study area location and some important areas.

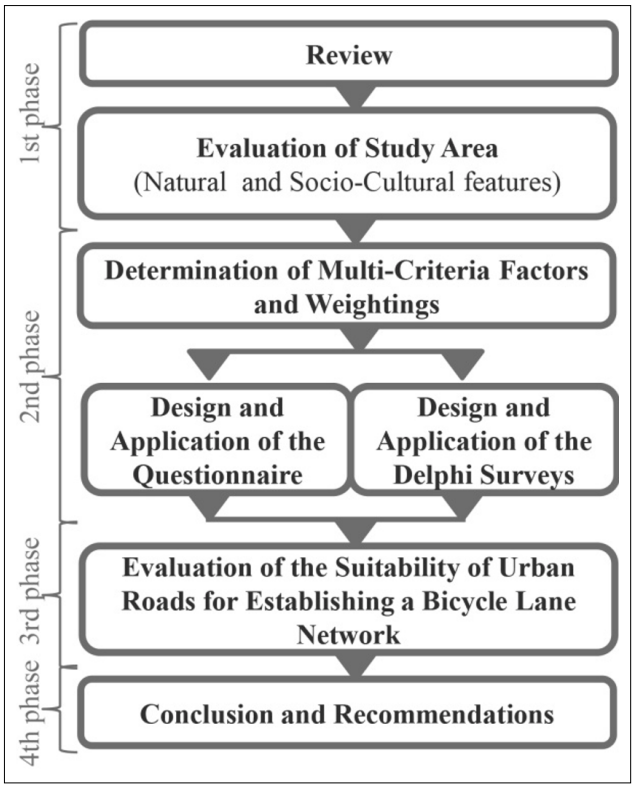

Figure 2. Method flow chart.

"Regulation on Bikeways" (Official Gazette, 2019) and the relevant standards were also examined in detail. At this stage, natural (climate, topographical features, vegetation cover) and socio-cultural structure characteristics (population, transportation facilities, and data on bicycle transportation, current land use status, protected areas) of Merkezefendi and Pamukkale districts were revealed. These data were obtained through interviews with the institutions and organizations described in the material section, plans, projects, and reports made by these institutions, as well as field observations and surveys.

In the second phase of the study, qualitative and quantitative studies were conducted to analyze the opinions of the participant groups. At this phase, the Delphi technique was utilized, and expert opinions and the opinions of the public (to use questionnaires) and bicycle users living in Denizli were consulted. Thus, the consistency, accuracy, and reliability of the data obtained (by using qualitative and quantitative data together) were tested.

In the third phase of the research, criteria influencing bicycle usage in Denizli were determined by evaluating data obtained from expert forms through the Delphi technique and survey applications. Within the framework of these criteria, field studies were carried out, and the suitability of the roads for bicycle use was evaluated using the weighting method. Evaluations were made in terms of suitability for bicycle use in the transportation network providing access to 2 centers (Pamukkale University and Çamlık Park) in Denizli city, where people want to reach by bicycles. In the final phase of the research, utilizing all this data, the suitability of roads in Denizli for bicycle usage was determined and mapped. The methods and techniques used in these study phases are described below:

Delphi Technique

The Delphi technique is a valuable tool for collecting data when researchers need insights from relevant individuals in the problem-solving phase. This technique, conducted in three stages with multidisciplinary participation, involved experts from both technical (2 architects, 3 landscape architects, 1 map technician, 3 urban planners, or 4 civil engineers) and sociological (3 NGOs, 1 public health specialist, 1 sociologist) disciplines. The Delphi technique survey consisted of three rounds, with responses analyzed from 18 experts in the first round, 17 experts in the second round, and 15 experts in the third round. Previous studies by Karacaoğlu (2009), Gencturk & Akbas (2013), Meijering et al. (2015), Kalaycı (2017), Adu-McVie et al. (2021), and Lei et al. (2023) faced similar situations, concluding their research when the number of expert feedbacks was acceptably more than the minimum required (7 experts). Following this approach, the data collection phase of the research using the Delphi technique was concluded by evaluating the opinions of 15 experts.

In the first part of the Delphi questionnaire, there were statements (11) related to the determination of the demographic structure of the participants. In the second part, opinions about the evaluation criteria were included. In this section, experts were asked to express their opinions on the main evaluation criteria that are thought to have an impact on cycling comfort in urban transportation. After the completion of the first-round Delphi technique survey, the responses of all experts were compiled and evaluated. Based on this evaluation, criteria that could be considered in creating a bicycle path were categorized, and second-round survey forms were prepared. The second-round survey form, prepared using standard forms, was sent to experts with adjustments based on a 5-point Likert scale. The results obtained from the second-round survey were re-evaluated. Following the second-round evaluation, a third-round survey form was created. At the end of the research, criteria with a consensus among experts were determined through statistical analyses. These agreed-upon criteria were then utilized in the assessment of the suitability of roads for bicycle use.

Questionnaire

Concurrently with the Delphi technique, a survey was conducted with 863 people using face-to-face interview techniques through standard forms for individuals residing in the Denizli city center. The purpose of the survey was to determine the opinions of individuals within the study area regarding bicycle usage. Data obtained from the survey

forms were coded, computerized, and evaluated using IBM Statistics SPSS Version 20.0 software. Frequency analysis was conducted to determine the socio-economic characteristics of the participants, their levels of participation in the survey scales, and the frequency of respondents. To assess the suitability of comparison tests for two or more variables, normality testing was performed using the "Kolmogorov-Smirnov" and "Shapiro-Wilk Test."

AHP; Multi-Criteria Factor and Weighting

In the third phase of the study, various methods were explored to identify suitable roads for bicycle usage. Although multi-criteria methods have been widely used in the transportation context (Giuliano, 1985; Schwartz & Eichhorn, 1997; Yedla & Shrestha, 2003; Tudela et al., 2006; Macharis & Pekin, 2009; Chow et al., 2013), limited applications have been found in bicycle transportation research so far (Gold, 1980 (utilized by Altunkasa et al., 2006); Aultman-Hall et al., 1997; Altunkasa et al., 2006; Hsu & Lin, 2011; Milakis & Athanasopoulos, 2014). The criteria for the methods used in the study were developed by drawing on the mentioned studies for value assignment and calculation. A new evaluation framework (Table 1) was created to align with the research objectives and the study area. In the assignment and calculation of the values of the criteria, an evaluation system was created in accordance with the purpose of the study (Table 1). The subunits of the evaluation factors were given scores ranging from "-1 to +3" (-1 is not appropriate, +1 is slightly appropriate, +2 is appropriate, and +3 is very appropriate).

In the final phase of the research, utilizing all this data, the suitability of roads in Denizli for bicycle usage was determined and mapped. In this context, maps for each criterion affecting bicycle usage in the city center of Denizli were prepared in ArcGIS. These maps were evaluated using the Analytic Hierarchy Process (AHP), one of the multi-criteria decision-making methods, to identify roads suitable for bicycle usage. The AHP was applied in ArcGIS using the "Weighted Overlay" sub-tool under the "Overlay" function in the "Spatial Analyst Tools" of the "Arctoolbox." As a result of the analysis, the roads in the city center were classified based on their suitability for bicycle usage. Thus, the suitability of roads for bicycle usage in the city center was determined. In this context, urban roads were categorized into 4 groups based on suitability levels: not suitable, less suitable, suitable, and highly suitable. However, recognizing that this classification alone was insufficient, a systematic proposal for a bicycle network covering the entire study area of Denizli was developed, considering the connection of the roads with determined suitability levels to existing bicycle paths within the city. The aim was to create comprehensive and safe bicycle riding areas within the city.

FINDINGS

In this section, the characteristics of the area and the results of quantitative and qualitative research are presented. In line with the findings, the suitability of the roads for bicycle usage is discussed and presented using the analytical hierarchy process, one of the multi-criteria decision-making methods.

Features of the Area

The features of the research area that affect bicycle usage and routes were examined under the titles of natural and socio-cultural structure.

Natural Features

Climate features: The average temperature in Denizli is 16.2 °C, the average relative humidity is 59.3%, and the average total precipitation is 571.9 mm according to the long-term averages (1957-2019) (Table 2). Considering the studies on the effect of urban climatic comfort on the rate of bicycle use, it was necessary to evaluate the climatic data in the city. At this stage, the climate characteristics of the city were evaluated using Denizli Provincial Directorate of Meteorology (DPDM, 2019) climate stations' data. Thermal comfort/biocomfort distribution was calculated using the discomfort index (temperature-relative humidity relationship) and classes formulated by Cetin et al. (2019). The study area is located within the comfort zone in terms of thermal comfort classifications.

Topographic features: Slope is an important factor affecting comfortable and safe cycling. Slope is categorized as 0-2% (8.79%), 2-6% (25.60%), 6-12% (22.04%), 12-20% (17.22%), 20-30% (11.99%), and 30+% (14.22%). Aspect also has some influence on bicycle use. It is important in terms of providing comfort by considering the prevailing wind direction in the city center. In rural areas, it affects recreation and mountain biking route determination studies more. According to the results of the aspect analysis in Denizli city, the areas with West (15.08%), Southwest (14.11%), North (14.12%), and Northeast (13.67%) aspects have the highest rates.

Vegetation: In densely populated urban areas, the anthropogenic effects on natural and sensitive areas, as well as protected areas, tend to be more significant compared to rural areas. Additionally, aesthetic/visual concerns within the city and the misdirection by local authorities often result in the frequent use of exotic plant species (*Acer negundo, Ailanthus altissima, Albizia julibrissin, Koelreuteria paniculata, Lagerstromia indica, Liriodendron tulipifera, Magnolia grandiflora, Melia azedarach, Morus platanifolia, Morus papyrifera, Paulownia tomentosa, Prunus cerasifera 'Nigra', Robinia pseudoacacia, Sophora japonica, etc.*) in urban landscape applications. All these factors contribute to the reduction of natural vegetation within the city, and

Table 1. Evaluation criteria and suitability values

Evaluation Criterion	Sub-Criteria	Score*
Road Widths (RW)	2,75 m ≤ RW < 5,50 m	+1
	5,50 m ≤ RW < 11,00 m	+2
	11,00 m ≤ RW ≤ 20,00 m	+3
Sidewalk Width (SW)	SW < 2,90 m	-1
	2,90 m ≤ SW < 4,00 m (one-way bicycle path)	+1
	4,00 m ≤ SW < 5,40 m (two-way bicycle path)	+2
	5,40 m ≤ SW ≤ 10,00 m (two-way bicycle path and green strip)	+3
Slope-Distance Relationship	< %5,00 (distance not significant)	+3
	%5,00 ≤ Slope < %7,00 (max. 240 m)	+2
	%7,00 ≤ Slope < %8,00 (max. 120 m)	+1
	%8,00 ≤ Slope < %9,00 (max. 90 m)	
	%9,00 ≤ Slope < %10,00 (max. 60 m)	-1
	Other (roads not suitable according to the Bicycle Paths Regulation in terms of Slope-Distance relationship)	
Parking Condition	Roads Without Parking	+2
	Parked Roads	+1
Road Usage Status	Pedestrianized Street	+2
	One-way Vehicle Road	
	Two-way Vehicle Road	+1
Traffic (flow) Speed (TS)	TS ≤ 30 km/h	+3
	30 km/sa < TS < 50 km/h	+2
	50 km/sa ≤ TS < 70 km/h	+1
	≥ 70 km/h	-1
Existing Bike Path Relationship	≤ 250,0 m.	+2
	> 250,0 m.	+1
Existing Bike Park Areas Relationship	≤ 250,0 m.	+2
	> 250,0 m.	+1
Existing Bike Share Stations Relationship	≤ 250,0 m.	+2
	> 250,0 m.	+1
Bike Maintenance Areas Relationship	≤ 250,0 m.	+2
	> 250,0 m.	+1
Relationship with Parks and Green Areas	Roads connected to parks and green areas	+2
	Roads not connected to parks and green areas	+1
Relationship with Public Transport (bus) Stops on Roads	Roads with stops	+2
	Roads without stops	+1
Existence of Traffic Signalizations on Roads	Roads with signalization	+2
	Roads without signalization	+1
Road/sidewalk Landscaping	Roads with suitable landscaping for bicycle use	+3
	Roads/sidewalks without landscaping (not hindering bicycle use)	+2
	Roads/sidewalks with faulty landscaping hindering bicycle use	+1

*-1 is not appropriate, +1 is slightly appropriate, +2 is appropriate, and +3 is very appropriate.

Table 2. Climatic data at Denizli climate station (using DPDM, 2019)

Climatic Data	Value
Average High Temperature (°C)	22.5
Average Low Temperature (°C)	10.7
Average Temperature (°C)	16.2
Average Relative Humidity (%)	59.3
Average High Relative Humidity (%)	93.1
Average Low Relative Humidity (%)	23.4
Average Total Precipitation (mm)	571.9
Average Number of Rainy Days	91.1
Average Wind Speed (m/sn)	1.3
Average Number of Stormy Days	5.7

research indicates that these areas may have a lower level of aesthetic/visual appreciation.

Studies conducted by Gürcan (2014) and Acar (2016) in the city center of Denizli reveal the presence of various plant cover types, including maquis, rock, forest, hygrophilic, and cultural vegetation types. The natural plant cover in Denizli city center encompasses 103 families, 379 genera, 568 species, and 576 taxa (Gürcan, 2014). Some common natural plant species observed in the city include *Arabis alpina* subsp. *brevifolia, Arbutus unedo, Asparagus acutifolius, Carlina biebersteinii* subsp. *brevibracteata, Cedrus libani, Cistus creticus, C. salviifolius, Dianthus elegans* var. *elegans, Juncus acutus* subsp. *acutus, Laurus nobilis, Lathyrus saxatilis, Platanus orientalis, Myrtus communis, Phillyrea latifolia, Pinus brutia, P. nigra, Pistacia terebinthus, Populus alba* subsp. *alba, Quercus coccifera, Q. petrea, Q. robur, Salix babylonica,* and *Vitex agnus-cactus*.

Socio-Cultural Features

Population: The population of Merkezefendi and Pamukkale districts has been steadily increasing. The population of Merkezefendi district was 336,818 in 2022, while Pamukkale district had a population of 347,926 (Turkish Statistical Institute, 2023). The presence of a university in Pamukkale district contributes to a higher number of young, dynamic individuals who are potentially inclined towards bicycle usage.

Transportation facilities and studies on bicycle transportation: Denizli, being a crucial intersection connecting the Aegean and Central Anatolia regions and recognized for its significance in agriculture, industry, and cultural tourism, has heavy motor vehicle traffic. According to the obtained data, as of the current situation, there are 14.85 km of bicycle lanes in the city center, and plans for proposed bicycle lanes have been made. However, it is noteworthy that as of 2022, the proportion of bicycle lanes within the transportation system in Denizli is only 0.63%. In addition, considering the city's population of 684,744 people in 2022 and the number of registered automobiles (215,984) and motorcycles (77,472), the motor vehicle ownership rate in the city is quite high, reaching 28.29%. This situation indicates the dominance of motor vehicles in the transportation preferences of the city's residents. The lack of connectivity among existing bicycle lanes contributes to the inadequacy of the bicycle transportation network. Consequently, due to insufficient bicycle infrastructure, the public perceives bicycle usage for transportation as unsafe.

Land cover: The land use status of Denizli city was evaluated according to the CORINE Level 3 land cover class. It is observed that coniferous forests have the largest share in the city, accounting for 24.67%. Continuous urban structure represents 2.71%, indicating that the city is continuously developing and there is a need for new settlements.

Protected areas: In terms of protected areas, the largest conservation area within Pamukkale district boundaries is the Pamukkale Special Environmental Protection Area (Pamukkale ÖÇKB-6,656 ha), with 97 registered conservation areas in the district. The protected areas within the district include various types such as ancient city (2), tumulus (5), archaeological site (13), necropolis area (10), marble quarry (1), rock tomb (8), cultural structure (7), religious structure (12), cemetery (6), civilian architecture example (36), agricultural industry structure (2), and military structures (Dağ & Mansuroğlu, 2023).

In the Merkezefendi district, the most well-known conservation area is the ancient city of Laodikeia, which is included in the Temporary Cultural Heritage List with reference number 5823 in UNESCO's meeting on April 15, 2013. In the district, there are 1 ancient city, 4 tumulus, 6 archaeological sites, 5 necropolis areas, 7 rock tombs, 12 cultural structures, 17 religious structures, 3 industrial structures, 3 cemeteries, and 58 examples of civilian architecture, totaling 112 registered conservation areas (Dağ & Mansuroğlu, 2023).

Delphi Technique and Questionnaire Application

Of the 18 experts who participated in the Delphi study, 16.7% were female, and 83.3% were male. Of these, 72.3% were married, 11.1% were single, and 5.6% were divorced. The youngest expert participating in the study was 30 years old (1 person) and the oldest was 55 years old (2 people), with the average age of the group being 41. Details about the participants' age, occupation, and education level are presented in Table 3.

Of the survey participants, 49.9% were female and 50.1% were male. The youngest respondent was 18 years old (48 people), and the oldest respondent was 78 years old (1 person), with an average age of 31.46 years. Participants in the 18-24 age group constituted the highest proportion

Table 3. Socio-economic characteristics of the expert group

Age	Percent (%)	Occupation	Percent (%)	Education Level	Percent (%)
30-34	33.3	Academician	44.4	High School/College	11.1
35-44	33.3	Civil Servant	33.3	University	33.3
45-54	22.2	Worker	5.6	Master's Degree	11.1
≥ 55	11.1	Private Sector	16.7	Doctorate	44.4

(45.3%), followed by the 25-34 age group (21.9%), the 35-44 age group (16.9%), the 45-54 age group (10.0%), the 55-64 age group (4.2%), and the 65 and over age group (1.7%). Some individuals beyond a certain age expressed a lack of interest in participating in the survey, possibly due to the common perception that bicycles are predominantly used by younger individuals. The rate of high school (46.3%) and university (34.1%) graduates is notable. Regarding occupations, 30.0% of participants are students, 16.3% are civil servants, and 13.6% work in the private sector (Table 4).

72.3% of the experts commute by car, 16.7% by public transportation, 5.6% on foot (1 km), and 5.6% by bicycle (6 km). Among the survey participants, 30.9% use private vehicles for transportation, 35.0% use public transportation, 19.0% walk, and 2.0% use bicycles regularly. 10.7% of private vehicle users mentioned that their transportation choice could be more economical; however, they continue to use a vehicle for the sake of shortening transportation time and comfort. Public transportation users express complaints about the overcrowding of vehicles (30.8%), lack of economic feasibility (25.4%), and untimeliness (22.4%). It was observed that bicycle users were satisfied with their transportation preferences. In Denizli, 78.8% of participants believe there is a traffic problem, and 37.1% consider infrastructure inadequacy as the most significant cause of traffic issues in the city. Additionally, participants believe that improving bicycle infrastructure will increase bicycle usage in the city (73.9%; mean: 3.97; Std. Dev.: 1.198; $p<0.001$) and partially solve transportation problems (76.1%; mean: 4.08; Std. Dev.: 1.125; $p<0.001$). Considering all these factors, the criteria to be considered for establishing a bicycle network in Denizli, based on the opinions of experts and survey participants, are presented in Table 5. After evaluations, 14 assessment criteria were identified for establishing bicycle infrastructure in Denizli, where there is a consensus between experts and bicycle users.

Determination of Multi-Criteria Factors and Weightings

In order to determine the multi-criteria factor weighting degrees, Delphi technique survey forms and data obtained from the questionnaire conducted with cyclists were used. Weight coefficients were graded according to the scores obtained. Accordingly, the difference between the highest (4.61) and the lowest (4.02) score (0.59) was calculated and proportioned to the total coefficient (3). The obtained value (0.19) was used to determine the weighting coefficient. According to Table 5, it is noteworthy that the priorities of experts and bicycle users in determining the evaluation criteria are different. For example, while experts prioritize safety-related criteria such as traffic flow speed and the presence of signalization, cyclists prioritize criteria related to road and sidewalk width, highlighting the importance of cycling comfort.

However, although cyclists indicate that the slope-distance relationship, an important criterion for cycling comfort, is of moderate importance (mean: 3.30), experts, approaching the issue technically, consider the importance level of the relevant criterion to be high (mean: 4.40) (Table 5). This situation is associated with bicycle users' awareness of the city having road features suitable for bicycle use in terms of slope distance. Additionally, differences in the opinions of experts and bicycle users are evident regarding the relationship between proposed bicycle paths and existing

Table 4. Socio-economic characteristics of the respondents

Age	Percent (%)	Occupation	Percent (%)	Education Level	Percent (%)
18-24	45.3	Civil Servant	16.3	Primary/Secondary S.	8.1
25-34	21.9	Worker	11.5	High school	46.3
35-44	16.9	Unemployed	5.9	High school (Univ.)	7.6
45-54	10.0	Student	30.0	University	34.1
55-64	4.2	Retired	5.6	Master/PhD	3.8
≥ 65	1.7	Private sector	13.6		
		Other	17.1		

Table 5. Evaluation criteria that can be used in the establishment of bicycle infrastructure according to the opinions of experts and bicycle users (public)

Evaluation Criterion	Experts' Opinions		Bicycle Users' Opinions		Average	Weight Degree
	Mean	SD	Mean	SD	Mean	
Traffic (Flow) Speed	4.80	0.41	4.12	1.09	4.46	3
Presence of Signalization	4.80	0.41	4.18	1.25	4.49	3
Road Widths	4.73	0.45	4.49	0.92	4.61	3
Sidewalk Width	4.73	0.45	4.49	0.92	4.61	3
Parking Condition	4.66	0.61	4.34	1.07	4.50	2
Relationship with Parks and Green Areas	4.60	0.50	4.26	0.97	4.43	2
Relationship with Existing Bicycle Parking Areas	4.60	0.50	4.39	0.99	4.49	2
Relationship with Existing Bicycle Paths	4.40	0.82	4.18	1.07	4.29	2
Slope-Distance Relationship	4.40	0.82	3.30	1.44	4.35	2
Relationship with Public Transport (Bus) Stops	4.53	0.51	4.41	0.99	4.47	1
Road Usage Status	4.46	0.51	3.58	1.37	4.02	1
Relationship with Bicycle Maintenance Areas	4.46	0.51	3.58	1.27	4.02	1
Relationship with Existing Bike Share Stations	4.46	0.51	3.58	1.27	4.02	1
Road/Sidewalk Landscaping	4.40	0.63	4.26	0.97	4.34	1

bicycle infrastructure. This is the consequence of the fact that existing bicycle infrastructure systems primarily serve recreational purposes. Thus, the hypothesis that more realistic and applicable planning studies can be conducted by considering expert and user opinions together is confirmed.

After obtaining responses from experts and bicycle users, the evaluation criteria used to determine the suitability of bicycle paths were examined based on the averages. Road and sidewalk widths received the highest score (4.61), while factors such as road usage status, relationship with bicycle maintenance areas, and relationship with existing bike share stations received the lowest score (4.02) (Table 5). Based on these criteria, factor degrees for the suitability of roads for bicycle use were determined according to the following suitability levels.

Evaluation of the Suitability of Urban Roads for Establishing a Bicycle Lane Network

According to 14 evaluation criteria, the suitability of the roads in the study area for the creation of a bicycle path network was evaluated (Figure 3). In terms of road widths, 56.69% of the roads in the study area are suitable for bicycle use (Figure 3a). The widest road in the study area is 20.00 m, while the narrowest is 3.00 m. The proportion of roads with a width between 11.00 m and 20.00 m (very suitable) is 11.08% (47.00 km). Roads with a width of 5.50 m to 11.00 m are suitable (56.69%; 240.25 km).

Sidewalks are mostly not suitable for bicycle use in terms of width (Figure 3b). The rate of roads with a sidewalk width of less than 2.90 m is 79.23%. 12.48% of sidewalks are 2.90-4.00 m wide and 4.48% are 4.00-5.40 m wide. Only 1.42 km of sidewalks have a width (5.40 m and above) suitable for the creation of two-way bicycle lanes and green belts.

Regarding the slope-distance relationship, the percentage of roads considered very suitable is 83.12% (Figure 3c). Roads with a slope between 5.00%-7.00% and a length of up to 240 m are suitable. For roads with a slope of 7.00%-8.00%, the maximum distance was 120 m. For roads with a slope of 8.00%-9.00%, the maximum distance was 90 m, and these roads were classified as less suitable.

In a significant part of the study area (64.62%), roads have parking, while the percentage of roads without parking is limited to 31.85% (Figure 3d). During the evaluation of the suitability of roads for bicycle use, roads with vehicle parking were considered as less suitable and roads without vehicle parking were considered as suitable because they negatively affect bicycle use (Figure 3d).

Pedestrianized streets (0.71%), one-way vehicle roads (12.58%), and two-way vehicle roads (83.18%) are present in the study area (Figure 3e). The percentage of roads with a traffic speed of 50 km/h and above is quite high (91.61% less suitable, 1.27% not suitable) in terms of traffic speed, and these roads are considered less suitable for bicycle use (Figure 3f).

Bicycle paths in the study area constitute only 3.52% of all

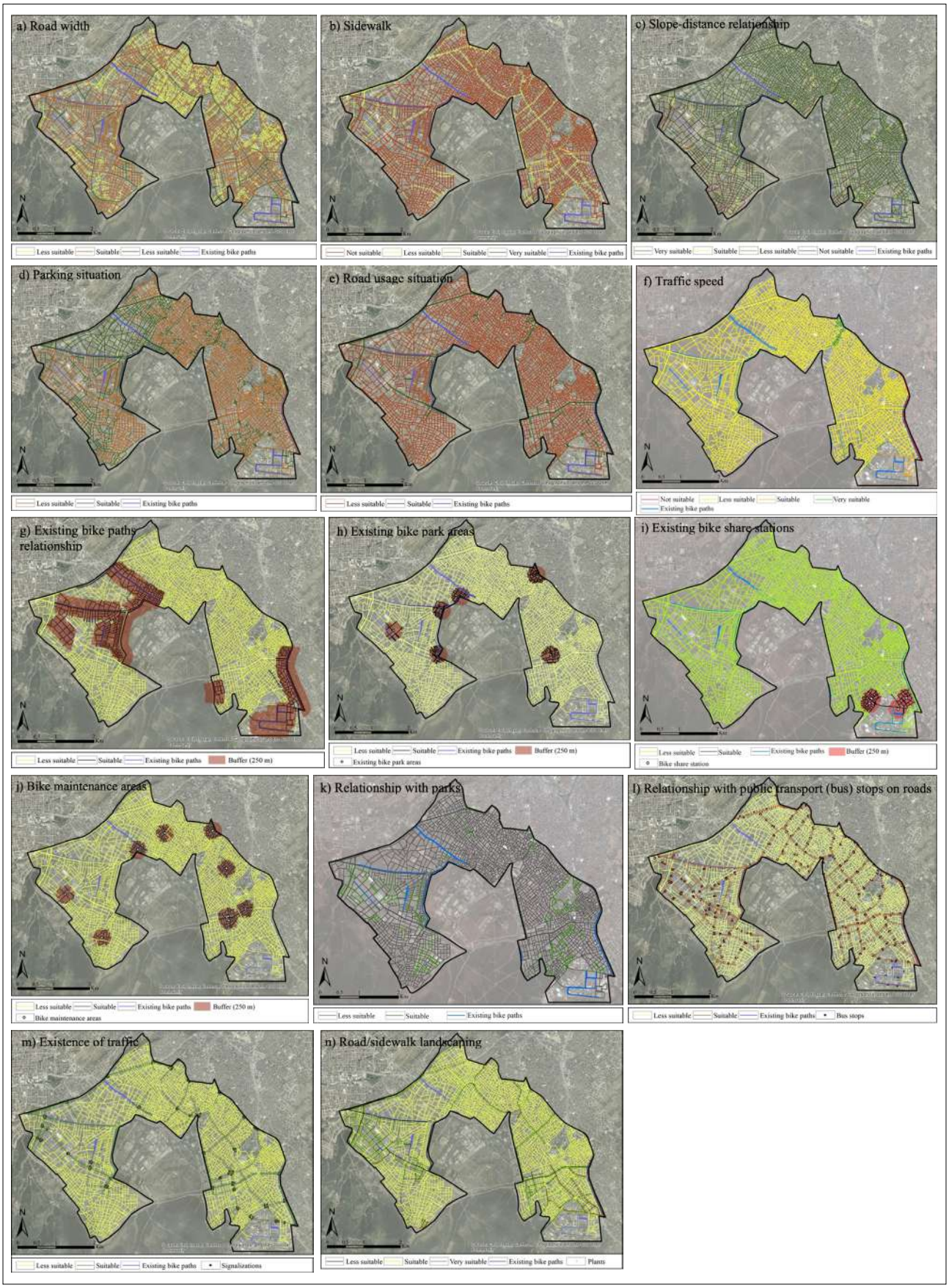

Figure 3. Suitability status of roads according to criteria.

roads (Figure 3g). Due to the inadequacy of existing bicycle paths (14.96 km) in Denizli city, the percentage of suitable roads related to existing bicycle roads is also quite low (19.03%). A total of 22.68 km (5.35%) of roads related to existing bicycle parking areas were identified as suitable for bicycle use (Figure 3h). Due to the low number of bicycle parking areas, the rate of unsuitable roads (91.11%) is quite high. Bike share stations within the study area cover 2.93% (12.44 km) of the roads according to the suitability zone (Figure 3i).

In terms of the relationship with bicycle maintenance/repair facilities that bicycle users may need at any time, 8.31% of the roads evaluated are suitable (Figure 3j). As a component of the urban green infrastructure system, the relationship of bicycle paths with existing green spaces should be taken into consideration (Figure 3k). In this context, roads that are connected to existing green spaces are considered suitable for bicycle use (11.66%), while roads that are not directly connected are considered less suitable (84.80%).

The public transportation (bus) vehicle route is considered suitable for bicycle use with the aim and objective of integrating bicycles into public transportation (Figure 3l). In this context, 20.27% of the roads within the boundaries of the study area (on which there is a bus stop) are considered suitable.

Roads with signalization are preferred by cyclists as they feel safer. Therefore, 70.66 km (16.67%) of roads with signalization in the study area are suitable for cycling (Figure 3m). In the study area, roads with vegetation suitable for cycling (13.49%) are very suitable. Roads with no planting were considered suitable (80.29%), and roads with faulty planting (2.68%) were considered less suitable (Figure 3n).

In the specific context of Denizli city, the suitability of roads for bicycle use was determined using a weighting technique based on the 14 evaluation criteria (Figure 4). In terms of bicycle use, there is 5.74 km (1.35%) of very suitable roads, 65.63 km (15.48%) of suitable roads, 242.89 km (57.30%) of less suitable roads, and 94.65 km (22.32%) of unsuitable roads in the research area.

CONCLUSION AND DISCUSSION

In this study, the natural and socio-cultural features of Denizli city were comprehensively evaluated using a landscape planning approach, and the suitability of roads for bicycle use was determined based on the criteria identified through the Delphi technique and a survey. Suitability maps for 14 criteria influencing bicycle use in Denizli were created, and these maps were evaluated using a weighting method to determine the suitability of roads for bicycle use in the city. As a result, the suitability of roads for bicycle use in the city center was revealed. In this context, urban roads were classified into four groups (not suitable, less suitable, suitable, and very suitable) based on their suitability levels. However, this classification alone was not sufficient. Considering the goal of creating comprehensive and safe cycling areas in the city, a systematic bicycle route network proposal was developed for the study area covering Denizli, considering the connection of the identified roads with existing bicycle paths. Criteria identified through the Delphi technique and user surveys were used in the development of the proposed bicycle route network, which considered factors such as the centrality of the route, the number of intersections, access to educational institutions (schools, education centers), readability, access to desired destinations (official buildings, squares, historical and cultural sites/structures, parks), and compatibility with existing bicycle infrastructure systems. The proposed bicycle route network is presented in Figure 5. A total of 26.49% of the roads within the study area are prioritized for

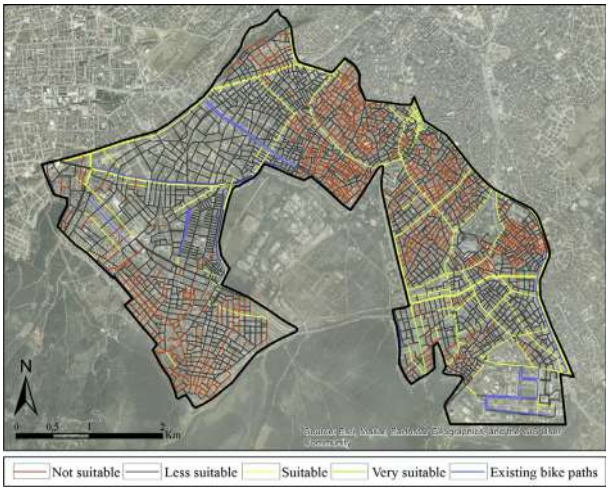

Figure 4. Suitability of roads for bicycle use.

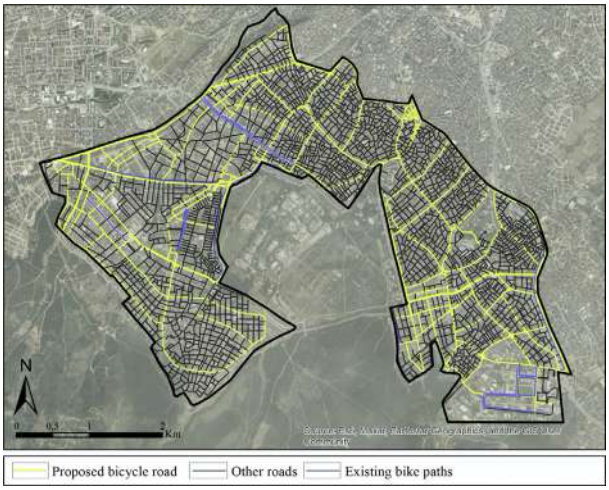

Figure 5. Proposed bicycle road network.

the proposed bicycle route network. The proposed bicycle route network exhibits a comprehensive structure covering the study area (Figure 5).

In this study, the weighting method of evaluation criteria used to determine the suitability of roads for bicycle use differs from previous studies. In the weighting of roads, Milakis & Athanasopoulos (2014) consulted the opinions of 10 professional cyclists, Altunkasa et al. (2006) consulted 10 design experts, 10 bicycle users, and 10 decision-makers (local government authorities), Cengiz & Kahvecioğlu (2016) consulted 10 cyclists, and Sönmez (2019) consulted the opinions of 5 landscape architects, 5 architects, 5 urban planners, and 5 cyclists. Alkılınç et al. (2021), Özkan et al. (2020), and Hsu & Lin (2011) did not provide any information about the number and characteristics of the expert group in their studies that mentioned relying on expert opinions for the weighting of criteria. Çeyiz & Koçak (2015) conducted interviews with 12 professionals, and Mansuroğlu & Dağ (2019) interviewed 30 professional cyclists to identify problems encountered in bicycle use. In the scope of this study, an interdisciplinary approach was followed in determining and weighing the criteria used to evaluate the suitability of roads for bicycle use, as stated in the Bicycle Paths Regulation (Official Gazette, 2019). In this context, both user (public) surveys and expert opinions were consulted.

The route selection model for bicycles is much more complex than the model used for motorized vehicles. This is because there are many criteria that influence cyclists' route selection decisions (Ryu et al., 2021). The evaluation criteria used in the research were determined through Delphi technique expert surveys and evaluations conducted in Denizli, in line with the opinions of bicycle users. In this context, compared to other studies, a comprehensive study has been conducted both in terms of the stages of determining the criteria and the versatility of the criteria used. Comprehensive participatory principles were utilized, and all roads were experienced by the researcher by bicycle. Such a comprehensive study has not been encountered in previous research. Many studies have focused on limited evaluations (explained in the introduction section), which allows limited evaluations. Criteria such as the relationship with bicycle maintenance places and the relationship with existing bike share stations were evaluated for the first time within the framework of comprehensive planning methodology in this study.

In conclusion, it is considered that the bicycle infrastructure system in Denizli is insufficient; there are limited safe and comfortable cycling areas within the city, and for the fulfillment of the increasing transportation needs in the city, the bicycle should be seen as a means of transportation. It is thought that this can be achieved by implementing the bicycle infrastructure system as a transportation network model. It is crucial to consider ecological and technical data prepared with landscape plans that preserve these values and contribute to the preparation of transportation plans in cities with important values in terms of natural, cultural, and social features. This is important for ensuring urban integrity, and it is essential to consider the participatory demands of urban residents.

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Article

Determination of the relationship between housing characteristics and housing prices before and after the Kahramanmaraş earthquake using machine learning: A case study of Adana, Türkiye

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ABSTRACT

Earthquakes have a significant impact on the real estate sector. Damage caused by earthquakes leads to an imbalance in the supply and demand for housing, thus temporarily causing stagnation in the real estate sector. Two earthquakes occurred in the Pazarcık and Elbistan districts of Kahramanmaraş on February 6, 2023, at 04:17 am with a magnitude of 7.7 and at 13:24 pm with a magnitude of 7.6. A machine learning-based model was created to analyze the change in house prices and the variables affecting the price during the earthquake, which is called "the Disaster of the Century." After the earthquake, the prices of houses for sale in the central districts of Adana province (Seyhan, Yüreğir, Sarıçam, and Çukurova), where there was the least damage, were collected from the relevant website with a web scraper. These data were classified as categorical and numerical datasets, and the necessary pre-processing stage for machine learning algorithms was performed. The characteristics that change and are effective in housing preferences before the earthquake (February 2022) and after the earthquake (February 2023) were determined by the decision tree method, which is one of the machine learning algorithms. In this context, it is aimed to determine the housing variables that are effective in before- and after-earthquake pricing in the central districts of Adana province. In the study, while 'Building Age and Number of Rooms' are effective in determining the price in 2022, 'Housing Shape and Facade' features come to the fore in 2023. The housing characteristics that affect the price change in two years. The change in housing preference criteria after the earthquake shows that the lifestyle in cities has also changed. According to this change, it requires the development of new approaches in urban design and planning approaches and is expected to be a reference for future studies.

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INTRODUCTION

Türkiye is geographically located on the North Anatolian, East Anatolian, and West Anatolian fault lines. Among these, the North Anatolian and East Anatolian Faults are the active fault lines (Caglar et al., 2023). There were 269 earthquakes that caused damage in Türkiye between 1900 and 2023. According to the Republic of Türkiye Presidency Strategy and Budget Directorate (TCCSBB) Kahramanmaraş and Hatay Earthquakes Report (TCCSBB, 2023), the largest earthquakes in terms of damage were, respectively, the Kahramanmaraş, 2023, Gölcük 1999, and Erzincan-centred 1939 earthquakes. On February 6, 2023, earthquakes occurred in Türkiye at 04:17 and 13:24 Turkish time, demonstrating this damage once again. According to the TCCSBB, (2023), two earthquakes of magnitude 7.7 and 7.6 occurred in districts of Kahramanmaraş (Pazarcık and Elbistan). This severe earthquake was felt over a wide area in southeastern Türkiye (Adana, Adıyaman, Diyarbakır, Elazığ, Gaziantep, Hatay, Malatya, Kahramanmaraş, Kilis, Osmaniye, Şanlıurfa provinces) and northwestern Syria. According to Turkish Statistical Institute (TÜİK) data, 14,013,196 people were affected (KRDAE, 2023; TÜİK, 2023a). The official report on the Kahramanmaraş earthquake stated that many people were trapped under the buildings due to the severity of the earthquake.

This caused extensive damage to the region, with over 45,000 people reported dead and many injured (Dal Zilio & Ampuero, 2023). According to the TCCSBB Kahramanmaraş and Hatay Earthquake Report, the cities of Hatay, Kahramanmaraş, Adıyaman, and Malatya were identified as the cities with the highest destruction. In total, damage assessment studies were conducted on 1,712,182 buildings in 11 provinces. Accordingly, it was determined that 35,355 buildings were destroyed, 31,421 buildings were slightly damaged, 40,228 buildings were moderately damaged, and 179,786 buildings were severely damaged. 46,640 independent units in 6849 buildings were moderately damaged and 439,647 independent units in 59,995 buildings were slightly damaged (TCCSBB, 2023).

Earthquakes, which cause large-scale damages, negatively affect the economy at regional and national levels and many sectors. One of these is the real estate sector. After the earthquake, there are changes in the prices of housing and land in the disaster area, causing a decrease in sales rates as people will not prefer to buy real estate in the earthquake zone (Beron et al., 1997; Nakagawa et al., 2009; Naoi et al., 2009). In addition, the purchase and sale of real estate for investment purposes will slow down in areas with high earthquake risk.

Related Work

There are many studies examining the impact of earthquakes on house prices, but most of these do not use machine learning methods.

The study by Brookshire et al. (1985) calculated the change in housing prices in earthquake-prone areas in California. They concluded that earthquakes directly affect prices. In another study conducted in California, the hedonic model was used to analyze housing prices before and after the earthquake. This study especially focused on the post-earthquake market values of single-family houses (Beron et al., 1997). There are many similar studies conducted in California. These studies emphasize that earthquake risk reduces housing prices (Beron et al., 1997; Brookshire et al., 1985; Fekrazad, 2019; Jung & Smith, 2022; Murdoch et al., 1993; Singh, 2019).

Similar results were obtained in Japan, a country where earthquakes are quite frequent. After severe earthquakes in Japan, earthquake risk maps were created using geographic information systems (GIS) and associated with house prices using a hedonic model. Accordingly, it was revealed that housing prices were lower in areas with high earthquake risk (Nakagawa et al., 2007). In another study, the effect of earthquake risk on land prices in the Tokyo metropolitan area was examined (Nakagawa et al., 2009). This study revealed that land with high earthquake risk is priced approximately 8% less than land with lower risk.

However, these studies were not very successful in establishing a relationship between earthquake risk and variables affecting house prices. The effect of such variables (housing variables, environmental variables, etc.) on house prices and their relation with earthquake risk maps in Japan was analyzed using a hedonic price model (Naoi et al., 2009). This study showed that housing prices decreased after the earthquake risk maps were created and stated that houses in earthquake risk areas were more discounted.

Hidano et al. (2015) investigated the impact of earthquake risk on real estate prices in Tokyo. They compared the Two-Dimensional Regression Discontinuity (2DRD) model, hedonic model, and the traditional one-dimensional regression (RD) approach. They found that housing prices fall in earthquake-prone areas and that newly constructed buildings are more resistant to earthquakes. The study emphasized that 2DRD was better than traditional approaches.

In another study examining the effects of earthquakes on the economy and housing, three different results were obtained with the hedonic model (Koster & Ommeren, 2015). According to this: (a) houses are sold at lower prices due to the damage caused by earthquakes, (b) people prefer to sell their houses as damaged buildings are repaired after earthquakes, leading to an oversupply, (c) demand for houses in the region decreases due to the fear that future earthquakes will cause more damage, leading to lower prices.

Lara-Pulido et al. (2022) analyzed the short- and medium-term effects of the earthquake in Mexico on the housing market using a hedonic model. As a result, they stated that

people's lack of sufficient information about the earthquake risk or the lack of proper understanding of the earthquake risk had an impact on real estate prices.

Several studies have reported that the hedonic model (HM) is often used to identify post-earthquake price changes (Beron et al., 1997; Hidano et al., 2015; Lara-Pulido et al., 2022; Murdoch et al., 1993; Nakagawa et al., 2007; Nakagawa et al., 2009; Naoi et al., 2009). However, hedonic models such as regression-based computation focus on numerical prices and their categorical price classification performance is generally poor (Yücebaş et al., 2022). Therefore, regression-based price estimation is not preferred in this study. According to the methods and analyses used in current studies, it is determined that real estate prices depreciated due to the earthquake (Beron et al., 1997; Murdoch et al., 1993; Nakagawa et al., 2007, 2009; Naoi et al., 2009).

However, the existing literature has not analyzed in detail the features affecting house prices before and after the earthquake using machine learning methods.

Although Adana has the largest population in the earthquake zone, it was the least affected by earthquake damage. In this study, a machine learning-based model is developed to analyze the change in house prices and the variables affecting the price before and after the earthquake. For the related study, pre-earthquake (February 2022) and post-earthquake (February 2023) house prices in the central districts of Adana province were collected via a web scraper. A machine learning model based on decision trees is built over this data to reveal the variables that affect house prices before and after the earthquake and to reveal any changes.

This study is designed to fill the gaps explained above and to reveal the potential of the decision tree model to explain the housing variables that are effective in pre- and post-earthquake pricing.

MATERIALS AND METHODS

Study Area

Adana province is located at coordinates 37.5005°N 35.715°D in the Çukurova, the Mediterranean Region in southern Türkiye (Figure 1). It is bordered by Kayseri to the north, Osmaniye to the east, Kahramanmaraş to the northeast, Hatay to the southeast, Niğde to the northwest, and Mersin to the west. According to the Turkish Statistical Institute (TÜİK) data for the year 2022, Adana is the 7th largest city in Türkiye with a population of 2,274,106. The area of the province is 13,844 km^2. It has 15 districts, five of which are central (Seyhan, Yüreğir, Sarıçam, Çukurova) and has 831 neighborhoods (Wikipedia, 2023; TÜİK, 2023b). In 2022, the population of Çukurova, Sarıçam, Seyhan, and Yüreğir districts was

Figure 1. Location of the study area.

389,195, 221,733, 795,012, and 404,726 respectively. Sarıçam district has the highest annual population growth rate of 62.8% in Adana province (TÜİK, 2023a).

Material

In order to build a decision tree model, two datasets covering house sales in the four main districts of Adana (Seyhan, Yüreğir, Çukurova, and Sarıçam) before the earthquake (February 2022) and after the earthquake (February 2023) were created through a web scraper. Two datasets, pre- and post-earthquake, were created by removing extreme data and uncommon variables (pre-processing) from the house sale prices collected from the open access internet sales site (HepsiEmlak, 2023) using the web scraper. In the pre-earthquake dataset, 3017 sales data and in the post-earthquake dataset, 3391 sales data were made ready for analysis with 11 variables (Table 1).

Table 1. Variables and data types

Variables	Data Type
Current Floor	Numeric
Number of Floors	Numeric
Unit Price (TL)	Categorical
Area Attribute (m2)	Categorical
Residential Type	Categorical
Building Age	Categorical
Heating	Categorical
Number of Rooms	Categorical
Building Type	Categorical
Facade	Categorical
District	Categorical

As Table 1 indicates, data types are numeric and categorical. Furthermore, the range of values of numeric variables is also inherently wide. When we tested the available data, we found that this caused the decision tree to branch too much and, in some cases, the data was memorized by the software. To avoid this, some of the numeric data sets have been converted into categorical data types. The price and area variables are categorized into three classes as 'High,' 'Medium,' and 'Low.' Standard deviation (σ) and mean ($\bar{x}$) are used to determine the range of values in these classes. The formulas (1,2,3) used are given below (Yücebaş et al., 2022).

$$\textbf{Low} = [MinUnit\_Price, MinUnit\_Price + \sigma] \quad (1)$$

$$\textbf{Medium} = [MinUnit\_Price + \sigma + 1, \bar{x} + \sigma] \quad (2)$$

$$\textbf{High} = [\bar{x} + \sigma + 1, MaxUnit\_Price] \quad (3)$$

After the transformation, there are 1537 low-priced, 1167 medium-priced, and 315 high-priced houses in the pre-earthquake dataset. In the post-earthquake dataset, there are 1786 low-priced, 1345 mid-priced, and 260 high-priced houses. Using the same formulas for the area attribute, there are 76 low, 2723 medium, and 217 high area attribute houses in the pre-earthquake dataset. In the post-earthquake dataset, there are 439 low, 2687 medium, and 265 high area attribute houses. In the case of building age, the range of values in the attribute is very sparse. The average building age in the pre-earthquake (2022) dataset is 10, and the average building age in the post-earthquake (2023) dataset is similarly 10. Therefore, the boundary value 10 was accepted as the average value and divided into 2 classes. Apart from these variables, for the 'Building Age' variable, buildings newer than 10 years are categorized as 'New,' and buildings older than 10 years are categorized as 'Old.' With this transformation, there are 1540 new and 1476 old buildings in the pre-earthquake dataset; and there are 1924 new and 1467 old buildings in the post-earthquake dataset. Variables, their value ranges, and frequencies of each value range are given in Table 2.

According to Table 2, the most preferred residential type in the central districts of Adana is 'Flat,' the most common heating type is 'Combi boiler,' and the most preferred building type is 'Reinforced Concrete' structures. In addition, the most common number of rooms is '3+1,' and these dwellings are mostly '3 Facade.'

In this dataset, the number of houses with a 1+1 number of rooms between 2022 and 2023 is higher. This may be an indication that affordable houses are being built in Adana. In addition, the increase in the number of houses with 4 facades in 2023 compared to 2022 is also noteworthy in the real estate sector. The tables in which the variables are analyzed in detail in terms of frequency, mean, standard deviation, minimum, and maximum values of the datasets obtained with the web scraper before and after the earthquake are given below. The purpose of analyzing these tables is to provide a better understanding of the datasets used for decision trees (Table 3 and Table 4).

Since the mean, standard deviation, minimum, and maximum values with less than 2 frequency cannot be calculated, they are not shown in Table 3 and Table 4. In Pre-Earthquake, the maximum price was 5,000,000 and the minimum price was 400,000, while in Post-Earthquake the maximum and minimum prices were 15,000,000 and 600,000 respectively. In Pre-Earthquake, the minimum value for the area attribute was 45 m^2 and the maximum was 950 m^2. In Post-Earthquake, the minimum value for the area attribute was 35 m^2 and the maximum area attribute was 980 m^2. For the number of rooms variable, it is observed that the average price and area attributes generally increase as the number of rooms increases. However, the opposite was observed for the current floor variable. In Pre-Earthquake and Post-Earthquake, the minimum current floor of the houses was current floor (0), while the maximum current floor of the houses was on the 21st floor. As the number of rooms increases, the current floor number and the number of floors generally decrease. In Pre-Earthquake, the houses with the highest number of rooms were detached houses. The building age variable varies according to the differences in the number of rooms. The minimum building age was 0, while the maximum building age was 45. In the number of floors variable, it is seen that in Pre-Earthquake and Post-Earthquake, there were buildings with a minimum number of 1 floor and a maximum number of 27 floors (Table 3 and Table 4).

The change in the average price of houses for sale in Adana province before and after the earthquake is analyzed and presented in Figure 2.

In 2022, the average prices in Çukurova, Sarıçam, Seyhan, and Yüreğir districts are similar. However, in 2023, there is a significant increase in the prices of houses for sale, especially in Çukurova and Seyhan districts.

Method

Decision trees are among the most widely used algorithms in machine learning (Salzberg L., 1994). It is preferred because the result of the decision tree is visually easier to interpret. In this study, decision trees were used to analyze the change in house prices and to determine the affecting variables before and after the earthquake. The decision tree determines the most discriminative variable in the training set (T) and assigns it to the root node of the tree. While there are several metrics to calculate the discriminative power of the variables, entropy-based Information Gain is widely used (Salzberg L., 1994). If we assume the target variable as X, the number of values that the target variable can take as n, and the number of values that the predictor variable can take as v (Paul &

Table 2. Species and frequency values in the dataset

Variable	Type	Frequency Pre Earthquake (2022)	Frequency Post Earthquake (2023)
Residential Type	Flat	2773	3132
	Detached House	128	175
	Residance	10	10
	Villa	107	75
Heating	Not Specified	63	50
	Natural Gaz Stove	21	31
	Solar Energy	33	38
	No Heating	105	110
	Floor Heating	10	19
	Air Conditioning	490	629
	Boiler	2177	2362
	Central	116	91
	Stove	39	83
	Underfloor Heating	1	10
Building Type	Reinforced Concrete	2986	3381
	Steel	4	3
	Brick	8	3
	Stone	19	5
Facade	Single Facades	103	179
	2 Facades	523	525
	3 Facades	1932	2073
	4 Facades	458	615
Number of Room	1+0	0	1
	1+1	76	214
	2+1	420	643
	3+1	1691	1565
	3+2	2	2
	4+1	628	848
	4+2	14	6
	5+1	99	56
	5+2	13	11
	5+3	0	2
	6+1	15	13
	6+2	7	6
	6+3	8	5
	7+1	6	2
	7+2	3	4
	7+3	2	2
	8+1	23	0
	8+2	1	4
	8+3	3	4
	9+3	6	2

Table 3. Standard (std.) deviation, mean, min-max values by number of rooms (Pre-earthquake: February 2022)

Number of Room	Frequency	Parameter	Unit Price	Area Attribute (m^2)	Current Floor	Building Age	Number of Floor
1+1	76	Mean	574.753	63	5	2	10
		Std. Dev.	90.972	13	4	2	4
		Min.	400.000	45	0	0	3
		Max.	720.000	120	12	6	18
2+1	420	Mean	732.550	123	5	7	10
		Std. Dev.	264.307	34	4	9	4
		Min.	405.000	65	0	0	1
		Max.	3,250,00	366	18	40	20
3+1	1691	Mean	1.009.438	170	6	12	10
		Std. Dev.	323.896	32	4	10	4
		Min.	410.000	100	0	0	1
		Max.	3.750.000	510	20	45	24
4+1	628	Mean	1.620.302	225	7	12	11
		Std. Dev.	562.625	173	4	8	4
		Min.	440.000	130	0	0	1
		Max.	4.250.000	950	18	40	26
4+2	14	Mean	1.184.540	368	3	11	5
		Std. Dev.	632.372	226	4	9	5
		Min.	435.000	130	1	1	2
		Max.	4.873.000	726	18	30	19
5+1	98	Mean	2.331.727	299	6	12	9
		Std. Dev.	1.132.498	102	4	9	5
		Min.	620.000	130	1	0	1
		Max.	4.950.000	720	21	35	25
5+2	13	Mean	1.194.878	305	3	11	6
		Std. Dev.	623.119	109	3	10	5
		Min.	465.000	100	2	0	2
		Max.	4.750.000	450	11	30	16
6+1	15	Mean	1.241.750	357	9	13	8
		Std. Dev.	648.766	111	5	9	6
		Min.	550.000	110	2	0	2
		Max.	5.000.000	550	21	35	22
6+2	7	Mean	1.446.645	383	5	14	3
		Std. Dev.	415.929	167	2	7	1
		Min.	980.000	220	1	6	2
		Max.	3.000.000	700	6	25	4
6+3	8	Mean	954.741	222	6	21	3
		Std. Dev.	253	123	2	9	0
		Min.	490.000	100	2	7	3
		Max.	1.425.000	420	6	35	4
7+1	6	Mean	2.066.609	378	9	8	8

Table 3. Standard (std.) deviation, mean, min-max values by number of rooms (Pre-earthquake: February 2022) (Cont.)

Number of Room	Frequency	Parameter	Unit Price	Area Attribute (m²)	Current Floor	Building Age	Number of Floor
		Std. Dev.	596.628	65	5	5	6
		Min.	1.450.000	300	6	0	4
		Max.	3.800.000	450	19	13	20
7+2	3	Mean	2.076.818	450	2	8	3
		Std. Dev.	467.310	87	0	6	0
		Min.	1.569.000	400	2	2	3
		Max.	3.400.000	500	2	13	4
8+1	23	Mean	1.159.346	397	6	11	4
		Std. Dev.	550.631	67	1	7	0
		Min.	450.000	210	1	5	2
		Max.	3.500.000	500	6	40	4
8+3	3	Mean	1.372.111	245	2	25	3
		Std. Dev.	146.004	153	0	9	1
		Min.	1.150.000	140	2	15	2
		Max.	1.700.000	420	2	30	4
9+3	6	Mean	1.157.057	323	2	19	3
		Std. Dev.	329.561	123	3	8	0
		Min.	685.000	193	2	5	3
		Max.	2.150.000	50	3	25	3

Thomas, 2016), then information gain can be calculated as follows:

$$\sum_{i=1}^{m} (pi \log_2 pi) \quad (1)$$

$$\sum_{j=1}^{v} \frac{|xj|}{|x|} x\ Entropy\ (Xj) \quad (2)$$

$$Information\ Gain\ (T,X)=Entropy\ (T)-Entropy\ (T,X) \quad (3)$$

The tree starts branching according to the predictor variable that provides the highest information gain. The process tests all predicted variables to form sub-branches. In this study, the maximum depth for the decision tree was set to 8, and pre-pruning was applied to prevent overtraining. The minimum gain variable for pre-pruning was set as 0.01, and the minimum number of data for a leaf (min samples leaf) was set as 2.

The dataset contains both categorical and numeric data. Due to the high number of numeric data, it is difficult to read the tree as it increases the branching in the decision tree. For this reason, some numeric variables were converted to categorical data types. The remaining numeric variables (current floor and number of rooms) were left as numeric since they are the main factors affecting housing preferences. Since both numeric and categorical data are used together, the C4.5 algorithm (Salzberg L., 1994) with the information gain ratio was used for classification.

Decision Tree Modeling

In this section, decision tree models established with pre-earthquake (2022) and post-earthquake (2023) data are compared (Figure 3-Figure 10). Since the size of the decision tree models is very large, they do not fit in a single figure. For this reason, the sub-branches of the trees are given separately. In all figures, % indicate the decision certainty of the price prediction. In some branches of the decision tree, the classification rate may be 100% when going to the leaves. This indicates that all examples belonging to that leaf belong to the same class and does not mean overfitting. It indicates that the samples in that leaf have a homogeneous distribution under the decision path. Overfitting and underfitting are terms for an entire learning model (Montesinos López et al., 2022). They are measured through the overall performance metrics of the model (Aliferis & Simon, 2024). If these metrics, for example, accuracy and/or precision, are very high (close to 100%), and/or the test performance of the model is higher than the training performance, overfitting may be suspected. However, when we look at the performance metrics given in Table 5 and Table 6, there is no concern of overfitting. Overfitting can be suspected if all samples belonging to any class are 100% distributed across all leaves in the tree.

Table 4. Standard (std.) deviation, mean, min-max values according to the number of rooms + halls (Post-erathquake: February 2023)

Number of Room	Frequency	Parameter	Unit Price	Area Attribute (m2)	Current Floor	Building Age	Number of Floor
1+1	214	Mean	965.981	66	4	2	11
		Std. Dev.	302.022	17	3	4	3
		Min.	600.000	35	0	0	1
		Max.	2.000.000	203	13	26	22
2+1	643	Mean	1.441.740	118	5	7	9
		Std. Dev.	505.666	28	4	9	4
		Min.	610.000	50	0	0	1
		Max.	4.500.000	300	21	40	22
3+1	1566	Mean	2.178.079	170	5	12	10
		Std. Dev.	910.008	43	4	10	4
		Min.	620.000	70	0	0	1
		Max.	10.900.000	750	21	45	27
4+1	848	Mean	3.538.704	221	6	12	11
		Std. Dev.	1.494.036	48	4	8	4
		Min.	930.000	125	0	0	1
		Max.	15.000.000	800	21	42	27
4+2	6	Mean	2.011.667	249	1	23	3
		Std. Dev.	1.371.210	111	1	8	4
		Min.	750.000	150	0	10	2
		Max.	4.120.000	418	2	31	11
5+1	56	Mean	5.945.482	301	6	13	10
		Std. Dev.	3.383.456	92	4	11	5
		Min.	1.200.000	150	0	0	2
		Max.	15.000.000	750	16	45	21
5+2	11	Mean	5.405.909	368	3	13	5
		Std. Dev.	2.806.926	190	4	10	4
		Min.	1.400.000	165	0	0	2
		Max.	9.500.000	800	15	26	15
6+1	13	Mean	8.567.308	420	6	7	8
		Std. Dev.	4.158.392	150	6	6	7
		Min.	3.100.000	240	0	0	2
		Max.	15.000.000	750	21	20	25
6+2	6	Mean	4.208.333	329	4	4	5
		Std. Dev.	2.164.351	139	4	10	3
		Min.	2.000.000	150	2	6	2
		Max.	7.400.000	550	11	31	11
6+3	5	Mean	6.126.000	395	2	11	3
		Std. Dev.	5.725.022	202	1	8	1
		Min.	730.000	140	0	0	3
		Max.	14.500.000	600	2	20	4

Table 4. Standard (std.) deviation, mean, min-max values according to the number of rooms + halls (Post-erathquake: February 2023) (Cont.)

Number of Room	Frequency	Parameter	Unit Price	Area Attribute (m2)	Current Floor	Building Age	Number of Floor
7+2	4	Mean	8.900.000	367	2	6	3
		Std. Dev.	2.802.380	217	0	5	1
		Min.	5.400.000	120	2	0	2
		Max.	12.000.000	650	2	10	4
8+2	4	Mean	10.198.750	702	3	15	9
		Std. Dev.	3.203.853	210	3	12	6
		Min.	8.500.000	540	0	0	4
		Max.	15.000.000	980	6	25	14
8+3	4	Mean	10.198.750	702	3	15	9
		Std. Dev.	3.203.853	210	3	12	6
		Min.	8.500.000	540	0	0	4
		Max.	15.000.000	980	6	25	14

The most distinctive variable for both years is the 'Area' variable (Figure 3). The pre-earthquake decision tree is divided into three branches (Number of Rooms, District, and Heating) according to whether the area variable is low, medium, or high. The post-earthquake decision tree is branched to Facade, Heating, and Residential Type. When the variables that form the branches in the first levels of these trees are examined, it is seen that variables affecting the house price changed after the earthquake, and the importance of residential type and facade variables increased (Figure 3).

In 2022 (pre-earthquake), for houses with a low area variable, the number of rooms is the most important variable as it is included in the tree root. 1+1 and 2+1 houses are projected to be low-priced. The price prediction of houses with a 3+1

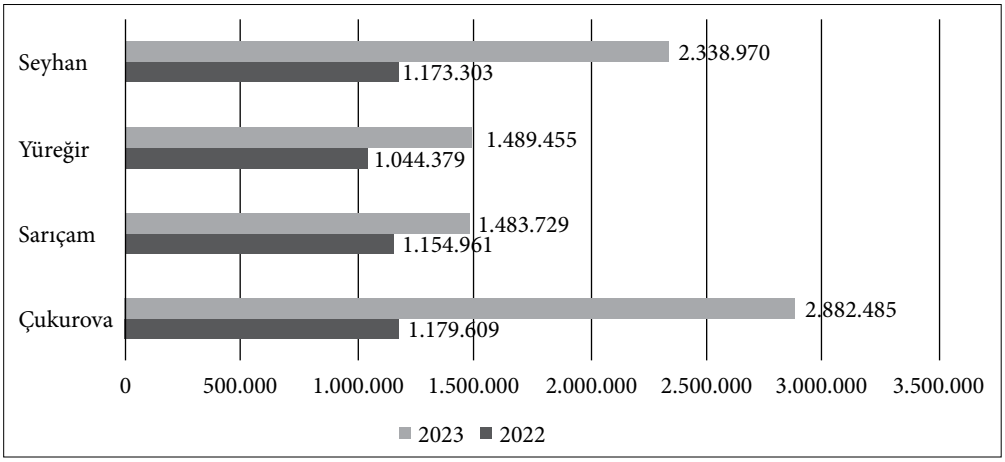

Figure 2. Change in the average price of houses for sale before and after the earthquake.

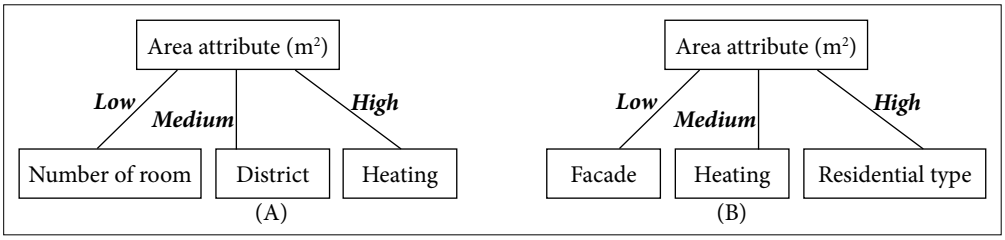

Figure 3. First two branches of the decision tree A: Pre-earthquake and B: Post-earthquake.

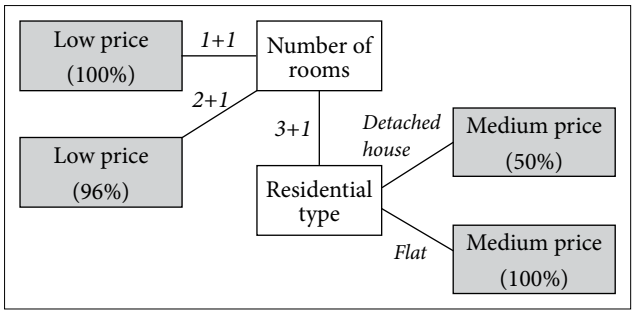

Figure 4. Pre-earthquake, sub tree for low area attribute.

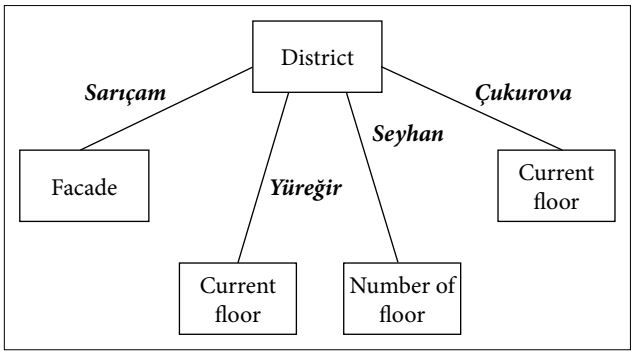

Figure 5. Pre earthquake, decision tree for dwellings with medium area attribute.

number of rooms is based on the residential type variable. For these, detached houses and flats are considered to be medium-priced (Figure 4).

In the decision tree model in Figure 5, the most important variable for houses with a medium area variable in 2022 is the district. At the 2nd level, the facade in Sarıçam district, the number of floors in Yüreğir and Çukurova, and the number of floors in Seyhan were found to be important variables. Since the branching in the tree is very high and the district with the highest price change between 2022 and 2023 is Çukurova district (Figure 2), the decision tree model for this district is given.

In 2022, the most important variable affecting the price of flats for sale in Çukurova, which has a medium area variable, is the floor variable. Facade and building age variables are at the 2nd level of the tree. Number of floors, number of rooms, and residential type are assigned to lower levels. Accordingly, detached houses with an older building age are moderately priced; villas with more than 2.5 floors are low priced, while houses with less than 2.5 floors are high priced. In flats, it is seen that houses with a 2+1 number of rooms are low priced, while the branching continues in 3+1 and 4+1 according to different variables. The decision tree model is given in Figure 6.

It is found that the heating type variable affects price for both pre- and post-earthquake. This variable is related to the high area variable for the pre-earthquake dataset while it is related to the medium area variable for the post-earthquake dataset. The decision tree for dwellings with a high area variable in 2022 is given in Figure 7.

The floor and residential type variables are found at levels 2 and 3 of the tree. Accordingly, houses with 2 facades were determined as medium priced, houses with 4 facades and a floor greater than 2.5 were determined as high priced, and houses with a floor less than 2.5 were determined as low priced. For 3-fronted dwellings, if the floor is less than or equal to 3, it is moderately priced, and if it is greater than 3, the residential type is considered.

The 2023 sub-tree for houses with a low area variable is presented in Figure 8. According to the figure, the most important variable affecting the price for houses with a low area attribute is the facade. However, the most important variable for houses with a low area attribute in 2022 is the number of rooms (Figure 4). In the tree for 2023, when the sub-branches of the area variable are analyzed, houses with one facade, 2 and 4 facades are classified as low priced. For houses with 3 facades, the district variable comes forward.

When the District sub-branch is followed, the price prediction of Çukurova and Yüreğir districts is determined as low priced. In Sarıçam district, residential type stands out, with flat and detached houses being low priced. In Seyhan district, houses with less than 3.5 floors are considered to be low priced.

For the 2023 dataset, the most important variable affecting the price for houses with a medium area variable is the heating type (Figure 9). For the 2022 dataset, the most important variable affecting the price of houses with a medium area variable is the district (Figure 5). It is seen that houses with 4 facades and a 4+1 number of rooms with air conditioning heating type are moderately priced. Houses with a 2+1 number of rooms are low priced. When the number of rooms variable takes the value of 3+1, the houses in Seyhan, Yüreğir, and Çukurova districts are determined as low priced. In Seyhan district, the floor is checked as the next variable. Houses with 2.5 floors or less are determined as low priced, and the certainty rate is 100%. Buildings above 2.5 floors are also considered low priced, but the certainty rate is 50%.

In 2023, the most important variable affecting the price of houses with a medium area variable is the heating type. While in 2022, the most important variable affecting the price of houses with a medium area variable is the district (Figure 5).

When Figure 9 is analyzed, it is seen that the most important variables in pricing are residential type, number of floors, number of rooms, and the floor on which it is located. Other variables are the age of the building and the district. It is seen that houses with 4 facades and a 4+1 number of rooms with

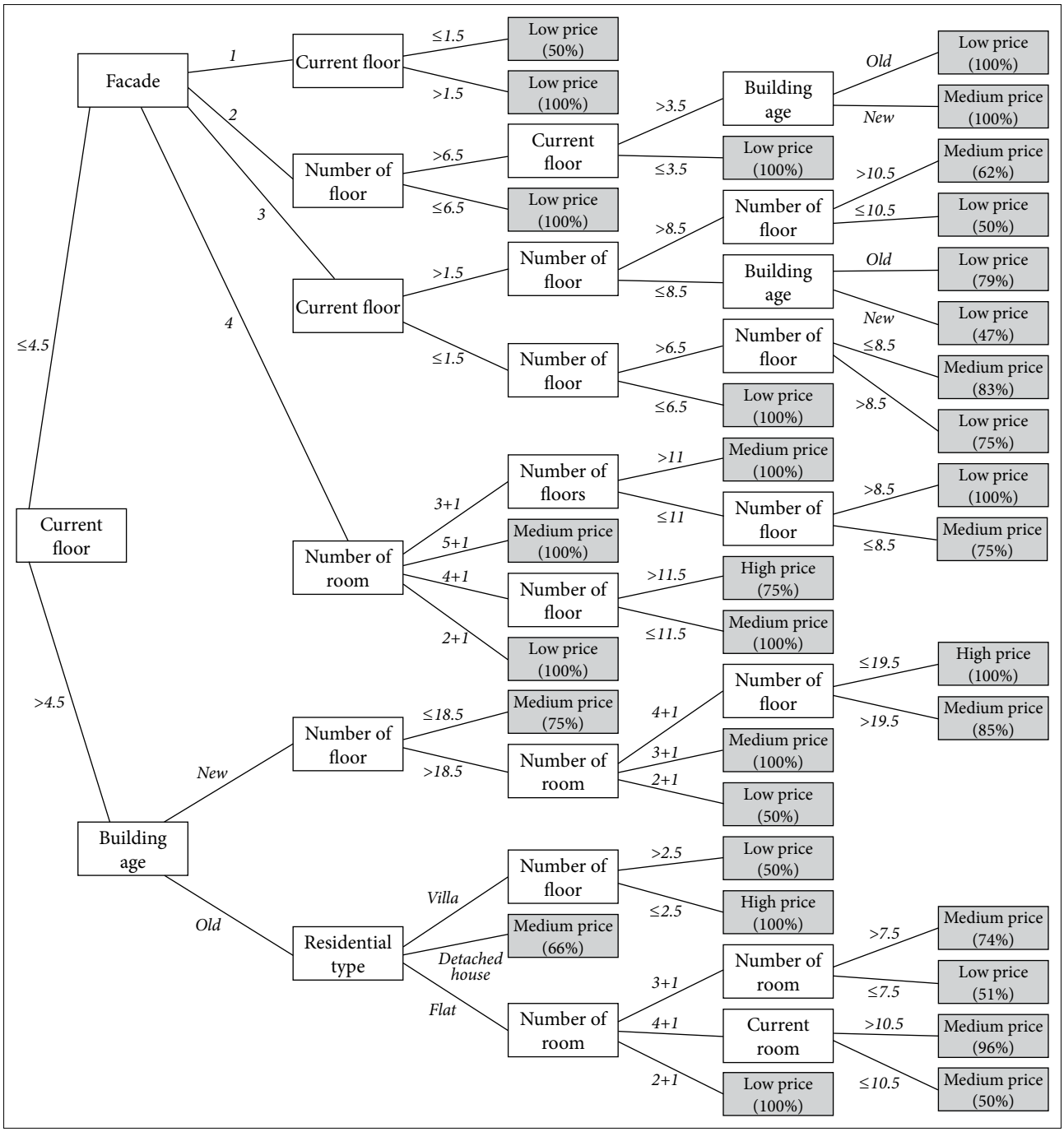

Figure 6. Pre-earthquake; Decision tree for Çukurova province with medium area attribute.

air conditioning are moderately priced. Houses with a 2+1 number of rooms are low priced. When the number of rooms variable takes the value of 3+1, the houses in Seyhan, Yüreğir, and Çukurova districts are determined as low priced. In Seyhan district, the floor is checked as the next variable. Houses with 2.5 floors or less are determined as low priced. Buildings above 2.5 floors are also considered low priced.

For houses with 3 facades, the district variable is checked first. In Yüreğir district, houses with 3 facades with air conditioning are predicted to be low priced (Figure 9). In Sarıçam district, the next variable, the type of housing, is checked, and it is seen that detached and flat-type houses are low priced. In Seyhan district, the next variable, which is the floor, is checked. Houses with 4.5 floors and below are low priced. For houses with a floor above 9.5, it is low priced, and if it is below 9.5, the number of floors variable is important. Houses with more than 6.5 floors are considered moderately priced, while houses with less than 6.5 floors are considered low priced. In Çukurova

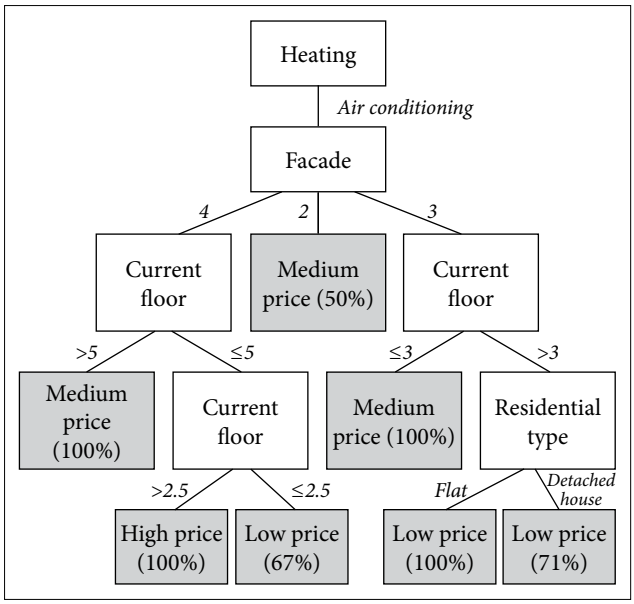

Figure 7. Decision tree for dwellings with high area attribute in 2022.

district, the floor variable is checked. If the current floor is above 9.5, the medium price is determined, while if the current floor is less than 9.5, the current floor becomes more important. Houses with less than 3 floors are predicted to be low priced, while for houses with more than 3 floors, the number of rooms variable is important. In Çukurova, houses with a 3+1 and 2+1 number of rooms are considered low priced, while 4+1 houses are predicted as medium priced (Figure 9). Similarly, the other branches of the tree can be read by following the lines to the right.

In 2023, the most important variable for dwellings with a high area variable is the residential type. For detached houses, flats, and villas, the most important variable is the number of floors. The details of the corresponding subtree are given in Figure 10. Residence-type houses are considered to be high priced. District, building age, heating, facade, and floor variables are assigned to lower levels.

Evaluation of Decision Tree Models

The variables affecting the price in the decision tree models for February 2022 before the earthquake and February 2023 after the earthquake are shown in Figure 11. The importance level of these variables decreases from the root to the lower levels, and the levels in the model are shown between Level 1 and Level 5.

Pre- and post-earthquake trees are branched according to the 'Area' variable. In the pre-earthquake period, the variables 'Number of Rooms,' 'District,' and 'Heating Type' are at the first level, while in the post-earthquake period, 'Facade,' 'Heating Type,' and 'Residential Type' variables are important at the first level. For both datasets, the variables affecting the price vary, but it is noteworthy that the heating type variable is at the first level for both datasets. It can be said that the heating type is important in affecting the price due to the weather conditions of the region.

On February 6, 2023, the earthquake and the demolition of flimsy high-rise buildings increased the tendency of people to prefer detached houses. In this case, residential type stands out among the variables affecting the price in 2023. The fact that detached houses generally have multiple facades shows that the 'Facade' variable is also a significant determinant of the house price in 2023.

After the earthquake, the effect of building age on the price changed due to the demolition of non-durable buildings, regardless of whether they were new or old. In the 2022 decision tree model, the age of the building is at a higher level, while in 2023 its importance in determining the price decreases.

In 2022, the number of rooms is important in the factors affecting house prices. However, in 2023, this factor is

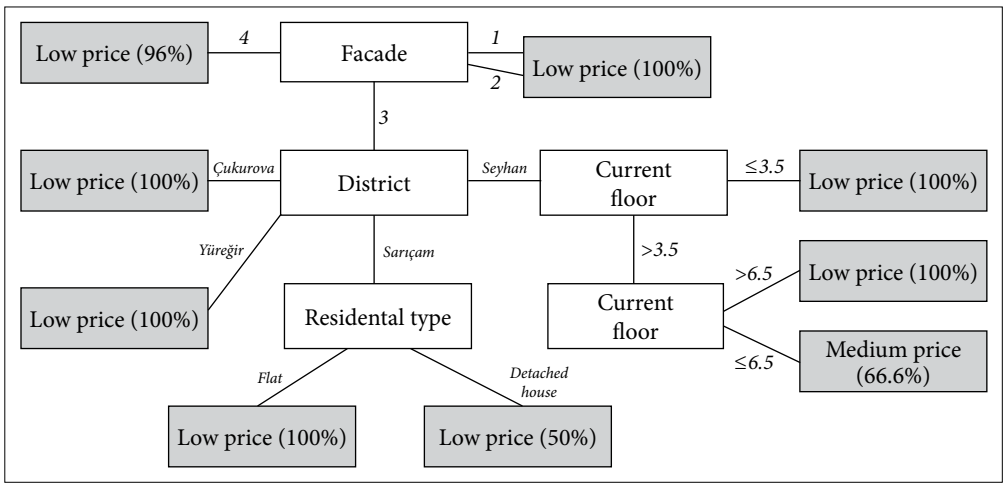

Figure 8. Decision tree for houses with low area attribute in 2023.

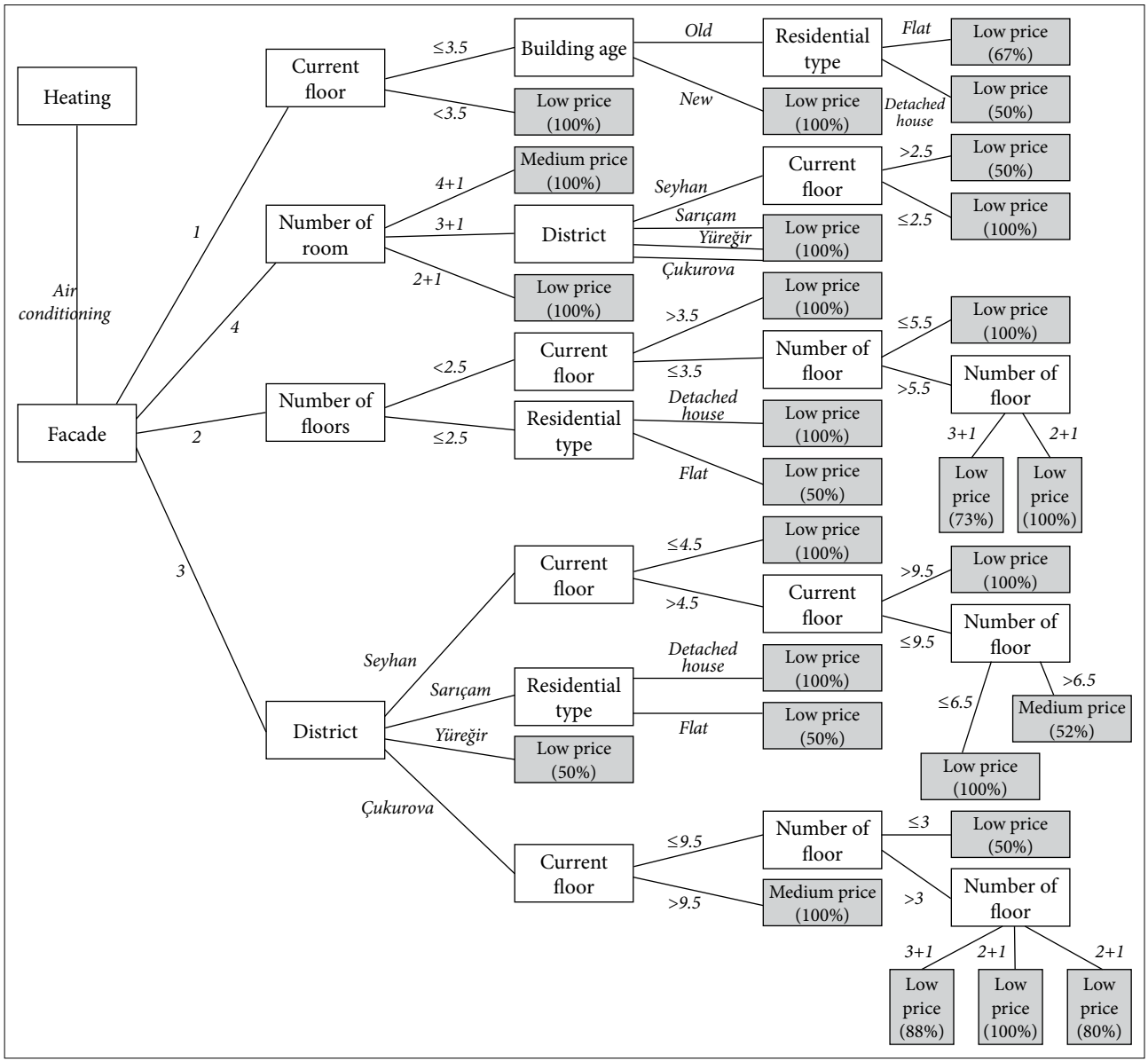

Figure 9. Decision tree for houses with medium area attribute in 2023.

found at lower levels of the decision tree. This shows that the number of rooms variable was more effective in the pre-earthquake period. The fact that this variable is less effective in housing preference criteria after the earthquake shows that the lifestyle in cities has changed.

Performance Evaluation of the Models

Accuracy was used to measure the prediction performance of decision tree models. Classification accuracy shows the rate of correct classification of the data in the sample. True Positive (TP) represents the result that the model correctly predicts the positive class, True Negative (TN) represents the result that correctly predicts the negative class, False Positive (FP) represents the result that incorrectly predicts the positive class, and False Negative (FN) represents the result that the model incorrectly predicts the negative class, and the way it is calculated is shown in formula (4) (Solanki et al., 2021).

$$\frac{True\ Positive(TP)+True\ Negative\ (TN)}{True\ Positive+False\ Positive\ (FP)+ True\ Negative+\ False\ Negative\ (FN)} \quad (4)$$

The accuracy values used to measure the success criteria of the decision tree model in this study are given in Table 5 and Table 6.

There are a total of 3 classes in the pre-earthquake cluster for the year 2022. There are 615 data in low class, 466 data in medium class and 126 data in high class. The accuracy of the pre-earthquake decision tree model is 71.33%.

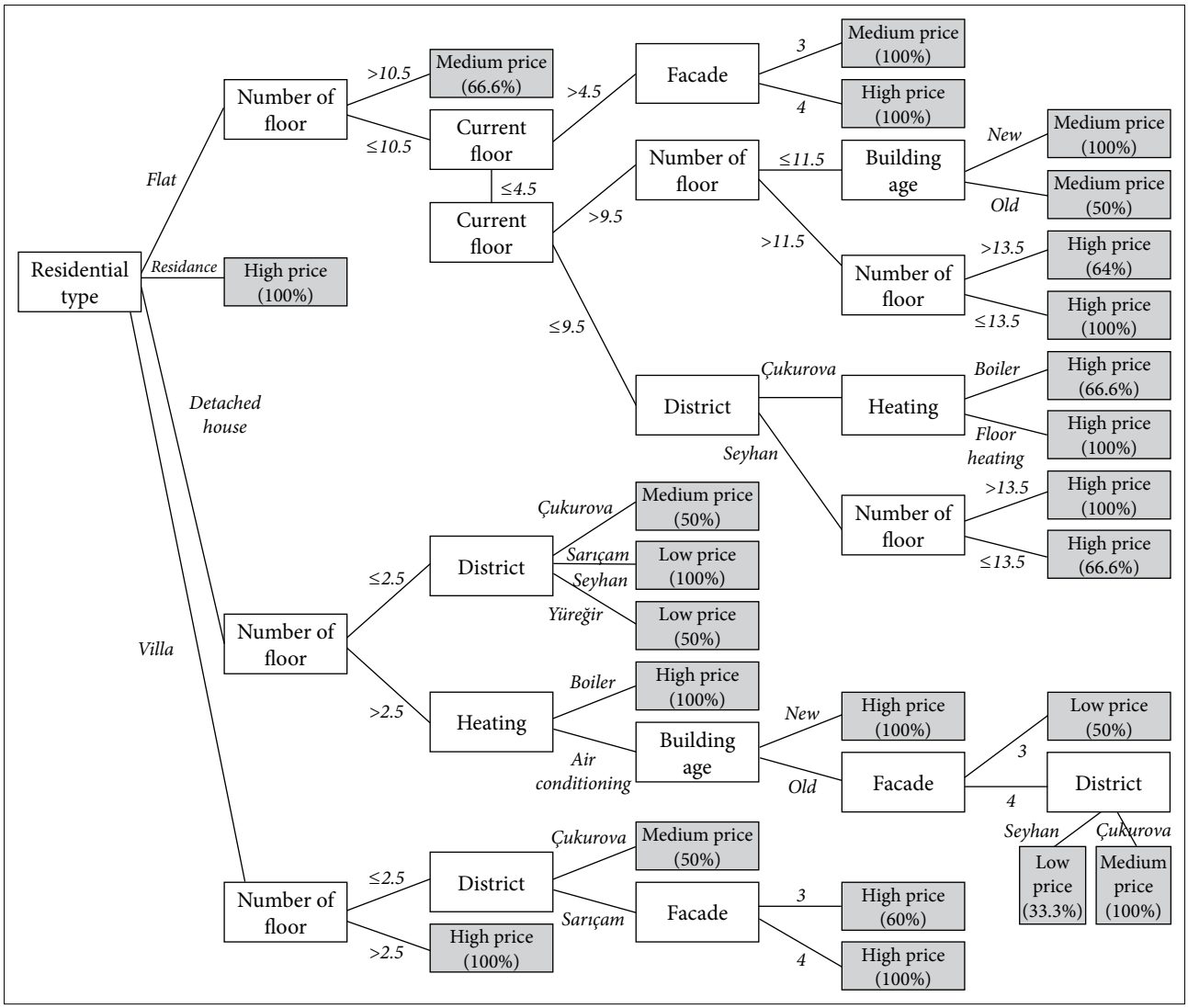

Figure 10. Decision tree for houses with high area attribute in 2023.

Table 5. Decision tree model performance values for 2022

Accuracy: %71.33	**Value**	**Actual**			
		Low	**Medium**	**High**	**Class Precision**
Model Prediction	Low	515	162	25	%73.36
	Medium	100	290	45	%66.67
	High	0	14	56	%80.00

Table 6. Decision tree model performance values for 2023

Accuracy: %74.63	**Value**	**Actual**			
		Low	**Medium**	**High**	**Class Precision**
Model Prediction	Low	584	144	18	78.28%
	Medium	128	383	41	69.38%
	High	2	11	45	77.59%

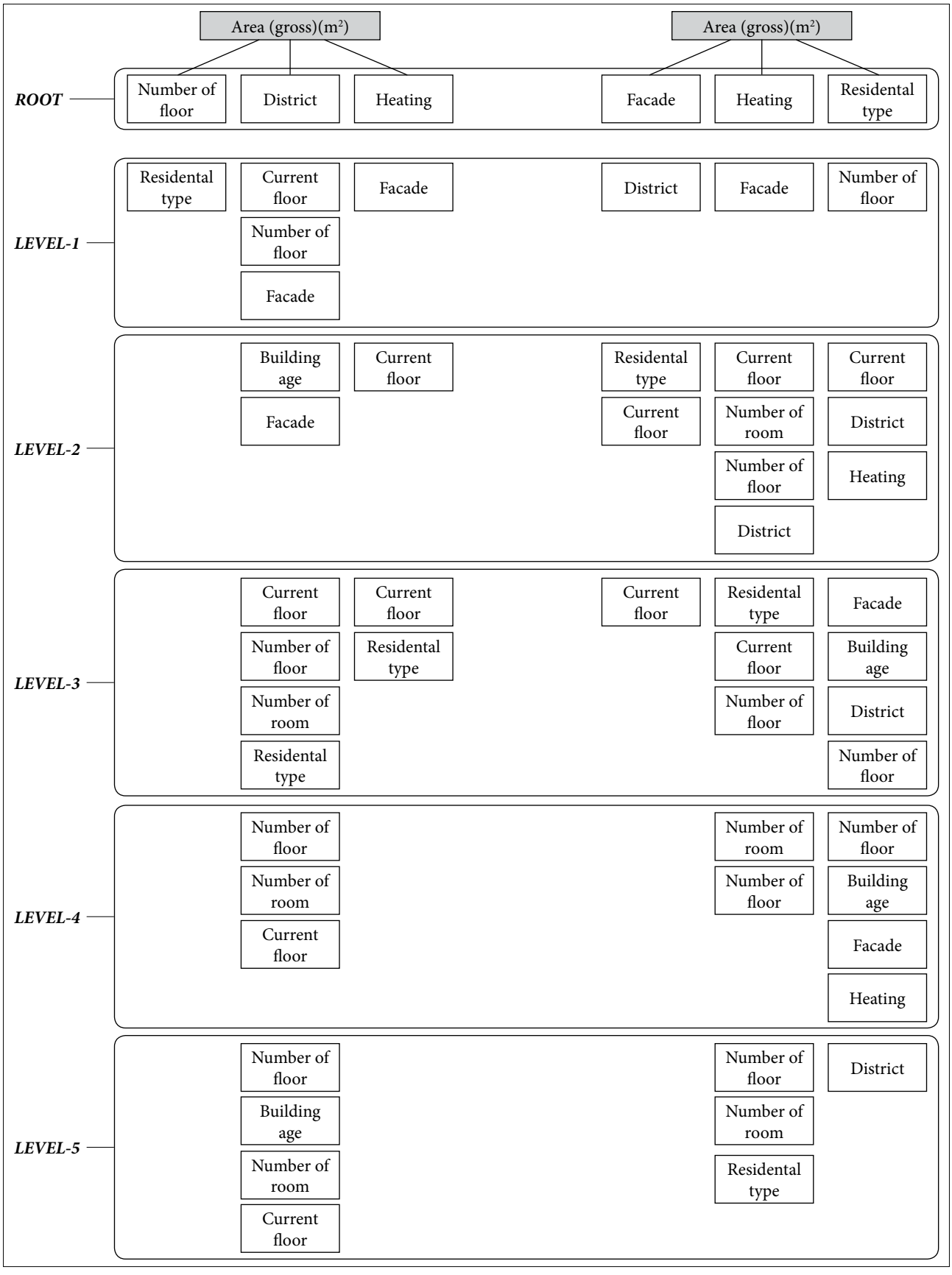

Figure 11. General representation of decision trees.

In the February 2023 dataset, there are 714 data in the low class, 538 data in the medium class, and 104 data in the high class. The accuracy of the decision tree was calculated as 74.63%. When the relevant tables are analyzed, it is seen that the model for 2023 has a better classification performance.

DISCUSSION AND CONCLUSION'

As houses in the region were directly or indirectly damaged after the 7.7 and 7.6 earthquakes in Kahramanmaraş and Gaziantep, Türkiye on February 6, 2023, the real estate sector in the region was also affected. The earthquake caused changes in house prices and variables affecting these prices. Price changes and the variables affecting the price were analyzed using machine learning.

The decision tree approach is used to compare the price change of house sales and variables affecting the price for both pre- and post-earthquake datasets. The central districts of Adana province (Seyhan, Yüreğir, Sarıçam, Çukurova) were chosen as the study area because it is the largest province in the earthquake zone, yet it suffered relatively less damage.

The prediction performance of the pre-earthquake model is 71.33%, while it is 74.63% in post-earthquake. For both models, the first branching occurred according to the area variable. The importance of this feature can be explained by the high population in the region. The socio-economic structure in the region may cause large families to live in a single house, and therefore structures with a high number of rooms may be preferred.

Features such as the number of rooms, district, and heating type were the determinants of housing preferences before the earthquake. Facade, heating type, and housing type were the reasons for preference in post-earthquake housing purchases. Due to the fact that Adana province is in a temperate region, housing purchase preferences, especially with air conditioning heating, have come to the fore. After the earthquake, it has been important in the sense that it strengthens the idea that there will be preferences for low-rise undamaged buildings, especially for detached houses. The preference for detached houses after the earthquake has automatically brought the facade feature to the forefront because detached houses have at least three facades. In this way, in addition to earthquake resistance standards, the variables revealed by the model can also be given importance in the new construction to be built in the region.

This study analyzes not only the earthquake effect but also the changes in house sales preferences before and after the earthquake and their impact on pricing. It cannot be said that these concepts are directly caused by the earthquake effect, but all the prominent features in house sales preferences are evaluated according to the results of decision trees.

Decision tree models were constructed to analyze the changes in house prices before and after the earthquake and to find the variables affecting the prices. Covering 11 provinces, Adana was chosen to be a quick representation and preliminary study of the disaster area. The study is a pioneering study that shows that machine learning models can be used successfully to reveal the price differences before and after the earthquake and to identify the variables affecting this change.

In order to reflect the overall situation in the earthquake region, more comprehensive datasets should be used, including the variability in the destruction rate and socioeconomic structure of all provinces in the region. The housing characteristics obtained for the creation of the database used in the study are limited to the characteristics provided by the open-source website. Another limiting factor is that the datasets were not collected in more than one month. The web scraper was able to access February 2022 and February 2023 housing data for a month before and after the earthquake. It is possible to obtain different results according to the damage in different areas of the earthquake zone and the data on the real estate website.

In parallel with increasing data size and detail, different machine learning models may also need to be used. Efforts have been initiated to create relevant datasets and model them with different machine learning methods.

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