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The Change of Spatial Organization in Konya Apartment Buildings: an Analysis with Space Syntax Approach

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ABSTRACT

This study aims to examine the spatial transformation that has taken place in apartment-type residential buildings constructed in Konya between 1937 and 2015 through a morphological analysis using graphic theory and spatial composition methods. The research reveals how changing lifestyles and housing needs during Turkey's modernization process were reflected in apartment planning and how this process was shaped by socio-cultural, economic, and technological changes. Eight apartment buildings constructed at approximately ten-year intervals were selected for the study and evaluated in terms of their plan typologies within a historical continuum. Spatial design was analyzed using quantitative indicators such as integration, connectivity, depth, and comprehensibility. Methodologically, the graphic method, which reveals the functional relationships between structures, was used in conjunction with the spatial layout method, which evaluates spatial accessibility. UCL Depthmap software was used to generate numerical data from architectural plans; connectivity and integration values, along with beta and gamma indices, were used as the basis for the analyses. The findings reveal significant transformations in the organization of spatial components: the disappearance of the sofa/hallway, which functions as a transition area, the shift from schemes where wet spaces and kitchens are planned together to more differentiated spatial organizations, and changes in the use of circulation areas due to privacy needs are among these transformations. While early apartment buildings retain traces of traditional multi-generational housing, later examples feature a linear, functionally divided, and privacy-based design; however, the buildings generally have a fragmented spatial integrity. The study reveals that the spatial transformation of apartment buildings in Konya is a continuous process of interaction between traditional values and modern lifestyles. This study provides a methodological framework for analyzing spatial changes in housing typologies using quantitative tools and contributes to design strategies that are sensitive to user behavior and social dynamics.

Konya Apartman Yapılarında Mekânsal Organizasyonunun Değişimi: Space Syntax Yaklaşımıyla Bir Analiz

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ÖZET

Bu çalışma, Konya'da 1937 ile 2015 yılları arasında inşa edilmiş apartman tipi konut yapılarında meydana gelen mekânsal dönüşümü, grafik kuramı ve mekân dizimi yöntemleriyle yapılan morfolojik bir analiz aracılığıyla incelemeyi amaçlamaktadır. Araştırma, Türkiye'nin modernleşme sürecinde değişen yaşam tarzı ve konut ihtiyaçlarının, apartman planlamasına nasıl yansıdığını ve bu sürecin sosyo-kültürel, ekonomik ve teknolojik değişimlerle nasıl şekillendiğini ortaya koymaktadır. Çalışma kapsamında yaklaşık onar yıllık aralıklarla inşa edilmiş sekiz apartman binası seçilmiş ve bu yapılar tarihsel süreklilik içinde plan tipolojileri açısından değerlendirilmiştir. Entegrasyon, bağlantılılık, derinlik ve anlaşılırlık gibi nicel göstergeler kullanılarak mekânsal kurgu analiz edilmiştir. Yöntemsel olarak, yapılar arası işlevsel ilişkileri ortaya koyan grafik yöntemi ile mekânsal erişilebilirliği değerlendiren mekân dizimi yöntemi birlikte kullanılmıştır. Mimari planlardan sayısal veri üretmek amacıyla UCL Depthmap yazılımı kullanılmış; beta ve gamma indeksleri ile birlikte bağlantılılık ve entegrasyon değerleri analizlerde temel alınmıştır. Elde edilen bulgular, mekânsal bileşenlerin örgütlenmesinde önemli dönüşümler olduğunu göstermektedir: Geçiş alanı olarak işlev gören sofa/holün zamanla kaybolması, ıslak hacimler ve mutfağın birlikte planlandığı şemalardan daha ayrışmış mekân organizasyonlarına geçiş ve mahremiyet ihtiyacına bağlı olarak dolaşım alanlarının kullanımındaki değişim bu dönüşümler arasındadır. İlk dönem apartmanları geleneksel çok kuşaklı konut izlerini taşırken, daha sonraki örneklerde doğrusal, işlevsel olarak bölünmüş ve mahremiyete dayalı bir kurgu öne çıkmaktadır; ancak yapılar genel olarak parçalı (fragmented) bir mekânsal bütünlüğe sahiptir. Çalışma, Konya'daki apartman binalarının mekânsal dönüşümünün geleneksel değerler ile modern yaşam tarzları arasındaki sürekli bir etkileşim süreci olduğunu ortaya koymaktadır. Bu çalışma, konut tipolojilerindeki mekânsal değişimin nicel araçlarla nasıl analiz edilebileceğine dair yöntemsel bir çerçeve sunmakta ve kullanıcı davranışları ile sosyal dinamiklere duyarlı tasarım stratejilerine katkı sağlamaktadır.

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INTRODUCTION

As a type of building that emerged to meet society's need for shelter, dwellings are units shaped as a result of human-time-space interaction. Rapoport (1980), defines housing as a product, a process, an identity, a personal value and a place or space where status is expressed. Shaped in line with the economic opportunities, socio-cultural values, needs, etc. of the place they belong to, dwellings undergo change and transformation by being affected by the changes in these factors over time. Housing typology, which is shaped and differentiated according to the place and era in which it is located, shows a parallel development and change with the material resources, living conditions, mindset, and needs of countries (Bülüç et al., 2016). The changing culture, lifestyle, expectations, and needs of society have also changed the plan typology of apartment buildings over time, and this situation has been reflected in the spatial organization of housing. The change in socio-cultural conditions (Rapaport, 1969), which is the most prominent factor in the shaping of housing, manifested itself in our country with the proclamation of the republic.

With the changes in the social sphere with the Republic, the traditional Turkish family structure with a patriarchal family structure was replaced by the nuclear family, and at the same time, industrialization and economic developments accelerated migration to cities. With the increase in population in the cities, the need for housing has also increased, and this situation has brought apartment buildings to the agenda as a new housing typology.

In our country, which entered the westernization process with the proclamation of the Republic, the apartment building phenomenon first entered our lives as a symbol of western life, but later it was seen as the most appropriate solution to the increasing need for housing (Mutdoğan, 2014). While developments in the economic and socio-cultural spheres have caused many factors in social life to change, the process of apartment building, which became one of the symbols of urbanization in Turkey in the 1950s, began to lose its impact in the 2000s.

Especially after the 1999 Marmara Earthquake, confidence in this type of structure was shaken, and the search for earthquake-resistant, secure, and well-equipped living spaces gained momentum. This transformation represents not only a change in building typology but also a significant shift in urban lifestyles, spatial preferences, and social expectations. This situation has paved the way for the rise of the secure gated community model in the housing market. Keleş (2012) states that the phenomenon of apartment buildings was a characteristic form of construction during a certain period of urbanization in Turkey and that this process was largely supported by urban rent mechanisms. However, it is also emphasized that this type of structure does not provide a sufficient solution for long-term and sustainable urban living. Especially since the early 2000s, with the change in housing policies, large-scale, planned collective housing projects that include features such as social amenities, security services, parking areas, and green spaces have begun to be developed, differing from the classic apartment model. In line with these developments, the individual parcel-based apartment building process has been replaced by gated community models that include more closed, collective, and amenity-rich living spaces. Özdemir (2022) defines this situation as a transition to more closed, secure, and socially equipped luxury housing complexes. Indeed, housing preferences are no longer solely focused on the need for shelter; they now also encompass elements such as social prestige, security, and quality of life (Tutal and Koç, 2023).

Konya has been one of the most important settlements in Anatolia, hosting many civilizations from history to the present day (Uysal et al., 2019). Apartment construction in Konya began to develop simultaneously with the modernization processes in Turkey. The first apartment building in Konya, Hayat Apartmanı, was constructed in 1937, but this process was interrupted due to the economic

stagnation the country faced at the time; no new apartment buildings were constructed in the city until the 1950s (Özdemir, 2022). From the 1950s onwards, with the urban growth and increase in housing needs observed throughout Turkey, apartment buildings became the dominant form of housing in Konya as well. The process of apartment building, which gained momentum especially after 1980, represented a new way of life in both architectural and social contexts. By the 2010s, the transition to secure luxury housing complexes throughout the country began to make its presence felt in the city of Konya. Eken (2023) emphasizes that traditional neighborly relations in Konya have changed with the rise of apartment buildings and, subsequently, housing complexes, and that more individualized lifestyles have become widespread. In conclusion, the development of residential structures in Konya began with the emergence of apartment buildings in a historical context; however, due to the impact of social, economic, and technological transformations, it has evolved into luxury residential complexes, particularly in the last decade. Luxury housing projects built in Konya in recent years are designed not only as housing but also as new types of settlements that serve as living centers. This transformation has profound effects not only on spatial aspects but also on social relations, lifestyles, and perceptions of the city. In this context, when we examine the change in housing typology in the city of Konya, we can say that apartment-type housing structures began in the 1930s and continued until the 2010s, after which they were replaced by secure, luxury complexes with social amenities.

In this context, in order to examine the change in the plan typology of apartment buildings, the changes in the spatial organization of selected apartment buildings from 1937, when the first apartment building in Konya was constructed, to 2015 were analyzed using the spatial syntax method. Since luxury residential complexes, which replaced apartment buildings after the 2010s, are outside the scope of this study, the historical limitation ends in 2015.

Purpose and Significance of the Study

With the proclamation of the Republic, the changes that took place in the economic and socio-cultural spheres also manifested themselves in housing, the most basic unit of shelter. Changes in lifestyle and expectations from housing led to changes in the spatial organization of housing. This study aims to identify the changes in the spatial organization of apartment-type housing structures built in Konya.

While the transformation of housing typologies has generally been examined in a sociological or historical context in the literature, this study aims to enable the spatial organization of apartments to be analyzed at the formal, functional, and syntactic levels using numerical data. The originality of the study lies in its evaluation of the plan organization of apartment buildings in Konya, a city characteristic of Anatolia, through graph theory and space syntax analyses (integration, connectivity, depth, etc.). In this regard, the study reveals how Turkey's socio-cultural transformation process is reflected in housing planning at the spatial level through quantitative methods.

By supporting the study with the space syntax method, the aim is to qualitatively define the data related to the plan organization of housing typologies in the context of spatial structure and social interactions. The study quantitatively reveals the effects of user behavior on spatial organization and examines the effects of spatial arrangements on social dynamics. Thus, through both qualitative and quantitative data production, the spatial traces of urban housing transformation can be traced within historical continuity; a locally focused, original model based on spatial analysis techniques is presented in both architecture and urban studies. In this regard, the study serves as a methodological foundation and comparative data pool for advanced research on housing production, plan typologies, and user-space interaction in Turkey.

METHOD OF THE STUDY

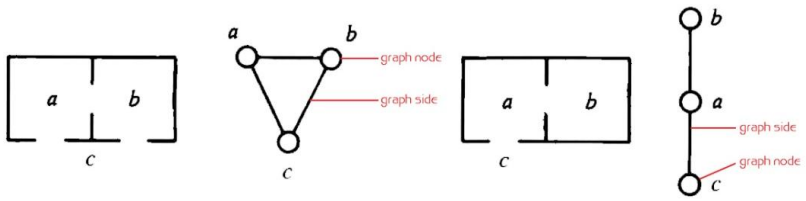
Within the scope of the study, the floor plans of 8 apartment buildings selected in the context of 10-year periods, starting from the first apartment building built in Konya in 1937, were analyzed. The development of Konya's urbanization process was taken into consideration in the selection of apartment buildings, and details regarding this are provided in the fieldwork section. In the selection made, attention was paid to the similarity of the apartments in terms of total m^2 and number of rooms. Accordingly, the selected examples were analyzed by graph method and spatial sequence method through their plan typologies and spatial structures.

Morphological analysis method in the architecture discipline is a commonly used method for analyzing buildings, spaces and spatial relationships. Morphological analysis is a method in which physical, morphological and structural aspects of spatial units and relations of items as well as reasons of formation and shaping principles of space and mass are analyzed (Çakmak, 2011). The graph method and the space syntax method are sub-titles of the morphological analysis and enable one to analyze structures and spaces functionally and syntactically.

Graph method; is a method of analysis that expresses space relations with each other by using lines. Graph method used for establishing/determining space relations with each other in spatial organizations is also used to understand and analyze spatial relations of existing buildings.

Figure 1

Representation of Spatial Relations Using the Graph Method (rearranged using Hillier and Hanson (1984))



Analysis tools of graph theory are utilized to analyze functional structures of spaces. These tools are called beta and gamma indices. The formulas are as follows: [E = graph side (total number of connections), V = graph node (total number of spaces)]

Beta index → $\beta = \frac{E}{V}$ **Gamma index →** $G = \frac{E}{V^2 - V} / 2$

Beta index numerically expresses the type of structure that is represented by graphs, depending on node and side relations. In this value, which is the ratio of total number of sides to total number of nodes, the properties a structure can be attributed to as follows: The structure displays tree properties, if $\beta<1$; ring properties, if $\beta=1$; and complex circuit properties, if $\beta>1$. Whether the structure is a tree, ring, or complex circuit defines which of the linear, cyclic, or composite forms the building's overall form is suitable for (Çakmak, 2011).

Gamma index gives the connectivity status of a mass numerically, depending on the intensity of spatial relations in the building. While a value of 1 means a complete connection and indicates that the mass is a compact mass, a value of 0 means a complete disconnection and the mass has a fractional structure (Çakmak, 2011). If the Gamma index is high, it means that the geometric neighborhood of the spaces and circulation links are short, and the form of the building is more compact; if the Gamma index is low, it means that the overall composition of the building may be more fragmented or organic (Yıldırım, 2002).

Space syntax method; is a space reading method developed by Hillier et al. in the 1970s. It is used to understand, interpret, quantify and represent spatial arrangements in a structure or a settlement

(Hillier et al, 1984). According to Hillier (1996), space sequence theory is based on a reciprocal shaping relationship between physical space and social structure; space is not only a physical arrangement but also shaped by social relations, and this interaction plays an important role in understanding how user behavior is guided, especially in urban fabric and architectural planning. The primary goal in the method of space syntax (Dursun, 2007), which examines the relationship between human behavior and the place where they live, is to objectively examine the relationship of the spatial organization with human movements and views to reveal the potentials of "spaces" to bring people together and direct them (Gündoğdu, 2014). The theory of this analysis is based on the idea that the social structure that creates a space can be derived from the physical construction of the space (Çil, 2006).

"In the method of space syntax, existing spatial models (plans, layout schemes, circulation networks, etc.) are transformed into graphical relations by schematizing through certain geometric expressions. Social, cultural and physical characteristics of users and architectural spaces are determined in the process of producing these relations. Spatial analyses are carried out by concretizing properties using numerical and graphical tools. The analysis of the relationship between the resulting numerical data and the pre-determined social characteristics leads to the acquisition of social knowledge underlying the spatial model" (Çakmak, 2011).

There are some tools used in the space syntax method to carry out syntactic analyses of spaces. In this study, "UCL Depthmap Application" software program was used. The concepts to be used in interpreting the analysis done with this program are connectivity, visual integration, visual mean depth, and intelligibility graph.

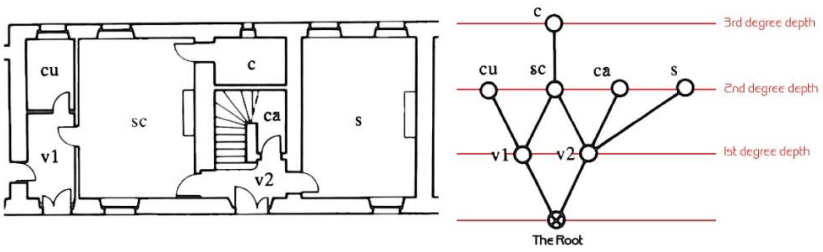
Connectivity which is the most basic value used in reading a space, is the measure of the number of neighboring spaces directly connected to the space (Çakmak, 2011). Through connectivity, spatial relations can be compared. In structures where there are a lot of spatial relations, the value of connectivity is high, whereas in structures where there are a few spatial relations, the value of connectivity is low. After the analysis in the program, the minimum, maximum and average values of the connectivity value are found, and the spatial relation of structures is interpreted.

Visual integration is a value that gives information about the mobility in spaces and questions how much the space in a mass are used. In this way, the rarest and most heavily used areas are calculated in a determined area, and the mobility in the area can be determined in advance (Çakmak, 2011). Places with high visual integration are connection points and places providing mobility within a structure, where most people are likely to pass through. The places with the maximum visual integration are the most readable places in which people can easily find their way (Çil, 2002).

Visual mean depth is the numerical value that expresses the average of relation between spaces in a structure and other spaces. The concept of depth, which occurs when one passes through more than one intersecting space to reach a space, is the expression of how many steps are necessary to reach spaces. Figure 2 shows a mass with 3 depths (has a 3rd-degree depth). As can be understood from the figure, in order to reach space c, a passage is provided first from the root to one of spaces v1 or v2, then to space sc, and finally to space c, in three steps. In the Depthmap program, depth comparisons of different masses can be made using depth values calculated and averaged separately for each space.

Figure 2

Depth Values of the Spaces (rearranged using Hillier and Hanson (1986))



Intelligibility graph is the expression of the ratio between connectivity and visual integration, and the higher the ratio, the more intelligible the structure is. If the interconnected spaces are at the same time integrated spaces, then it means the spatial relation is strong, or the system is intelligible (Çakmak, 2011).

In summary, the apartment samples that were selected within the present study were subjected to functional structure analysis using the graph method, and to syntactic analysis using the space syntax method. In line with the results, changes in the spatial organization of apartment buildings in Konya were identified.

CHANGE IN THE SPATIAL ORGANIZATION OF HOUSING

Housing is one of the architectural products that not only meets people's needs—primarily the requirement for shelter—but also reflects the characteristics of the society to which it belongs. Housing is considered as a building element and a socio-spatial communication environment that reflects the value judgments, social status and cultural assumptions of its users. Rapoport (1969), describes a house as a phenomenon influenced by the culture of a community, rather than a shelter or a structure. Gür (1996), defines a house as a phenomenon that, on the one hand, reflects the characteristics, lifestyle, rules of conduct, environmental preferences, public opinions, time and space taxonomies of a culture or ethnic group to which it belongs, and, on the other hand, reflects the user's self-opinions, means of proving himself and being equipped, as well as personality and distinctiveness of an individual.

Functions such as the following are performed in a house hosting many different actions, as a type of building that meets needs of people:

- Sitting and resting
- Working and hobby
- Preparing food and eating
- Cleaning (washing + toilet)
- Sleeping

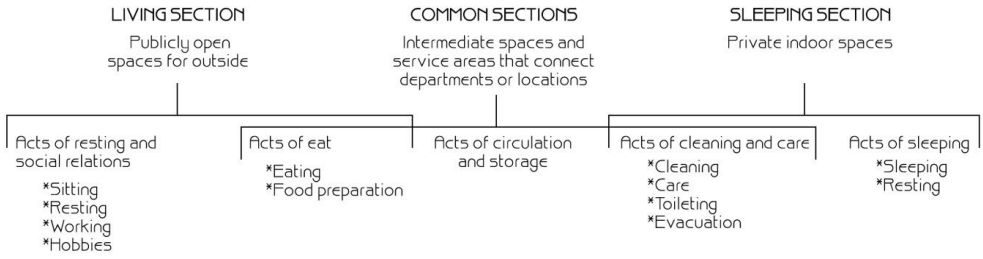
These actions differ and vary depending on many factors such as the user needs, lifestyle and socio-economic characteristics. Sections of a house are formed based on grouping of activities carried out in the house according to their functions. These sections are divided into three: living section, sleeping section and common sections (Zorlu, 2004).

The living sections are generally open spaces for outside use and consist of spaces where acts of resting and social relations are carried out. In these places, activities such as the following are performed: sitting, resting, working, hobbies, eating and preparing food. The sleeping sections are made up of more private spaces and contain cleaning, care and sleeping activities. Cleaning, care, toileting, sleeping and resting activities are carried out in these spaces. The common sections include storage and service areas, primarily circulation elements. In the common areas, there are also places where seating, cleaning-toileting, eating, and food preparation take place (Figure 3). The relationship between the sections of a

house and the location of spaces in these sections are planned according to the privacy needs (Faiz, 2013).

Figure 3

The actions in a house and their relations with the sections of the house (rearranged using Zorlu (2004))



Socio-cultural factors precede environmental and technological factors in shaping houses, which are the units that will best adapt to the way people live (Rapoport, 1969). Houses that reflect their user's culture undergo morphological and spatial changes as a result of changes in socio-cultural factors of a society. In our country, there has been a change in the socio-cultural and social environments with the proclamation of the republic. With this change, people's lifestyle, economic status and social structure have changed. In this context, solutions have been developed for the organization of space by considering the physical environment and social and cultural values with a holistic approach (Osmanlı, 2023). Housing planning, which is directly influenced by the social change processes, has been restructured by the design concept, character of interior organization and construction techniques (Faiz, 2013), and the traditional housing type has left its place to apartments.

Apartment-type housing was first introduced as housing for high-income people, and its widespread use and adoption in general was caused by the following factors:

- Increase in population in cities
- It's being a matter of prestige
- Its bringing rental income
- The fact that new parcels cannot be produced very quickly, and a zoning which is suitable for the construction of apartment buildings is not in effect in the newly available ways (Süslü, 2009).

Since the establishment of the Republic of Turkey, this type of housing has proliferated in different forms rapidly until today and formed a part of our lives (Görgülü, 2010). The widespread use of apartment buildings has developed in a continuum parallel to cultural change, and this development took place not with sudden interruptions, but in a framework of a continuous change (Süslü, 2009). While the influence of the traditional plan scheme is felt in first apartment buildings, the developments in economic, technological and socio-cultural factors over time have led to lifestyle change of the society, which has caused people's housing needs and expectations to change. These changes have also manifested themselves in space organizations of apartment buildings.

FIELD STUDY: CHANGE OF SPACE ORGANIZATIONS IN KONYA APARTMENTS

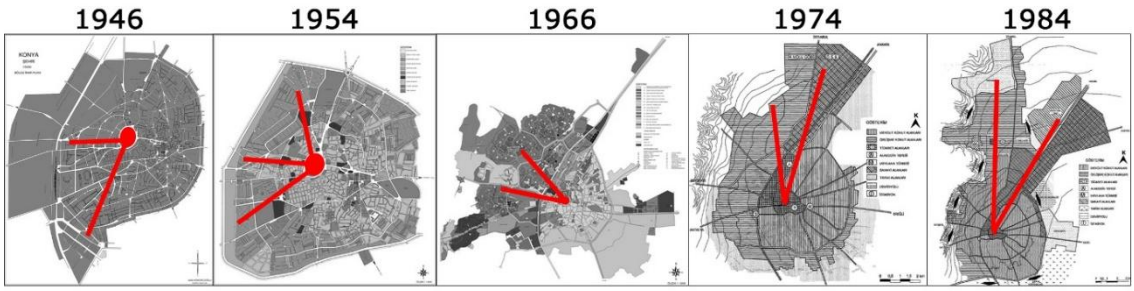
The city is a dynamic phenomenon that gains different meanings according to time, space and society (Semerci ve Bulanık, 2023) and therefore change can always be observed. Reading socio-cultural changes in city through space is a method that reveals important social data. In this context, it is important to read and interpret the traces of change in living spaces in order to comment on changes in people's lifestyles.

The beginning of apartment building construction in Konya, one of the oldest settlements in Anatolia, dates back to the 1930s as a reflection of the modernization and westernization process after the Republic. In addition to the traditional settlement structure of the city of Konya, it has undergone a significant morphological transformation since the mid-20th century with the start of apartment building construction. This process can be traced through distinct phases in terms of both spatial expansion and housing typologies. The spatial development of Konya has been shaped by changing production methods, transportation technologies, the transition to industrial production, and advancements in the service sector (Yenice, 2012).

The first urban plan aimed at directing the city's development toward the west and southwest was implemented in 1946. The railway line and station located in the west of the city determined the direction of urban development; the area around the station developed as a new settlement area, and İstasyon Caddesi, which connects the station to the city center, became a new development axis (Yenice, 2012). During this period, residential areas concentrated in the west and southwest, while commercial areas focused along Mevlana Boulevard, which connects Alaeddin Hill and the Mevlana Tomb. With the 1954 Urban Plan, the direction of urban development was expanded to the west, northwest, and southwest; residential areas concentrated in the west and northwest, while commercial areas shifted to the south and west. A bus terminal was proposed in the southeast to support commercial development along this axis (Yenice, 2012). The 1966 Urban Plan directed urban development toward the west and northwest in order to protect agricultural land. Residential areas were planned both east and west of the railway line and in the northwest; a Slum Prevention Zone (4th SPZ) was established in the north, wholesale commercial areas were planned at the entrances to the Istanbul and Ankara roads, a new bus terminal site was designated in the north to alleviate the burden on the city center, and the opening of Nalçacı Street was decided (Yenice, 2012). With the 1974 Supplementary Plan, slum prevention efforts were carried out along the northern and northeastern axes, and the shift toward the north was strengthened with the construction of public housing around Nalçacı Street and the location of the bus terminal in this area (Topçu, 2011). During this period, apartment construction gained momentum. In the 1984 Environmental Planning Scheme, the direction of development was shifted predominantly to the north. The reason for this was to protect the fertile agricultural lands in the south and the unsuitability of the terrain in the west and east for settlement (Yenice, 2012). A new sub-center consisting of administrative and service units was planned along the northern development axis (Istanbul Road), new industrial areas were planned in the northeast (Konya-Ankara and Konya-Aksaray roads), and a new bus terminal area was planned in the north (Figure 4).

Figure 4
Development map of the city of Konya[1]

[1] The zoning plans were obtained from Konya Metropolitan Municipality and Yenice (2012) and reorganized.



The development of apartment buildings in the city of Konya has been directly related to the city's spatial growth; this process has been shaped by the development areas and transportation axes envisaged in the zoning plans. In particular, in the urban fabric centered on Alaeddin Hill, main arteries such as Demiryolu Street, Nalçacı Street, Mevlana Street, and Yeni Meram Street, which leads to the station, have formed the primary routes where apartment buildings have concentrated.

The buildings selected for analysis in Konya are directly linked to the planned development of the city (Figure 5). Apartment buildings, which represent a transition from the rural housing style of houses with gardens and courtyards to urban housing, are architectural forms in which spatial organization has changed rapidly. In this study, the changes in the spatial organization of apartment buildings from 1937, when the first apartment building was constructed in Konya, to 2015 were examined using morphological analysis methods such as the graph method and spatial arrangement method. Considering that the changes did not occur suddenly but rather through transformations over time, apartment buildings were selected in 10-year intervals. Care was taken to ensure that the selected apartment buildings were examples that optimally reflected the typological characteristics and living habits of the period. In this context, the apartment buildings examined in the study and the dates of their construction in chronological order are as follows:

- Hayat Apartment (1937)
- As Apartment (1953)
- Anıt Apartment (1964)
- Karatay Apartment (1973)
- Güvez Apartment (1982)
- Sedef Apartment (1994)
- Sarıkaya Apartment (2007)
- Selay Apartment (2015)

Figure 5
Locations of apartment buildings selected for the study

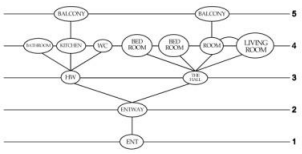
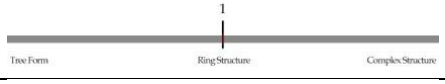
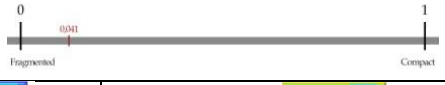
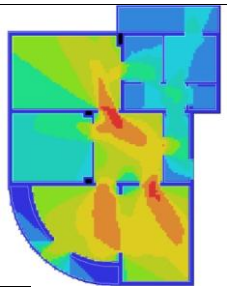
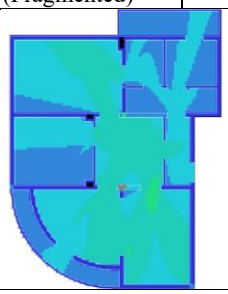
The first example of an apartment building in the city is the Hayat Apartment Building, dating back to 1937, located in the city center on Mevlana Street. This apartment building, in terms of its floor plan, shares similarities with the traditional Konya house floor plan (Ulusoy and Ulusoy, 2014), yet it offers the amenities of modern multi-story living. Following the construction of the first apartment building, no further apartment buildings were constructed in Konya until the 1950s due to economic stagnation. From the 1950s to the 1970s, apartment construction remained limited to a small area, mainly in the immediate vicinity of the city center. By the 1970s, the opening of Nalçacı Street marked the most significant step toward planned apartment development in the northern part of the city. This axis extending northward from the city center facilitated the transformation of low-density settlements around the Musalla Cemetery into apartment buildings. In the 1980s, the intensification of commercial areas along Demiryolu Street, which was activated to contribute to the connection of the city's focal points to the Selçuklu district, also paved the way for an increase in apartment blocks around the station. The 1990s brought about the transition from apartment buildings to housing complexes, and in Konya, these examples were more prevalent in the city's new residential area in the north. In this context, even in the 2000s, apartment buildings were more common in the southern part of the city. With the opening of Şefikcan Street in 2005, the city's new residential area began to shift westward. The latest apartment building examples, along with the first structures built here, have been replaced by luxury gated communities. These structures have been excluded from the scope of this study due to their differences from the apartment buildings examined in the study, such as social amenities (swimming pools, sports areas), secure entrances, and enclosed parking lots.

Analyses of apartment buildings are presented in Table 1 to Table 8 in the morphological card technique.[2]

Table 1
Graph and space syntax analysis of Hayat Apartment (1937)

1. Hayat Apartment (1937)

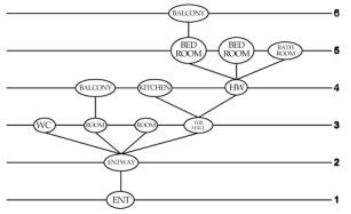
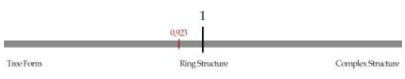
[2] The plans of the buildings were redrawn based on documents obtained from Süslü (2009) and the Selçuklu municipality.

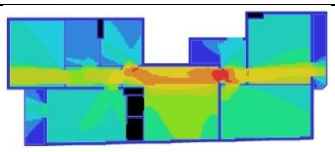
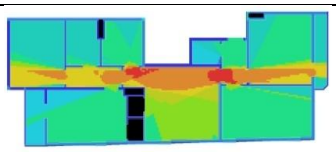
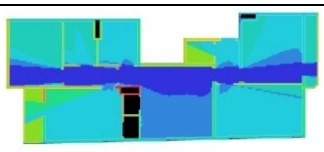
Identification Record of the Structure	*Name of the Building:* Hayat Apartment *Date of Construction:* 1937 *Size of the Building:* 3+1 *Normal Floor Plan m²:* 109.76			
Graph Analysis		Beta Index 1 (Ring Structure)		
		Gamma Index 0.041 (Fragmented)		
Space Syntax Analysis				
	Connectivity	Integration	Mean Depth	
	Min. Avg. Mak. 2 1752,7 4006	Min. Avg. Mak. 1,918 9,922 36,725	Min. Avg. Mak. 1 2,158 4,245	

Since it was the first example to move from the traditional housing to the apartment building, traces of the traditional housing were visible in the building. At the entrance, while the distribution to the building was provided through the entranceway, the hall connected to the entranceway provided access to the living spaces. Another hallway provided access to wet areas and kitchen spaces. This situation had arisen from the desire to provide the unification of installations. The distribution to the bedrooms and living space was provided through the hall. As a result of the graph analysis, the depth level of the structure was 5, and the deepest places were the balconies. The Beta index of the structure was calculated as 1. The structure had a cyclic form. The Gamma index was 0.041, and the structure had a fragmented composition. Considering the connectivity, visual integration and visual mean depth analyses of the structure, it was seen that the most commonly used spaces in the structure were the hall and living spaces that provided distribution within the apartment.

Table 2

Graph and space syntax analysis of As Apartment (1953)

	2. As Apartment (1953)			
Identification Record of the Structure	*Name of the Building:* As Apartment *Date of Construction:* 1953 *Size of the Building:* 4+1 *Normal Floor Plan m²:* 101,38			
Graph Analysis		Beta Index 1 (Ring Structure)		
		Gamma Index 0.041 (Fragmented)		

Space Syntax Analysis										
	Connectivity			Integration			Mean Depth			
	Min.	Avg.	Mak.	Min.	Avg.	Mak.	Min.	Avg.	Mak.	
	2	1962,65	5179	1,805	8,719	17,072	1,648	2,360	4,452	

At the entrance, distribution to the structure was provided through the entranceway. There were two rooms, a hall and a toilet that were connected to the entranceway. While access to the sleeping spaces and the bathroom was provided through a hallway from the hall, the kitchen was reached through the hall. In the early years, wet areas and kitchen were considered together for the unification of installations, but this situation changed in the subsequent years. Bathroom and kitchen were considered together while the toilet was considered separately. There was no classification of actions in the structure. As a result of the graph analysis, the depth level of the structure was 5, and the deepest places were the balconies. The Beta index of the structure was calculated as 1. The structure had a cyclic form. The Gamma index was 0.041, and the structure had a fragmented composition. Considering the connectivity, visual integration and visual mean depth analyses of the structure, it was seen that the most commonly used spaces in the structure were the circulation areas that were used as passages such as entranceway and hallway.

Table 3

Graph and space syntax analysis of Anıt Apartment (1964)

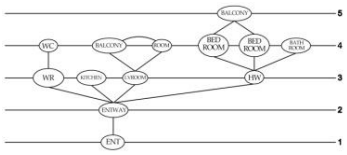
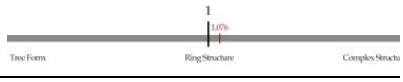
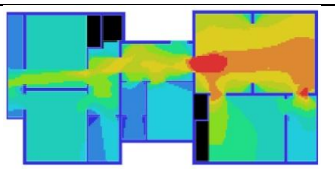
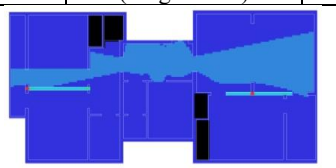
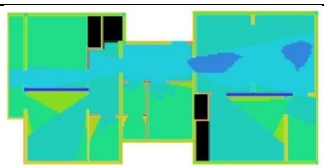
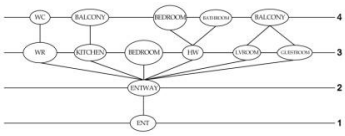
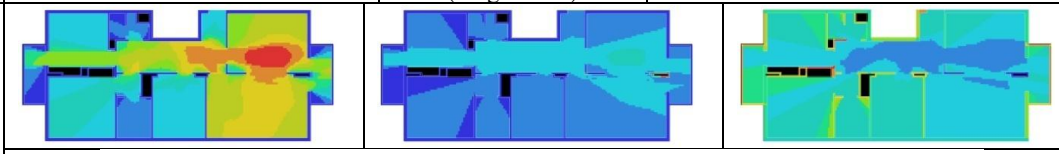
3. Anıt Apartment (1964)										
Identification Record of the Structure	*Name of the Building:* Anıt Apartment *Date of Construction:* 1964 *Size of the Building:* 3+1 *Normal Floor Plan m²:* 96,24									
Graph Analysis				Beta Index 1.076 (Complex Structure)						
				Gamma Index 0.044 (Fragmented)						
Space Syntax Analysis										
	Connectivity			Integration			Mean Depth			
	Min.	Avg.	Mak.	Min.	Avg.	Mak.	Min.	Avg.	Mak.	
	3	2226,93	5349	1,801	9,522	96,963	1,042	2,276	4,265	

Table 4

Graph and space syntax analysis of Karatay Apartment (1973)

4. Karatay Apartment (1973)

<table>
<tr><td>Identification Record of the Structure</td><td colspan="2">Name of the Building:
Karatay Apartment
Date of Construction: 1973
Size of the Building:
3+1
Normal Floor Plan m²:
106,22</td><td>  </td><td> 
</td></tr>
<tr><td rowspan="2">Graph Analysis</td><td rowspan="2">  </td><td>Beta Index
1
(Ring Structure)</td><td> 
</td></tr>
<tr><td>Gamma Index
0.041
(Fragmented)</td><td> 
</td></tr>
<tr><td>Space Syntax Analysis</td><td colspan="3"> 
<table>
<tr><th colspan="3">Connectivity</th><th colspan="3">Integration</th><th colspan="3">Mean Depth</th></tr>
<tr><th>Min.</th><th>Avg.</th><th>Mak.</th><th>Min.</th><th>Avg.</th><th>Mak.</th><th>Min.</th><th>Avg.</th><th>Mak.</th></tr>
<tr><td>5</td><td>2213,01</td><td>5151</td><td>1,362</td><td>10,625</td><td>58,782</td><td>1</td><td>2,102</td><td>4,527</td></tr>
</table></td></tr>
</table>

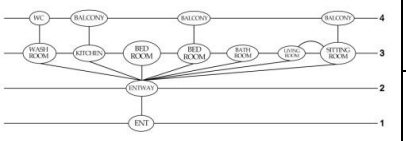
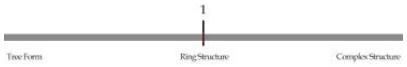
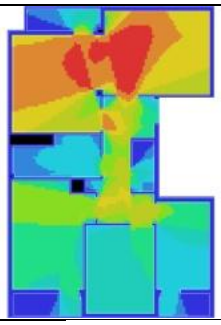
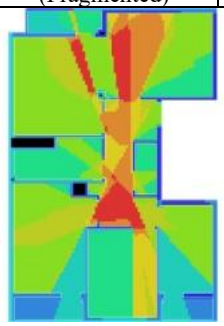
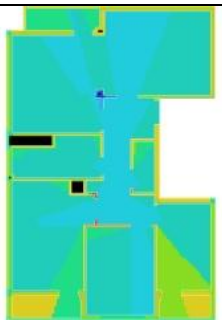
It was seen that the sofa disappeared in this period. At the entrance, distribution to the structure was provided through the entranceway. Access to living spaces was achieved by using the living room, and the space that was used as a sitting room was accessed through the living room. The first night hallway, in the real sense, was seen in this example. Access to the sleeping spaces and the bathroom was through a hallway that was connected to the entranceway. Wet spaces and kitchen were accessed through the entranceway. It was seen that the unification of installations was aimed in the structure. As a result of the graph analysis, the depth level of the structure was 5, and the deepest places were the balconies. The Beta index was calculated as 1.076. The structure showed the complex circuit properties. The Gamma index was 0.044, and the structure had a fragmented composition. Considering the connectivity, visual integration and visual mean depth analyses of the structure, it was seen that the most commonly used spaces in the structure were the circulation areas -used as a passage from the entranceway to the living spaces-, the entranceway and the living room.

At the entrance, distribution to the structure was provided through the entranceway. There was a passage between the sitting room and the living room, while the distribution to the living area was provided through the entranceway. Kitchen and wet areas were accessed through the entranceway. In this example, while the unification of installations was achieved in the kitchen and toilet, the bathroom was considered separately. While the master bedroom and the bathroom were accessed through a hallway connected to the entranceway, the space that was customized to be the children's bedroom was accessed through the entranceway. In this example, it was seen that the hallway used as a night hallway lost its function. As a result of the graph analysis, the depth level of the structure was 4, and the deepest places were the bedroom, the bathroom, the balcony and the toilet. The Beta index of the structure was calculated as 1. The structure showed the cyclic structure properties. The Gamma index was 0.041, and the structure had a fragmented composition. Considering the connectivity, visual integration and visual mean depth analyses of the structure, it was seen that the most commonly used spaces in the structure were the circulation areas and living spaces.

Table 5

Graph and space syntax analysis of Güvez Apartment (1982)

5. Güvez Apartment (1982)

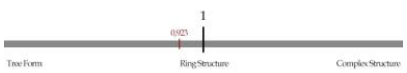
Identification Record of the Structure	*Name of the Building:* Güvez Apartment *Date of Construction:* 1982 *Size of the Building:* 3+1 *Normal Floor Plan m²:* 92,23		
Graph Analysis		Beta Index 1 (Ring Structure)	
		Gamma Index 0.041 (Fragmented)	
Space Syntax Analysis			

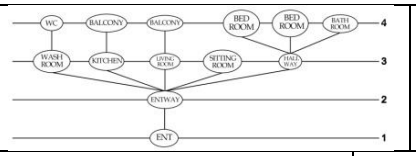
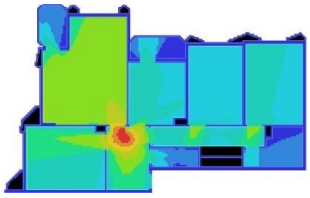
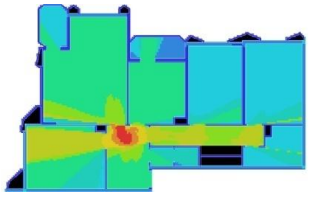
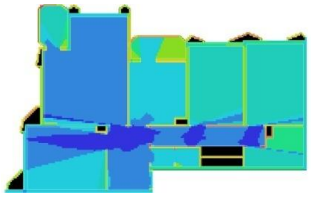
Connectivity			Integration			Mean Depth		
Min.	Avg.	Mak.	Min.	Avg.	Mak.	Min.	Avg.	Mak.
1	1721,87	3691	1,564	8,252	14,458	1	2,378	4,634

At the entrance, distribution to the structure was provided through the entranceway. It was seen that in the structure that did not have a second hallway, the spaces were not classified according to the actions they hosted. At the same time, the unification of installations that was desired in the preceding years for planning was completely lost here. As a result of the graph analysis, the depth level of the structure was 4, and the deepest places were the toilets and the balconies. The Beta index of the structure was calculated as 1. The structure showed the cyclic structure properties. The Gamma index was 0.041, and the structure had a fragmented composition. Considering the connectivity, visual integration and visual mean depth analyses of the structure, it was seen that the most commonly used spaces in the structure were the circulation areas and living spaces.

Table 6

Graph and space syntax analysis of Sedef Apartment (1994)

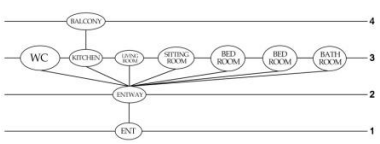
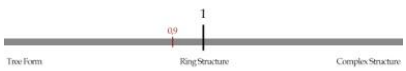
6. Sedef Apartment (1994)			
Identification Record of the Structure	*Name of the Building:* Sedef Apartment *Date of Construction:* 1994 *Size of the Building:* 3+1 *Normal Floor Plan m²:* 148,56		
Graph Analysis		Beta Index 0.923 (Tree Form)	

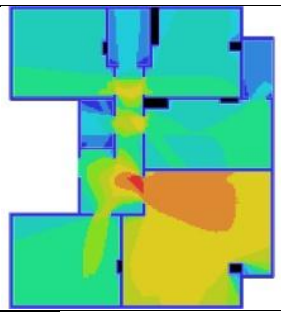
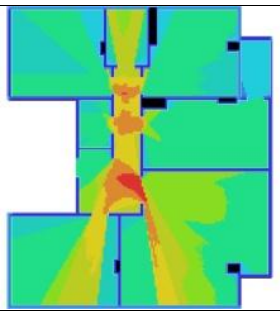
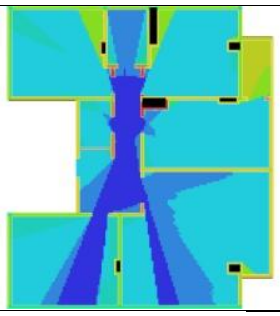
		Gamma Index 0.038 (Fragmented)	
Space Syntax Analysis	  		
	Connectivity: Min. 1, Avg. 1992, Mak. 6064 Integration: Min. 1,807, Avg. 8,706, Mak. 19,643 Mean Depth: Min. 1,562, Avg. 2,343, Mak. 4,472		
Results			

At the entrance, distribution to the structure was provided through the entranceway. It is seen that while the living sections, the kitchen and the toilet were accessed through the entranceway, the access to the sleeping section and the bathroom was provided through the night hallway. The installations in the kitchen were considered separately while a unification of installations was sought in the wet areas in the structure. It is noteworthy that the spaces were planned according to the actions they hosted. As a result of the graph analysis, the depth level of the structure was 4, and the deepest places were the bedroom, the bathroom, the balcony and the toilet. The Beta index of the structure was calculated as 0.923. The structure was in the tree form and showed the linear structure properties. The Gamma index was 0.038, and the structure had a fragmented composition. Considering the connectivity, visual integration and visual mean depth analyses of the structure, it was seen that the most commonly used spaces in the structure were the entranceway and the living room.

Table 7

Graph and space syntax analysis of Sarıkaya Apartment (2007)

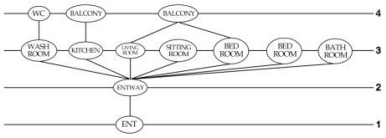
7. Sarıkaya Apartment (2007)			
Identification Record of the Structure	*Name of the Building:* Sarıkaya Apartment *Date of Construction:* 2007 *Size of the Building:* 3+1 *Normal Floor Plan m²:* 140		
Graph Analysis		Beta Index 0.9 (Tree Form)	
		Gamma Index 0.05 (Fragmented)	

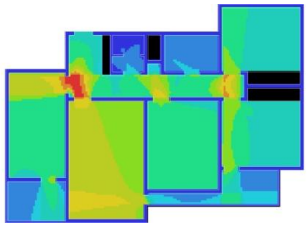
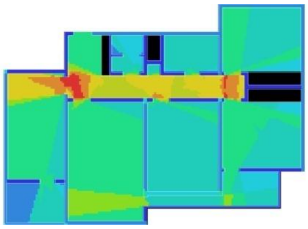
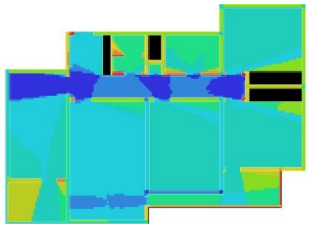
Space Syntax Analysis			
	Connectivity	Integration	Mean Depth
	Min. Avg. Mak.	Min. Avg. Mak.	Min. Avg. Mak.
	11 3149,89 7050	2,063 8,900 17,409	1,665 2,377 4,219

At the entrance, distribution to the structure was provided through the entranceway. There was no second hallway in the building. The unification of installations was not sought in the structure, but it was noticed that the spaces were planned according to the actions they hosted. As a result of the graph analysis, the depth level of the structure was 4, and the deepest space was the balcony. The Beta index of the structure was calculated as 0.9. The structure was in the tree form and showed the linear structure properties. The Gamma index was 0.05, and the structure had a fragmented composition. Considering the connectivity, visual integration and visual mean depth analyses of the structure, it was seen that the most commonly used spaces in the structure were partly the circulation areas and the living room.

Table 8

Graph and space syntax analysis of Selay Apartment (2015)

8. Selay Apartment (2015)			
Identification Record of the Structure	*Name of the Building:* Selay Apartment *Date of Construction:* 2015 *Size of the Building:* 3+1 *Normal Floor Plan m²:* 145		
Graph Analysis		Beta Index 1 (Ring Structure)	
		Gamma Index 0.041 (Fragmented)	

Space Syntax Analysis			

Connectivity			Integration			Mean Depth		
Min.	Avg.	Mak.	Min.	Avg.	Mak.	Min.	Avg.	Mak.
4	1758,3	4514	2,040	7,605	16,058	1,679	2,488	4,030

At the entrance, distribution to the structure was provided through the entranceway. There was no second hallway in the building. While the unification of installations was achieved in the wet areas, the kitchen was considered separately. However, although the places were positioned according to the actions they hosted, it is seen that the privacy was not fully achieved compared to previous years. As a result of the graph analysis, the depth level of the structure was 4, and the deepest places were the toilets and the balconies. The Beta index of the structure was calculated as 1. The structure showed the cyclic structure properties. The Gamma index was 0.041, and the structure had a fragmented composition. Considering the connectivity, visual integration and visual mean depth analyses of the structure, it was seen that the most commonly used spaces in the structure were partly the circulation areas, the living room, and the area that was used to pass from the entranceway to the kitchen and the living room.

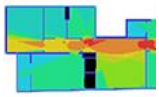
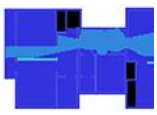
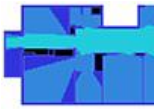
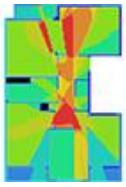
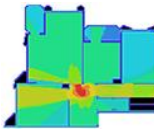
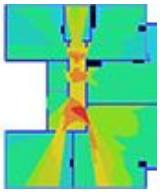
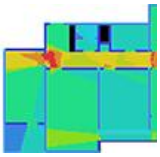
EVALUATION

As one of the products that best reflect the unique cultural characteristics and relationships of societies, changes in housing are effective in observing and identifying changes in society. As a result of the analyses conducted within the scope of the study, changes in the spatial organization of apartment-type housing structures over a period of approximately 80 years have been identified. In these transformations occurring during the process of adapting to changing lifestyles, there is a coexistence of the desire to adopt a Western lifestyle and the values brought by one's own culture. Therefore, the changes did not occur within a specific order or system. The spatial organization of apartment buildings, planned according to the desires and needs of the period, was also shaped within the framework of the technological and economic opportunities of the era. Features such as spatial dimensions, functional relationships, utility integration, balcony usage, the function of the kitchen, and its relationship with other spaces have varied over time and influenced changes in spatial organization. As seen in Table 2, over an 80-year historical process, under the leadership of Westernization trends and technological developments, the residential space underwent rapid change, and the parallel and mutually influencing processes of social development and architecture were observed.

Table 9

Spatial Transformation of Apartment Buildings ın the Process of 80 Years

Year	Buildings	Plan	Unification of Installations	Max. Integration	Beta	Gamma	The deepest space
1937	Hayat Apartment				Ring Structure	Fragmented	Balcony

1953	As Apartment				Form Structure	Fragmented	Balcony
1964	Anıt Apartment				Complex Structure	Fragmented	Balcony
1973	Karatay Apartment				Ring Structure	Fragmented	Wc Balcony Bedroom Bathroom
1982	Güvez Apartment				Ring Structure	Fragmented	Balcony Wc
1994	Sedef Apartment				Tree Form Structure	Fragmented	Wc Balcony Bedroom Bathroom
2007	Sarıkaya Apartment				Tree Form Structure	Fragmented	Balcony
2015	Selay Apartment				Ring Structure	Fragmented	Balcony Wc

The findings show that, over a period of approximately eighty years, spatial design has been directly linked to both social transformations and technological possibilities. In the first apartment buildings, the sofa space in traditional Turkish homes was a central distribution element, but in subsequent years this function was replaced by the entrance hall. This finding is consistent with Hillier and Hanson's (1984) emphasis on the capacity of space to shape social structure.

The issue of plumbing unity was a priority in early apartment buildings due to economic conditions, but this unity largely disappeared after the 1980s. This situation shows that during the period of rapid urbanization, user expectations shifted from functionality to modern living comfort.

Spatial arrangement data revealed significant differences in integration and connectivity values. In early-period apartment buildings, high integration values were concentrated in common spaces such as sofas and living rooms, while by the 2000s, integration had shifted toward a living room and kitchen-focused organization.

Additionally, it has been observed that spatial depths have decreased over the years, meaning that

accessibility has increased. In this context, the typological transformation of apartments in Konya is an indication not only of architectural formation but also of the redefinition of social relations.

When evaluated overall, three main phases stand out in the spatial organization of apartments:

- 1937–1960: A period dominated by traditional spatial codes, with the sofa and hall playing an important role.
- 1970–1990: A period of increased functional differentiation, but with a decline in shared facilities and accelerated modernization.
- Post-2000: A period marked by the emergence of gated communities, the weakening of the concept of privacy, and spatial organization defined more by individual comfort than social amenities.

These phases validate the relationship between social transformation and space and present unique spatial patterns specific to Konya.

CONCLUSION

The results of the study reveal that the spatial organization of Konya apartments has undergone significant transformations in line with social change, economic conditions, and technological developments throughout history. The findings show critical changes such as the transformation of the sofa-entrance hall in housing typologies, the loss of plumbing unity, the weakening of the concept of privacy, and the integration center becoming focused on the living room and kitchen.

The changes identified as a result of the analyses are as follows:

- The sofa space, which originated from the influence of traditional culture, was used as both a transition and living space in apartments in the early years, but over time, it was completely replaced by the entrance hall.
- In the early years of apartment living, wet areas and kitchens were combined to save money, but over time, this changed, and bathrooms and toilets were combined, while kitchens were separated.
- It has been observed that the concept of privacy has lost its influence in the use of hallways leading to sleeping quarters. The clash between the new lifestyle and traditional culture has particularly reflected in the concept of the night hallway.

This study draws conclusions about the fictional order that constitutes architectural typology through apartment buildings. These include functional relationships, spatial dimensions and their interconnections, plumbing systems, balcony usage, spatial depths, and the relationship between connecting and distributive spaces such as entrances and hallways with the entire system. As a result of the study, numerical and formal codes related to space were analyzed within the historical process, revealing spatial outcomes in the social data relationship of living spaces for the present and future.

However, the study also has limitations. The analysis was conducted on only eight apartment buildings, and a larger sample size would increase the generalizability of the findings. Additionally, the urbanization process after 2015 was excluded from the scope; including this period in the analysis would enable a more comprehensive assessment of the effects of urban transformation policies on spatial organization.

The research once again demonstrates the power of the space syntax approach to make socio-spatial changes in housing typologies visible through numerical data. In this respect, the study is a qualitative analysis of the spatial codes of the apartment building process in Turkey.

In conclusion, the spatial organization of apartment buildings in Konya constitutes a unique document reflecting the modernization and urbanization process in Turkey. These findings are not only significant for architectural history and typology research but also serve as a guide for future housing policies and urban transformation strategies.

Ethical Statement

The present study is an original research article designed and produced by the authors.

Author Contributions

Research Design (CRediT 1) Author 1 (%50) – Author 2 (%50)

Data Collection (CRediT 2) Author 1 (%50) - Author 2 (%50)

Research - Data Analysis - Validation (CRediT 3-4-6-11) - Author 1 (%50) - Author 2 (%50)

Writing the Article (CRediT 12-13) Author 1 (%50) - Author 2 (%50)

Revision and Improvement of the Text (CRediT 14) - Author 1 (%50) – Author 2 (%50)

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Conflict of interest

The authors declare no conflict of interest for the present study.

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