Building materials are an essential element in building construction. Improving the properties of building materials is becoming increasingly important. Many different disciplines must be involved in this process to improve building materials. This book, prepared in this context and titled " ACADEMIC STUDIES IN THE FIELD OF BUILDING MATERIALS ", includes different studies and ideas in this field. This book, which is very useful for the scientific world, has emerged as a result of the meticulous preparation of different materials and subjects.



Arzu ÇAĞLAR (Ed.)

# ACADEMIC STUDIES IN THE FIELD OF BUILDING MATERIALS

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# ACADEMIC STUDIES IN THE FIELD OF BUILDING MATERIALS



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## 2. Chapter

### ANALYSIS OF THE URBAN TRANSFORMATION PROJECT IMPLEMENTED IN KIRŞEHİR/KAMAN WITH GEOGRAPHICAL INFORMATION SYSTEM (GIS)

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# EFFECT OF RICE HUSK ON SUSTAINABLE BRICK (IN THE CONTEXT OF POROSITY AND HEAT CONDUCTION COEFFICIENT)

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# Analysis of The Urban Transformation Project Implemented in Kırşehir/Kaman With Geographical Information System (GIS)

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**Abstract**

In this study, it is targeted to examine the urban transformation application carried out in Kaman district of Kırşehir province in terms of structure and to analyze it with Geographic Information System (GIS). In line with this goal, all data belonging to the urban transformation application area have been obtained. The evaluation was made on a yearly basis using the GIS method. Within the scope of Law No. 6306 "Transformation of Areas Under Disaster Risk", it is aimed to investigate the effects of this transformation on the district in the context of the social, cultural and economic characteristics of the city. The main purpose of the study is to evaluate the geographical locations and attribute data of disaster risky structures together. In the study, the structures and their qualities within the urban transformation application area were examined in detail. The structures constructed after the urban transformation were examined and documented on site. As a result of the study, it was determined that many structures of different qualities such as educational buildings, places of worship, banks, and art centers within the urban transformation application area were demolished. It was observed that only housing and workplaces were built in place of these demolished structures. It has been understood that the removal of social and cultural facilities such as health, education and art centers and the construction of only housing and

workplaces in their place has created a need for social and cultural facilities. Single-storey, two-storey or three-storey buildings within the urban transformation application area were demolished and replaced with block-shaped buildings consisting of ground floor + 6 floors. In satellite images taken with remote sensing method, it was observed that the building density in Kaman district and the urban transformation area increased over time. It is suggested that urban transformation practices continue in order to renew of the old face of the district.

**Key Words:** Urban transformation, GIS, remote sensing method, Kirsehir, Kaman

## Kırşehir/Kaman'da Uygulanan Kentsel Dönüşüm Projesinin Coğrafi Bilgi Sistemi (Cbs) İle Analizi



### Özet

Bu çalışmada, Kırşehir ili Kaman ilçesinde yapılan kentsel dönüşüm uygulamasının yapı bağlamında irdelenmesi ve Coğrafi Bilgi Sistemi (CBS) ile analiz edilmesi hedeflenmiştir. Bu hedef doğrultusunda, kentsel dönüşüm uygulaması alanına ait tüm veriler temin edilmiştir. CBS yöntemi kullanılarak yıl bazında değerlendirme yapılmıştır. 6306 sayılı kanun "Afet Riski Altındaki Alanların Dönüştürülmesi" kapsamında yapılan bu dönüşümün kentin sosyal, kültürel ve ekonomik özellikleri bağlamında ilçe üzerindeki etkilerinin araştırılması amaçlanmıştır. Çalışmanın başlıca amacı, afet riski taşıyan yapıların coğrafi konumları ve öznitelik verilerinin birlikte değerlendirilmesidir. Çalışmada, kentsel dönüşüm uygulama alanı içerisindeki yapılar ve nitelikleri detaylı bir şekilde irdelenmiştir. Kentsel dönüşüm sonrası yapılan yapılar yerinde incelenmiş ve belgelenmiştir. Çalışmada sonuç olarak, kentsel dönüşüm uygulama alanı içerisinde bulunan eğitim yapıları, ibadethane, banka, sanat merkezi gibi farklı nitelikte çok sayıda yapının yıkıldığı tespit edilmiştir. Yıkılan bu yapıların yerine sadece konut ve işyeri yapıldığı görülmüştür. Sağlık, eğitim, sanat merkezi gibi

sosyal ve kültürel donatıların kaldırılıp yerine sadece konut ve işyeri yapılması sosyal ve kültürel donatı ihtiyacını doğurduğu anlaşılmıştır. Kentsel dönüşüm uygulama alanı içerisindeki tek katlı, iki ya da üç katlı yapıların yıkılıp yerine zemin+6 kattan oluşan blok formunda yapılar yapılmıştır. Uzaktan algılama yöntemi ile alınan uydu görüntülerinde, zaman içerisinde, Kaman ilçesi ve kentsel dönüşüm alanı çevresinde yapı yoğunluğunun arttığı görülmüştür. İlçenin eski yüzünün yenilenmesi açısından kentsel dönüşüm uygulamalarının devam etmesi önerilmiştir.
**Anahtar Kelimeler:** Kentsel dönüşüm, CBS, uzaktan algılama yöntemi, Kırşehir, Kaman

## 1. Introduction

Cities are constantly experiencing changes. However, contemporary urban change processes are unique. Cities are groan under with interrelated challenges, such as pollution, poverty and inequality, aging infrastructure, and climate change (Haase et al. 2018; Seto et al. 2017). Urbanization in its current form causes significant changes in land use, energy demand, biodiversity and lifestyles. It raises questions about the contribution of cities to global and environmental change (Alberti et al. 2018). At the same time, cities are concentrating the conditions and resources to achieve the fundamental changes in energy, transportation, water use, land use, housing, consumption and lifestyles needed to ensure the livability, prosperity and sustainability of our (urban) future (Romero-Lankao et al. 2018).



While the primary goal of urban transformation is to improve the quality of built structures and urban environments, it has also given rise to new challenges. These include increasing population density, gentrification, unregulated and haphazard urban expansion, and the creation of fragmented, disconnected spatial systems on a larger scale (Sezgen, 2024).

When urban transformation is mentioned in Türkiye, it is understood as the improvement of shantytowns and the construction of safer housing against

earthquakes. In addition, due to the risk of reconstruction and earthquake in shantytowns as a result of illegal and unauthorized construction in the past, the construction of new apartment buildings is generally considered rather than poor quality and solid structures. However, the meaning of the concept of urban transformation is much broader. It includes the processes of renewing destroyed areas and historical areas in city centers and revitalizing them by providing new functions (Tekeli, 2011).

Urban transformation in Turkish cities is linked to earthquake risk. However, population growth and rapid urbanization are challenging factors in this process. Renewal of old stock is gaining importance in metropolitan cities with increasing housing demand. The Urban Transformation and Türkiye Report, prepared in 2014, estimated that approximately 6.7 million housing units across the country will be demolished and rebuilt in the next 20 years. This equates to approximately 334,000 units per year (Pakdemir, 2014).



People have been quite familiar with maps and their applications since the beginning of history. This practice dates back to 600 BC. At that time, the first world map was drawn on clay tablets depicting Babylon and the Euphrates River in the center of a five by three inch rectangle. Like other information, cartography has evolved and developed throughout history. The ancient Greeks created the first paper maps used for navigation and to depict specific areas of the Earth. The evolution of this knowledge continued until the early 1960s, when computer systems emerged and new technologies enabled people to advance further in this field. The first Geographic Information System was born in the 1960s and was developed by new companies that emerged in the 1970s (Taha, 2022).

This study aims to examine in detail the urban transformation application carried out in the region consisting of parcels 3693/1, 3694/1 and 3695/1 in Kaman district of Kırşehir province. In this context, both the studies carried out were examined and

satellite images were taken and interpreted based on certain dates in the urban transformation area and Kaman district using the remote sensing method of GIS. The study aimed to investigate the effects of this transformation, which was carried out within the scope of Law No. 6306 on "Transformation of Areas Under Disaster Risk", on the district in the context of the social, cultural and economic characteristics of the city.

## 2. Kırşehir/Kaman

Kırşehir is one of the 13 cities in the Central Anatolia region (Figure 1). Located in the middle Kızılırmak section, Kırşehir is adjacent to the provinces of Ankara, Kırıkkale, Yozgat, Nevşehir and Aksaray. Kırşehir has 7 districts. These are Kaman, Mucur, Boztepe, Akpınar, Akçadağ and Çiçekdağı (Babacan, 2023).


**Figure 1.** Kırşehir and province map

The surface area of Kırşehir province is 6,570 km$^2$ and its altitude is 985 m. Geometrically resembling a parallelogram, Kırşehir constitutes 0.8% of Türkiye's land and 2.9% of the region's land (Ünsal, 2012). It is the 53$^{rd}$ largest province in Turkey in terms of surface area. Kırşehir province consists of 64.5% plateau, 17.2% mountainous area and 18.3% plain (Deniz, 2024).

According to 2024 data, the city's population is 244,546. Of this population, 121,457 are male and 123,089 are female. When evaluated as a percentage, 50.3% of the city's population consists of women and 49.7% consists of men (TÜİK, 2025).

Like other cities in the Central Anatolia region, Kırşehir also experiences a continental climate. There is a significant temperature difference between seasons in the province. Summers are hot and dry, winters are cold and snowy (Piri, 2020). The city's vegetation is steppe (Babacan, 2023).

Located on the Central Anatolian fault line, Kırşehir is defined as a 1st, 2nd and 3rd degree earthquake zone. While Kırşehir central district, Kaman, Akpınar, Akçakent and Boztepe are located in the 1st degree earthquake zone, Mucur and Çiçekdağı are located in the 2nd degree earthquake zone (Gömcü, 2013). The villages of Karacalı, Pınarkaya, Altınyazı, Kargın, Güzyurdu, Bazlamaç and Kılıçlı of the Mucur district are located in the 3rd degree earthquake zone.



### About Kaman

Kaman is the largest and densest district after the Central District in terms of both surface area and population (Figure 2). Kaman, which had town status in 1913, became a district of Kırşehir in 1944. When Kırşehir was connected to Ankara in 1954, it became a district of Ankara. With the law enacted in 1957, Kırşehir gained provincial status and Kaman was once again connected to Kırşehir.

Located 53 km away from the city center, Kaman has a surface area of 1185 km (Kırşehir Governorship, 2025). There are a total of 10 towns and 41 villages in Kaman. 21,118 of the total population live in the district center and 23,683 live in villages and towns (Kırşehir Governorship, 2025).

**Figure 2.** Kaman (Web Message 1)

## 3. Geographic Information Systems (GIS)

There are many applications for rapidly developing technology. One of these is the Geographic Information System (GIS) (Kabakıbou, 2023). The origins of Geographic Information Systems lie in the application of computer graphics in various fields such as urban planning, land management and geocoding in the 1960s and 1970s. In 1990, Geographic Information Systems continued to develop with personal computers (Erol, 2022). Nowadays, Geographic Information Systems have become one of the most interesting and promising high-technology fields (Wieczorek & Delmerico, 2009).



GIS is a multidisciplinary field with applications in various disciplines such as earth sciences, geography, environmental sciences, urban and regional planning (Başeğmez, 2024). GIS technology is a computer system designed with a set of tools and functionality to collect, store, process, manage, analyze and visualize spatial data (Erden, 2012; Malczewski, 2006; Nyimbili & Erden, 2018; Rashid, 2019). This technology plays an important role in supporting decision-making processes and policy development, and provides convenience to practitioners (Hong et al., 2013; Yomralıoğlu, 2009; Chang, 2016).

The benefit of GIS is seen in how precisely data can be displayed and analyzed. It can take unstructured, complex data and map its geographic connections. Thus, it enables researchers to obtain new insights (Kabakıbou, 2023).

Many different types of information can be compared, organized and visualized using Geographic Information Systems. The system can include data such as education level, population, location of streams, income, factories, farms, schools, roads and power lines. GIS applications help companies, industries, and consumers make informed decisions. Some of the most common sectors and business areas where geographic information systems are used are banking, supply chain management, health and human services, forestry and timber, urban planning, insurance, accident analysis, hot spot analysis, environmental impact analysis, etc. (Erol, 2022).

GIS consists of a set of elements that are brought together and linked together to achieve specific goals. GIS, like other information technologies, consists of five components, in addition to geographic data, as given in Figure 3 and described below (Obermeyer and Pinto, 2007).




**Figure 3.** GIS components (Web Message 2, 2025)

- ***Data;*** Data is defined as raw facts in the form of numbers or letters that have little meaning on their own, while information is data on which certain operations have been performed that change its original form.
- ***Hardware:*** Computers for data processing, data storage and input/output, printers and plotters for reports and printed maps, digitizers and scanners for spatial data digitization, GPS and mobile devices for field work are examples of GIS hardware.
- ***Software:*** Commercial or open source GIS software includes computer-executable programs and applications for data management, data analysis, data display, and other functions.
- ***People:*** People, one of the most important components of geographic information systems, develop the procedures of geographic information systems and know their duties. Therefore, any person using GIS must have experience and competence, development ability, creativity and innovation (Taha, 2022).
- ***Method:*** It can be defined as the path to be followed in GIS applications. Because GIS operations occur within an organizational setting, the purpose and value of GIS depend on the culture of the method and decision-making processes on issues such as GIS education, data collection and dissemination, and data standards (Telfah, 2022).



## 4. Urban Transformation

Cities are structures where economic, social and cultural interactions take place while meeting the sheltering needs of large human communities. By establishing production and consumption networks, it offers a much wider range of presentation areas compared to other settlements. Urban areas, shaped by intense human circulation throughout history, have faced different potentials and challenges due to technological developments, especially in the last 150 years (Köse et al., 2023). Today, cities face

significant challenges due to rapid population growth, aging infrastructure and risks posed by natural disasters. Therefore, urban transformation has become increasingly important. Urban transformation is seen as a planned process that aims to strengthen, modernize and increase the quality of life in cities. The key elements of this transformation include risk reduction and security, renovation and modernization, infrastructure development, and social impact.

Urban transformation is the planned renewal of physical, social, economic and environmental structures in urban areas (Çakar, 2024). This renovation aims to improve the use of existing spaces, improve environmental quality, protect historical and cultural values, and increase social harmony and economic vitality (Şen, 2024). Additionally, it plays an important role in the future sustainability and livability of cities (Çakır, 2023).



## Effects of the Urban Transformation Process

- **Urban Fabric:** For urban sustainability, physical and environmental impacts at multiple scales are inseparable. These encompass a variety of factors: land use patterns, physical connectivity, plot sizing, architectural expression, flexibility, adaptability, consistency, and human scale in the built environment.
- **Social Impact:** The social impacts of urban transformation at various scales are important issues for urban sustainability. These impacts resulting from changes in the built environment affect urban environmental quality of life and equity associated with social factors.
- **Economic Impact:** The economic impacts of the urban transformation project are multifaceted. It manifests itself at various contextual and temporal scales. It affects both the specific area and the broader physical context, extending down to the city level.

- **Achieving Project Objectives:** The consistency between the drivers and results of the urban transformation project (in the sense of sustainable urban development) is crucial for its success (Sezgen, 2024).

## 5. About The Urban Transformation Application Area

The satellite image of the area selected within the scope of the study taken before the urban transformation application is given in Figure 4. In the figure, the urban transformation application area is marked in purple. The urban renewal area covers 3 hectares. It includes numerous residences, marketplaces, and workplaces. It also includes educational institutions and a shopping mall. At the time of its construction, the urban renewal area was located at the intersection of Orta and Cuma neighborhoods. Located in the district center, this area was a highly populated commercial area.



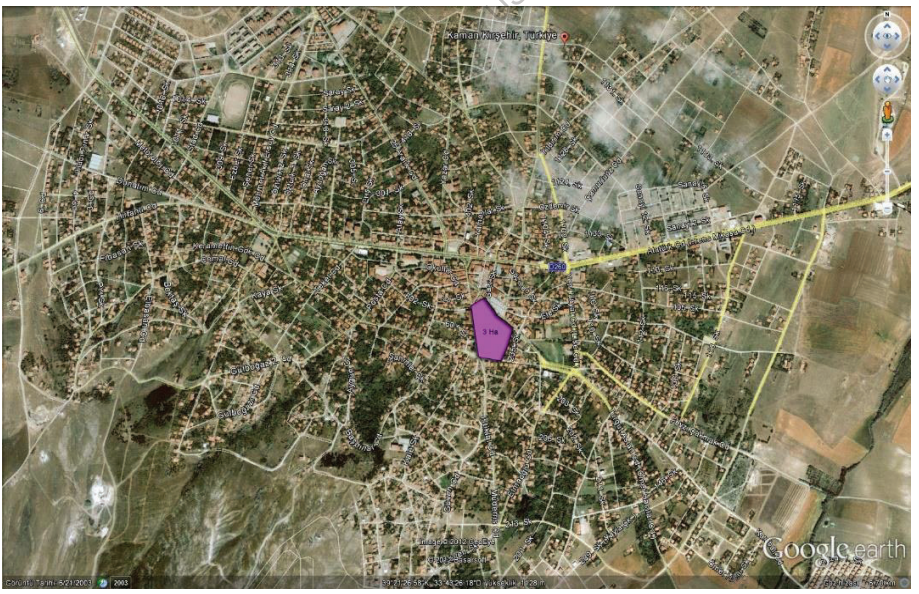


**Figure 4.** Satellite image before urban transformation implementation

## 5.1. Analysis of Buildings in the Urban Transformation Application Area

The number of building types and their current status in the area examined within the scope of the study are presented in Table 1. An examination of the table reveals 401 residences and 235 workplaces. In addition, there are 401 other areas (coal silos, warehouses, stables, pools, etc.). Within the urban transformation area, there is one mosque, one science and arts center, one public education center, one cram school, one student dormitory, and three educational institutions (high schools).

**Table 1.** Types and numbers of buildings in the urban transformation area

| Building Type | Number | Current Situation |
|---|---|---|
| Housing | 401 | Useable |
| Workplace | 235 | Useable |
| Sanctuary | 1 | Useable |
| Mosque | 1 | Useable |
| Health Center | 1 | Useable |
| Rehabilitation Center | 1 | Useable |
| Public Education Center | 1 | Useable |
| Science and Art Center | 1 | Useable |
| Anatolian High School | 1 | Useable |
| Kaman High School | 1 | Useable |
| Girls' Vocational High School | 1 | Useable |
| Others Aera | 400 | Useable |
| Bank | 1 | Useable |
| Cram school | 1 | Useable |
| Student Dormitory | 1 | Useable |
| Ruin | 9 | Unuseable |



Table 2 shows the skeletal systems of the most numerous residences and businesses. According to the table, residences are categorized as having gardens, courtyards, two-story buildings with gardens, and two-story buildings with courtyards.

Construction methods in the study area include masonry, adobe, and reinforced concrete. The largest number of businesses are masonry shops (122). The masonry shops are followed by an office building with numerous shops.

**Table 2.** Skeleton system of buildings

| **Building** | **Number** | **Workplace** | **Number** |
|---|---|---|---|
| Masonry House with Garden | 117 | Reinforced Concrete Shop | 4 |
| Masonry House with Courtyard | 102 | Masonry Shop | 122 |
| Two-Story Masonry House with Garden | 4 | Kargir Business Center | 4 |
| Two-Story Masonry House with Courtyard | 2 | Reinforced Concrete Business Center | 17 |
| Three-Story Masonry House | 7 | | |
| Adobe House with Garden | 21 | | |
| Adobe House with Courtyard | 14 | | |
| Adobe House | 25 | | |
| Reinforced Concrete Apartment | 133 | | |
| **Total** | **425** | **Total** | **147** |

Figure 5 shows the proportions of housing types. According to the figure, the most common housing type, at 31.3%, is the reinforced concrete apartment building.

Second is the masonry house with a garden, and third is the masonry house with a courtyard. The least common building type, at 0.5%, is the two-story masonry house with a courtyard.

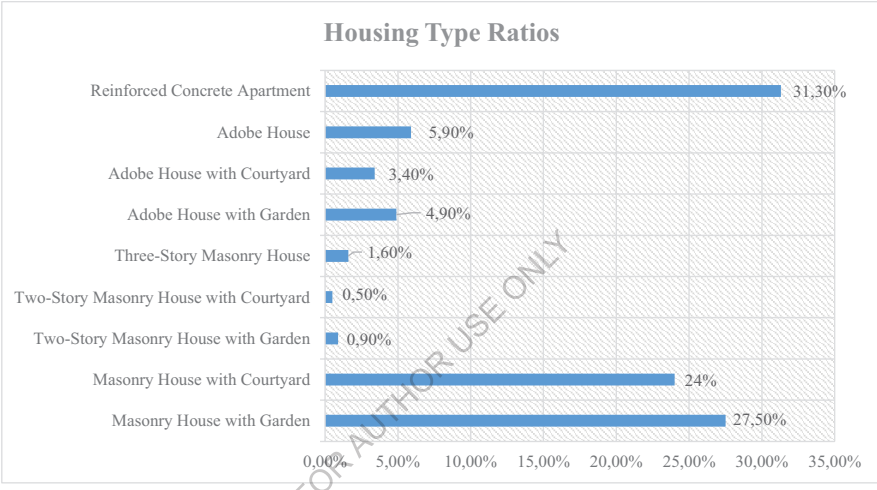



**Figure 5.** Proportions of housing types

Figure 6 shows the proportions of workplaces according to their skeletal system. The figure shows that the masonry shop has the highest proportion, at 83%. The lowest proportion, at 2.7%, belongs to the reinforced concrete shop and the masonry office building.

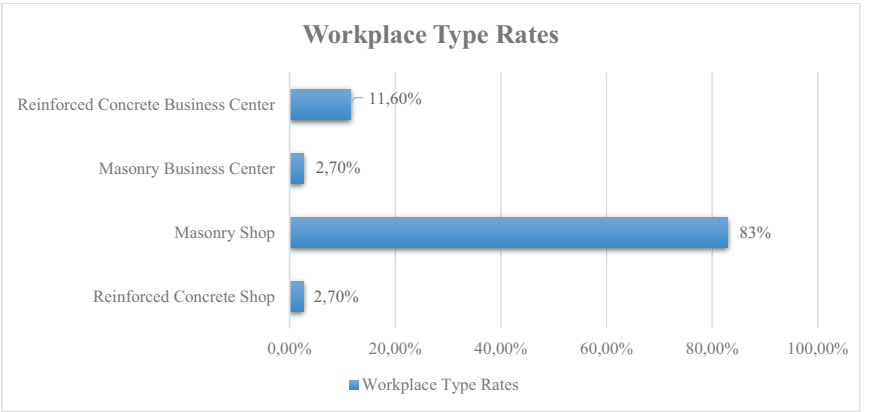


**Figure 6.** Workplace type rates

## 5.2. Images of the Urban Transformation Implementation Area

There are many types of buildings in the urban transformation area, such as residences, workplaces, ruined buildings, office buildings, apartments, mosques and educational buildings. Figure 7 shows images of residences in urban areas before urban transformation. The images in the figure include apartments, two-story garden houses, dilapidated buildings, and single-story courtyard houses.






**Figure 7.** Residential buildings before urban transformation implementation

Figure 8 shows images of shops located in the urban transformation area. While some of the images consist of a single storey, some have been observed to have 2 or more floors. Some include images of commercial buildings. Some of the commercial buildings show shops on the ground floor, while the upper floors are vacant. The images also reveal that the shops are quite worn and outdated.




**Figure 8.** Shop images before urban transformation

## 5.3. Urban Transformation Implementation in the Designated Area

The 3-hectare area cleared within the scope of urban transformation was transferred to TOKİ for reconstruction. TOKİ has completed reconstruction work on almost one-third of the designated area. In other words, the TOKİ 1st Phase, planned by the TOKİ Institution, was completed. However, the TOKİ 2nd and 3rd Phases were not. This situation stems from disputes and lawsuits between TOKİ and local residents. TOKİ (Housing Development Administration of Turkey) has built housing and a shopping mall in the area. The market area was built by the Kaman Municipality.

The zoning plan of the urban transformation area is given in Figure 9. The area marked in red on the zoning plan represents the urban renewal project. At the time of the urban renewal project, this area was located within the boundaries of Orta and Cuma neighborhoods. As a result of the changes made over time, the urban transformation area remained within the borders of Cuma Neighborhoods.

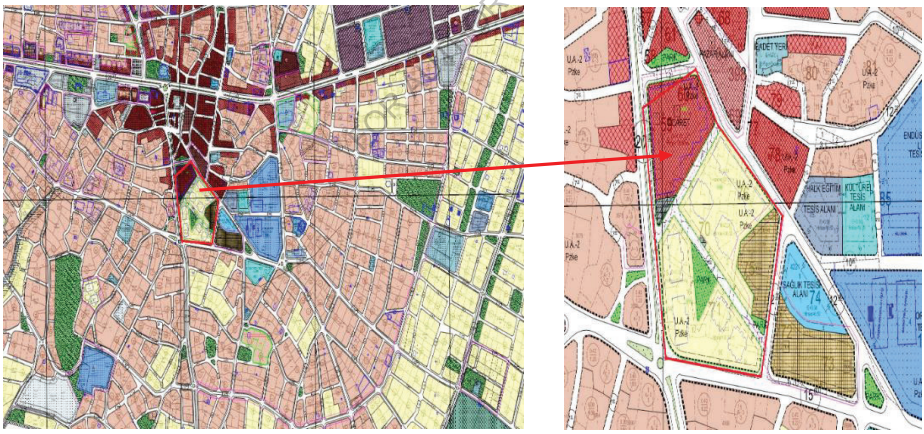

**Figure 9.** Zoning plan of the urban transformation implementation area

Figure 10 shows visuals of the residences built within the urban transformation application area. All structures were constructed using a reinforced concrete skeleton system and tunnel formwork. TOKİ has constructed a shopping mall and seven residential blocks within the urban transformation area. The blocks consist of ground

floor and six floors. The ground floor is generally designed for shops or offices. The inner blocks are designed to have independent units on the ground floor. The site, designed as a residential complex, includes a children's playground and gazebos.

41 shops were constructed within the shopping mall. The number of residences and workplaces constructed in this area is shown in Table 3. According to the table, there are a total of 236 independent units in seven blocks within the urban transformation area. Residence 2, which has the highest number of residences with 48 independent units, contains 13 shops. Also within the urban transformation area are 28 workplaces, including 16 shops and 12 offices.

**Table 3.** Number of residences and workplaces built after urban transformation

| **Housing Name** | **Number** |
|---|---|
| Housing 1 | 39 |
| Housing 2 | 48 |
| Housing 3 | 24 |
| Housing 4 | 24 |
| Housing 5 | 31 |
| Housing 6 | 39 |
| Housing 7 | 31 |
| **Total** | **236** |
| **Workplace** | **Number** |
| Shop | 16 |
| Office | 12 |
| **Toplam** | **28** |

**Figure 10.** Houses built after urban transformation

Figure 11 presents the exterior facades of the shopping mall and the offices located below the blocks, built within the urban transformation area. The shopping mall forms a unified whole with the blocks in terms of exterior appearance and color harmony. A form consisting of numerous recesses and protrusions was chosen. Large windows were used for lighting. Similarly, windows were of the same shape and size on all protrusions. The shopping mall was constructed using a reinforced concrete skeleton system. Due to the topography of the site, some sections are comprised of Ground+2, while others are Ground+1. The basement of the shopping mall is designed as an indoor parking garage. Additionally, the ground floor of the shopping mall is used as an indoor market area.




**Figure 11.** Exterior visuals of shopping malls, shops and offices

Figure 12 shows images of the market area, which is located within the urban transformation area but whose construction was undertaken by the Kaman Municipality. The market area was designed as a semi-open area. The floor was paved with concrete. Constructed using steel profiles, the market area is a total area of 2,500 m². It is covered with a canopy roof.

**Figure 12.** Images of semi-open market area



## 5.4. Satellite Images of the Urban Transformation Implementation Area by Year

Using GIS's remote sensing method, satellite images of the urban transformation area were taken between 1985 and 2025. The years 1985, 1990, 2003, 2013, 2015, 2017, 2020, and 2025 were determined. Google Earth was used for the satellite imagery. The 1985 image is shown in Figure 13. Kaman was quite small in 1985.

Because there was no clear zoning plan, the urban transformation area could not be clearly shown.

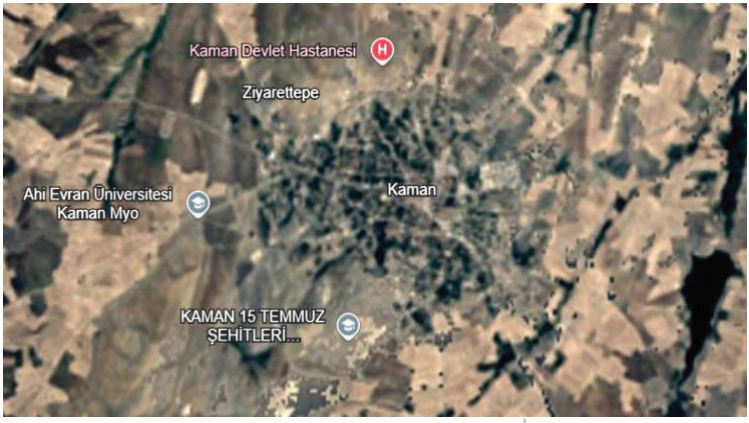


**Figure 13.** Satellite image of Kaman from 1985

Figure 14 shows a satellite image of Kaman from 1990. Although roads and buildings are visible on Google Earth, detailed area views are not available. Therefore, the urban transformation area is not defined. When comparing the 1990 image with the 1985 image, the number of buildings is higher and the transportation network is more dense.



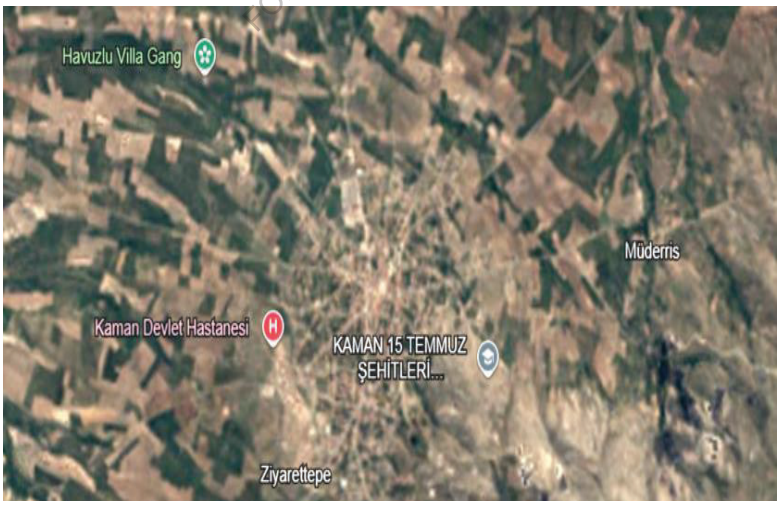


**Figure 14.** Satellite image of Kaman from 1990

Figure 15 shows a satellite image of Kaman and the urban transformation implementation area from 2003. Google Earth observed that the image with the most visible structures, roads, and areas was from 2003. Therefore, the urban transformation area and environmental analysis began with the 2003 imagery. The area where the urban transformation implementation took place is marked in red. Workplaces (shops, office buildings, etc.), residences, educational buildings, and other units mentioned in other sections are located within this area. Although the adjacent market area is not included within the urban transformation implementation area, it has been stated that landscaping work will also be carried out there. The urban transformation implementation area is located in a highly populated area of the district.


**Figure 15.** Satellite image of the urban transformation implementation area in 2003

Figure 16 shows a satellite image of the urban transformation implementation area in 2010. No significant visible changes were observed in the urban transformation implementation area and its surroundings from 2003 to 2010.


**Figure 16**. Satellite image of the urban transformation implementation area in 2010



In Figure 17, Satellite image of the urban transformation application area for 2013 is given. The year 2013 was specifically chosen because it was the year in which demolition and cleaning began in the area of urban transformation. The area marked in red in the figure is the urban transformation application area. When compared with the 2010 image, it appears that the area is vacant and free of any structures. The blue sign in the image shows some areas around the urban transformation application area. Demolition work has also been carried out in the areas within the sign. These processes are of great importance for the urban transformation application area and its surroundings, both in terms of aesthetics and the silhouette of the district.

The yellow line is the main artery that divides the district into two, providing access to the city centers of Ankara and Kırşehir. The urban transformation area is located on İstiklal Avenue, which branches off from the main artery. The urban transformation area is located between İstiklal Avenue on the left, Şehit Üstteğmen

Keramettin Gök Avenue on the lower side, 235th Street on the lower right, and Turgut Aslan Avenue on the upper right.

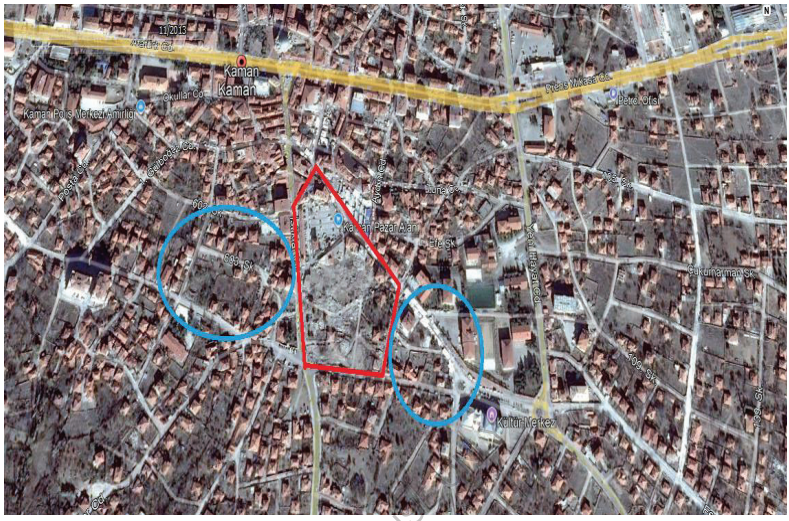


**Figure 17.** Satellite image of the urban transformation implementation area in 2013

Figure 18 shows a satellite image of the urban transformation area and its surroundings from 2015. The image shows that TOKİ has begun work in the cleared urban transformation application area.

The area marked in red indicates the urban transformation implementation area. The area marked in blue within the area indicates the shopping mall building. The area marked in yellow indicates blocks with ground-floor offices. The area marked in orange indicates blocks with independent units on the ground floor.

A 2013 satellite image revealed reconstruction work around the urban transformation implementation area. The 2020 satellite image shows that the building density in these areas has increased. When the area is examined in detail, it is seen that construction work on Istiklal Street had not started on the date the image was taken.


**Figure 18.** Satellite image of the urban transformation implementation area in 2017

Figure 19 shows a 2020 satellite image of the urban transformation area and its surroundings. The area marked in red in the satellite image contains buildings demolished and rebuilt by TOKİ as part of the urban transformation project. An examination of the satellite image reveals construction. Furthermore, There are within the urban transformation area, 232nd Street, separates the shopping mall and residences, and 233rd Street, separates the residences designed as blocks. Separating the urban transformation area with a street is important in terms of removing the feeling of belonging of the shopping mall to the blocks.

In the on-site inspection and visuals taken, it is seen that 232nd Street, located between the shopping mall and the blocks, and 233rd Street, which separates the blocks, are actively used.

The purple marked area, in the satellite image represents the market area. As seen in 2020 satellite imagery, the market area has been demolished and is being rebuilt. Although the market area is not within the urban transformation area, it is crucial for both aesthetics and meeting user needs.


**Figure 19.** Satellite image of the urban transformation implementation area in 2020

Figure 20 shows a 2025 satellite image of the urban transformation implementation area. The satellite image shows that the building density in the urban transformation implementation area has increased significantly. This density is found to be higher on İstiklal Street. It is understood that the market area, marked in purple and under construction in 2020, has been completed.

When the satellite images of 2025 are compared with the satellite images of 2020, no significant changes or differences are visible to the eye, other than the density of the structure.




**Figure 20.** Satellite image of the urban transformation implementation area in 2025

## 6. Conclusion and Recommendations

In the study, the urban transformation application area of the island parcel numbers 3693/1, 3694/1 and 3695/1 located within the borders of Kaman district of Kırşehir province was examined in detail. It was analyzed using the remote sensing method of GIS. The results and recommendations are listed below.

- According to data received from Uğur Urban Transformation company, which carried out the demolition and cleaning works of the urban transformation application area, 425 houses and 147 workplaces were demolished.
- Numerous structures of various types, including educational buildings, places of worship, banks, and art centers, were demolished within the urban renewal area. The demolished residences were found to be constructed of masonry, reinforced concrete, and adobe. The demolished workplaces were found to be made of masonry and reinforced concrete. The majority of the demolished residences were single-story masonry structures.
- Due to the Anatolian tradition of <<father and son living in the same courtyard>>, it has been observed that there are plots with more than one residence in a courtyard or a garden.
- Construction operations began in the area cleared by TOKİ in 2015.
- Due to the dispute between TOKİ and the property owners and the fact that this dispute was brought to court, 1/3 of the 3-hectare area was completed and no action was taken on the remaining 2/3.
- It has been understood that moving educational buildings within the urban transformation area to another area causes problems in accessing education.
- The removal of social facilities such as health, education and art centers and the construction of only housing and workplaces in their place has created the need for social and cultural facilities.

- The renewal of the urban transformation application area, located in a very busy area of the district center, has renewed the old face of the region and created an aesthetic appearance.
- Single-storey, two- or three-storey buildings within the urban transformation application area were demolished and replaced by buildings in the form of blocks consisting of ground floor + 6 floors.
- Demolishing single-storey houses and replacing them with multi-storey buildings has led to an increase in the population density of the urban transformation area.
- Demolishing the workplaces within the urban transformation area and replacing them with a shopping mall has enabled the development of the modern face of the district.
- Moving workplaces into shopping malls has been a very effective approach to ensure a more orderly and orderly distribution.
- The indoor parking lot in the shopping mall has become a very effective solution to prevent the densely populated area from experiencing parking problems.
- The use of the ground floor of the shopping mall, which opens onto Turgut Aslan Street, as a covered market area has been a very useful design for the people of Kaman, who experience snowy and harsh winters.
- Satellite images obtained using GIS remote sensing method were very effective in seeing the change in Kaman district and urban transformation application area.
- In the 2017 images, it was understood that the new buildings built in the urban transformation application areas were completed.
- When the images were evaluated on a yearly basis, it was seen that the building density around the urban transformation application area increased, the number of streets and avenues increased and became more prominent.

- To enhance the district's skyline and aesthetic appeal, these areas require renovation as part of the urban renewal initiative.
- Areas with numerous abandoned buildings need to be renovated as part of urban renewal. This is important for both aesthetic and safety reasons.
- When carrying out urban transformation applications, attention should be paid to whether social and cultural facilities are sufficient.
- Urban transformation applications should be carried out without damaging the socio-cultural fabric of the region.
- Care should be taken to ensure that the necessary infrastructure services are sufficient for the population density that may occur after urban transformation applications.
- Not only remote sensing methods but also mapping and analysis methods of GIS should be used.
- Regarding urban transformation application areas, building density maps and population density maps depending on this density should be created using GIS method.
- Care should be taken to ensure that the implemented urban transformation projects are sustainable.



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