# FACTORS AFFECTING HOUSING PRICES: THE CASE OF ISTANBUL-ATAKOY

## Konut Fiyatlarını Etkileyen Faktörler: İstanbul-Ataköy Örneği

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**ABSTRACT**

Different structural and spatial features such as type of housing unit, age of housing unit, size of housing unit, number of rooms, number of bathrooms, construction quality, heating system, parking lot, quality of public services, proximity to centers, distance to health and education facilities, transportation facilities, crime rate, satisfaction with social activities, landscape, environment, pollution and airport noise affect the prices of the housing units. Atakoy is one of the important residential areas of Istanbul with a high quality of life, due to the richness of its green areas and its urban texture, the closeness to centers, high quality of transportation and urban services. The lack of vacant land, the high demand and the high occupancy rate in the region have increased the housing prices considerably, and the importance of the regional housing market. The aim of the study is to determine the characteristics of housing unit that may affect the housing prices in Atakoy. In this context, multiple regression analysis has been made with the data which consist of physical information about 149 housing units for sale in the region and it has been examined which features related to the housing unit how much may affect the housing prices.

**ÖZ**

Konut tipi, konutun yaşı, konut büyüklüğü, oda sayısı, banyo sayısı, inşaat kalitesi, ısıtma sistemi, otopark varlığı, kamusal hizmetlerin kalitesi, merkezlere yakınlık, sağlık ve eğitim kurumlarına uzaklık, ulaşım aksları, suç oranı, sosyal aktivitelerden memnuniyet, manzara, çevre kirliliği, otoyollar ve havaalanı gürültüsü gibi birbirinden farklı yapısal ve mekânsal özellikler, konutların fiyatlarını etkilemektedir. Konut harcamasının, hayat boyu yapılan en büyük harcamalardan biri olması, yerel ve merkezi yönetimlerce konutun ekonomik ve politik açıdan önem arz etmesi gibi nedenler ise konut fiyatlarını etkileyen faktörlerin incelenmesini önemli kılmaktadır. Merkezlere, ulaşım ve donatılara yakınlığı; yeşil alanlarının zenginliği ve yerleşim düzeni gibi nedenlerle İstanbul'un önemli ve yaşam kalitesi yüksek konut yerleşim alanlarından biri olan Ataköy'de; boş arsa bulunmaması, talebin ve bölgedeki doluluk oranının ise çok yüksek olması konut fiyatlarını oldukça yükseltmiş, bölgesel konut pazarının İstanbul genel konut pazarı içerisindeki önemini artırmıştır. Çalışmanın amacı Ataköy'de konut fiyatlarına etki eden konut birimine ilişkin özellikleri belirlemektir. Bu kapsamda bölgedeki satılık 149 konutun fiziksel verileri ile çoklu regresyon analizi yapılmış ve konut fiyatlarına etki edebilecek konut birimine ilişkin özelliklerin hangisi ya da hangilerinin konut fiyatlarını nasıl ve ne ölçüde etkilediği irdelenmiştir.

**1. Introduction**

In its historical development, the housing has been shaped and developed according to the geography it is located, the mode of production of the society and the resulting level of development, income distribution, type and speed of urbanization, family structure and the requirements of social life. Housing is the most important type of building that meets the shelter needs of people, protects them from external influences and allows them to live in safety. It is also a phenomenon where all life actions like sleeping, resting, eating take place, bringing individuals or families together. Therefore, housing is one of the most basic human needs and rights (Arcan, 1999; Barlas, 2014; Keleş, 2014). Local and central governments, on the other hand, saw housing as an important economic resource and policy tool that should be controlled (Tekeli, 1996). With the increasing share of the private sector in housing investments in Turkey after 1980, housing has turned into an investment and prestige beyond meeting the need for housing. The technology that has developed from the past to the present and the rise in living standards have also greatly affected the housing market. The housing market consists of heterogeneous components, as houses have different characteristics from each other. The different structural, physical, spatial and neighborhood characteristics of the houses affect the prices of the houses (Kangallı Uyar and Yayla, 2016). The reasons such as the fact that housing expenditure is one of the largest expenditures of a person or a household in a lifetime, local and central governments see housing as an economic resource and use it as a policy tool make it important to examine the factors affecting housing prices.

This study covers Atakoy District of Bakırkoy-Istanbul. Ataköy is a sub-region where the quality of life is high in Istanbul with its proximity to Bakırköy, its planning approach, the presence of green areas and social facilities, its proximity to public transportation and the shore, therefore demand is high. It was chosen mainly because it contains different neighborhoods/sub-regions within itself and has significant differences in housing type, housing age, housing size, housing plan and features. The aim of the study is to determine the characteristics of the housing unit that may affect the housing prices in Atakoy. It also aims to find an answer to the question of how much effect these variables have on housing prices. The study is shaped on the physical characteristics of the housing units. Economic and political factors affecting the housing price and externalities such as pandemics are out of the scope of the study. The data used in the study were obtained from hepsiemlak.com website in November 2022 and an evaluation was made for 149 housing units for sale based on their physical characteristics. In Atakoy, one of the important residential areas of Istanbul with a high quality of life; the lack of vacant land, the high demand and the high occupancy rate in the region have increased the housing prices considerably, increasing the importance of the regional housing market in the Istanbul general housing market. In addition, Atakoy, which is an old settlement, will need to be renewed in the future. It is thought that the results of the research will be useful for real estate investors and buyers to make the right decisions and for the local government to make the decision of choosing the location of service, equipment and infrastructure areas that will affect the structuring of the city more accurately.

**2. Conceptual Framework**

Housing meets one of the most basic needs of people, which is shelter. It also provides physical and psychological needs such as safety, belonging, esteem, self-actualization in Maslow's hierarchy of needs (Hablemitoglu, Özkan and Purutçuoğlu, 2010). Although there are various reasons for housing demand, it is possible to examine these reasons within the framework of two main motives. Accordingly, it is desired to own the house mainly for consumption (shelter) or investment purposes. Individuals who request housing for accommodation can buy or rent the house. The general tendencies of people in housing preference, the factors affecting the preference and the order of priority among these factors vary. When viewed from the upper scale, per capita income level, prices, rate of urbanization, interest rates are effective on housing preferences. Moreover, the factors affecting people's housing preferences vary according to the type of housing demand, such as primary or secondary housing demand, investment or residential demand, purchase or rental housing demand. People's socio-economic status, culture and education level, habits, personality traits and lifestyle, Demographic characteristics such as age, gender and household size also directly affect preference factors. In addition, the geography and climatic conditions in which people live have a great impact on their housing preferences. Although people's housing preferences differ for different reasons, these differences are gradually decreasing, especially in metropolitan cities, with the developing technologies, globalization and neoliberal

processes, and similar housing needs and as a result, similar housing types emerge. On the other hand, economic crises, pandemics, natural disasters have significant effects on housing preferences especially in metropolitan cities (Filiz and Hacıhasanoğlu, 2011; Güney-Yüksel, 2022; Uysal and Yiğit, 2016).

Housing contains many components and can be examined in a broad perspective. Different disciplines have handled housing for different purposes, and examining the factors that play a role in determining housing prices has also been the subject of many studies. After establishing the relationship between urban land use and housing market dynamics, planners and politicians started to work on this issue (Ding, Simons and Baku, 2000). Brown and Pollakowski (1977) examined housing prices in settlements close to lakes and green belts in their study using regression analysis in Seattle. Mozolin (1994) revealed that features such as distance from the city center, proximity to recreation areas, socio-economic status of the neighborhood have significant effects on the price of housing in Moscow. Daniere (1994) examined housing prices using hedonic price analysis in Cairo and Manila, concluded that transportation axes, water elements and the distance to the CBD have an effect on housing prices. Goodman and Thibodeav (1995) used hedonic price analysis, and examined the sales prices of 8500 houses in Dallas. At the end of the study, it was determined that the age of the building has a negative effect on the house price. Mok, Chan and Cho (1995) found in their study in Hong Kong that house prices are inversely proportional to the age of the building and the distance from the center, and directly proportional to the size of the house.

Joke (2000) analyzed with hedonic pricing method, and determined that the prices of the houses with a large garden and close to a lake are higher in the study on 3000 houses of 8 different regions of the Netherlands. In Wilhemsson's (2002) study for residences in Stockholm, it was seen that more living space and better quality interior design affect preferences and housing prices. In the study of Maurer, Pitzer and Sebastian (2004) in which they analyzed the Paris housing market, it was stated that the number of floors in the building would affect the housing price positively and the occupancy rate of the building would affect the housing price negatively in the bourgeois districts. Wen, Jia and Guo (2005) examined housing prices in Hangzhou-China, and found that housing prices were affected by 60% by building features, by 19.8% by location features, by 16.5% by neighborhood features, and by other features by 2.7%. Sue and Wong (2010) examined housing prices in Singapore, and concluded that the prices of new, large and high-rise houses are higher. Liao and Wang (2011) applied the spatial quantile regression method on 46,362 houses belonging to 113 residential areas in Changsha-China, and concluded that the housing prices were affected by the physical properties of the house as well as the important parks and the CBD hotel in the city. Wu, Jiao, Yu, Li, Peng, Liu and Zeng (2018) examined housing prices in Wuhan-China. According to the study, distance to the center, distance to the hospital and distance to the metro station are important for housing prices.

Özus and Dökmeci (2006) determined the physical and functional factors and their degree of impact that affect the housing sales prices in Beyoğlu's historical residential areas using hedonic price analysis. The study revealed that the most effective variables on the housing price are the sea view and the angle of the sea view, the building structure type, the number of empty flats in the building, the distance to the industrial facilities, the number of floors in the building, the using of the garden and the presence of heat insulation. According to the results of the study, the expansion of the sea view angle of the house increases the sales price of the housing unit. According to the study, the increase in the number of building floors in the region also increases the housing sales prices. In addition, a detached house for sale has a higher value than a house for sale in an apartment building according to study. In the study, it was concluded that while the number of vacant flats in the building increased the housing prices, the presence of industrial facilities around the housing decreased the housing prices. Yazgı and Dökmeci (2007) used multiple regression analysis as a method for thirty-two different areas with different spatial and historical characteristics in the metropolitan area of Istanbul. As a result of the study, it has been determined that the size of the housing unit, the density of the buildings in the region, the distance to the sea and the road surface ratios have an effect on the house prices.

Cingöz and Altınay (2010) examined the factors that differentiate housing prices in closed housing complexes/gated communities in Istanbul. In the study, it was determined that there is a positive relationship between the service and the quality of the region. For this reason, it can be said that the neighborhood where the house is located has a determining effect on the price of the house. However, as an important finding regarding the neighborhood, it has been revealed that being far from the city center has a negative effect on the housing price. In the study, it was concluded that as the area of the housing unit and the number of rooms

increase, the housing prices also increase. Likewise, it can be said that the presence of the parking lot, landscaping, water element etc. increase housing price. Yayar and Gül (2014) examined the factors affecting the prices of housing units in Mersin city center using the hedonic analysis method. According to the results of the research, it can be said that variables such as proximity to shopping or market, number of bathrooms, size of kitchen, number of elevators, garage, central satellite system and private security are directly proportional to housing prices. It has been revealed that the fact that the house is far from public transportation and is old reduces the house prices. Kördiş, Işık and Mert (2014) examined the factors affecting housing prices in Antalya using hedonic analysis method. According to the results of the study, the housing type, age, width, facade, number of floors of the building and the floor where the housing unit is located, sea view and proximity to the sea, number of bathrooms, heating system, presence of indoor parking lot, presence of swimming pool and elevator is important factors affecting the housing price. According to the study, building age is inversely proportional to housing prices. It is seen that there is a direct proportionality between the housing prices and the size of the housing unit and the number of rooms. It is stated that the price of the housing units that are not on the south facade is far below the general house price average in Antalya. In addition, the fact that the building is multi-storey, the housing unit is on a high floor and the number of bathrooms is high affect the housing price in the study. In the study, it has been seen that proximity to the sea and sea view have a large and positive effect on housing prices. The presence of the indoor parking lot and the apartment attendant, and the fact that the house is in the complex, also affect the house prices positively.

In the study conducted by Çiçek and Hatırlı (2015) in Isparta Province, housing prices were also higher in the neighborhood with the highest level of development. According to the study, the most important factors affecting housing prices are distance from the city center, air pollution, the neighborhood of the housing unit, the age of the housing unit, the size of the housing unit, the number of rooms, having a central heating, having a parking lot and being on the south side. Among these variables, the proximity of the housing unit to the city center, the size of the housing unit, the number of rooms, having central heating, being on the south side and having a parking lot affect housing prices positively, while the presence of air pollution and the increase in the age of the house decrease the price of the house. Bulut, Öner and İslamoğlu (2015) examined the prices of 3+1 housing units in three central districts of Samsun using hedonic analysis. In their study, it was revealed that the proximity of the tram and bus stop and the sea view increase the price of the housing unit. When the floor where the housing unit is located is 1 and above, it has been determined that the housing price is higher than the apartments on the basement-ground floor. In addition, while a positive relationship was observed between the size of the housing unit and the housing price, it was revealed that the building age of 5 and higher reduces the housing prices. In the study, it has been revealed that the presence of elevator, en- suite bathroom and the heating system increase the price of the housing unit. Alkan-Gökler (2017) investigated the factors affecting the housing prices in Ankara. According to the study, the size of the housing unit, the number of bathrooms it has, the number of floors of the building where the housing unit is located, the location of the housing unit in Çankaya, Gölbaşı or Keçiören districts, the detachment of the housing unit and the fact that the housing unit has a central heating system affect housing prices positiveliy. In addition, it is said that the location of housing unit in the Etimesgut district affect the house prices negatively. Among these variables, it is seen that the size of the housing unit is has the most impact on the housing prices, while the location in Etimesgut has the least impact among the variables. Gözen and Bostancı (2021) investigated the factors affecting the housing prices in Izmit. According to the results obtained from the study, having an outdoor swimming pool, having a built-in kitchen, having an elevator, number of bathrooms, size of the housing unit in square meters, having a closed garage, number of rooms, being in the site and having underfloor heating affect the housing prices positively. Özsoy and Şahin (2021) investigated the factors affecting the housing prices in Izmir. According to the study, features such as the size of the housing unit, the presence of an elevator, the floor on which the housing unit is located, the number of balconies, air conditioning, and the number of bathrooms positively affect the housing prices (Table 1).

When the conceptual and theoretical framework is examined, the factors affecting the housing price can be grouped into three groups as structural variables of the housing unit and the building in which the housing unit is located, neighborhood unit variables or natural and built environment variables. Variables such as parcel area, type of housing unit, construction style of the building, age of the building, size of the housing unit, number of rooms, number of bathrooms, construction quality, heating system, presence and size of the parking

lot can be given as examples of the structural variables of the housing unit and building (Can, 1990; Forrest, 1990; Goodman and Thibodeau, 1995; Özus and Dökmeci, 2006). The quality of public services, distance to the central business district, centers and shopping centers, distance to health and educational facilities, distance to transportation axes and public transportation, socio-economic status of the neighborhood unit, access to other parts of the city can be given as examples for the variables of the neighborhood unit (Can, 1990; Cheshire and Sheppard, 1995; Daniere, 1994; Özus and Dökmeci, 2006). Household size and income level, education level and per capita income, crime rate, satisfaction with social activities are examined within the socio-economic status of the neighborhood unit, but they are important parameters affecting the housing price (Lynch and Rasmussen, 2001; Tse and Love, 2000; Özus and Dökmeci, 2006). Natural and built environment variables are natural constraints, landscape, climate, environmental pollution, highways and airport noise, storage areas, etc (Table 1).

**Table 1.** Factors Affecting Housing Prices.

**Housing Unit/Building Features**

| | |
|---|---|
| age of the building | (Çiçek and Hatırlı, 2015; Forrest, 1990; Kördiş, Işık and Mert, 2014; Mok, Chan and Cho, 1995; Sue and Wong, 2010; Thibodeav, 1995; Özus and Dökmeci, 2006; Yayar and Gül, 2014) |
| number of floors | (Kördiş, Işık and Mert, 2014; Maurer, Pitzer and Sebastian, 2004; Sue and Wong, 2010; Özus and Dökmeci, 2006) |
| occupancy ratio | (Maurer, Pitzer and Sebastian, 2004; Özus and Dökmeci, 2006) |
| parcel area | (Can, 1990; Forrest, 1990; Goodman and Thibodeau, 1995; Özus and Dökmeci, 2006) |
| construction style-quality | (Can, 1990; Forrest, 1990; Goodman and Thibodeau, 1995; Özus and Dökmeci, 2006) |
| parking/garage presence-size | (Can, 1990; Cingöz and Altınay, 2010; Çiçek and Hatırlı, 2015; Forrest, 1990; Goodman and Thibodeau, 1995; Kördiş, Işık and Mert, 2014; Yayar and Gül, 2014) |
| number of elevators | (Bulut, Öner and İslamoğlu, 2015; Kördiş, Işık and Mert, 2014; Yayar and Gül, 2014) |
| private security | (Yayar and Gül, 2014) |
| apartment worker presence | (Kördiş, Işık and Mert, 2014) |
| garden presence-size | (Joke, 2000; Özus and Dökmeci, 2006) |
| swimming pool presence | (Kördiş, Işık and Mert, 2014) |
| heat insulation-system | (Alkan-Gökler, 2017; Bulut, Öner and İslamoğlu, 2015; Can, 1990; Çiçek and Hatırlı, 2015; Forrest, 1990; Goodman and Thibodeau, 1995; Kördiş, Işık and Mert, 2014) |
| the floor of the housing unit | (Alkan-Gökler, 2017; Bulut, Öner and İslamoğlu, 2015; Kördis, Işık and Mert, 2014) |
| facade of housing unit | (Çiçek and Hatırlı, 2015; Kördiş, Işık and Mert, 2014) |
| view of the housing unit | (Bulut, Öner and İslamoğlu, 2015; Kördiş, Işık and Mert, 2014; Özus and Dökmeci, 2006) |
| size of the housing unit | (Alkan-Gökler, 2017; Bulut, Öner and İslamoğlu, 2015; Can, 1990; Cingöz and Altınay, 2010; Çiçek and Hatırlı, 2015; Forrest, 1990; Kördiş, Işık and Mert, 2014; Mok, Chan and Cho, 1995; Sue and Wong, 2010; Wilhemsson, 2002; Yazgı and Dökmeci, 2007) |
| number of rooms | (Cingöz and Altınay, 2010; Çiçek and Hatırlı, 2015) |
| housing type | (Alkan-Gökler, 2017; Can, 1990; Kördiş, Işık and Mert, 2014; Özus and Dökmeci, 2006) |
| interior design | (Wilhemsson, 2002) |
| number of rooms | (Cingöz and Altınay, 2010; Çiçek and Hatırlı, 2015) |
| number of bathrooms/master bathroom | (Alkan-Gökler, 2017; Bulut, Öner and İslamoğlu, 2015; Can, 1990; Kördiş, Işık and Mert, 2014; Yayar and Gül, 2014) |
| kitchen size | (Yayar and Gül, 2014) |

**Table 1 (continue).** Factors Affecting Housing Prices.

| Location Features | |
|---|---|
| distance from the city center | (Cingöz and Altınay, 2010; Çiçek and Hatırlı, 2015; Mok, Chan and Cho, 1995; Mozolin, 1994) |
| distance to public transportation | (Bulut, Öner and İslamoğlu, 2015; Daniere, 1994; Yayar and Gül, 2014) |
| proximity to parks and recreation areas | (Liao and Wang, 2011; Mozolin, 1994) |
| distance to water elements | (Cingöz and Altınay, 2010; Joke, 2000; Kördiş, Işık and Mert, 2014; Yazgı and Dökmeci, 2007) |
| proximity to accommodation | (Liao and Wang, 2011) |
| distance to industrial facilities | (Özus and Dökmeci, 2006) |

| Neighborhood Features | |
|---|---|
| socio-economic status of the neighborhood | (Alkan-Gökler, 2017; Çiçek and Hatırlı, 2015; Mozolin, 1994) |
| the structure and population density of the neighborhood | (Yazgı and Dökmeci, 2007) |
| service quality | (Can, 1990; Cheshire and Sheppard, 1995; Cingöz and Altınay, 2010; Daniere, 1994; Özus and Dökmeci, 2006) |
| landscaping | (Cingöz and Altınay, 2010) |
| environmental pollution | (Can, 1990; Cheshire and Sheppard, 1995; Daniere, 1994; Özus and Dökmeci, 2006) |
| demographic structure | (Can, 1990; Cheshire and Sheppard, 1995; Daniere, 1994; Özus and Dökmeci, 2006) |
| crime rates | (Can, 1990; Cheshire and Sheppard, 1995; Daniere, 1994; Özus and Dökmeci, 2006) |
| noise pollution | (Can, 1990; Cheshire and Sheppard, 1995; Daniere, 1994; Özus and Dökmeci, 2006) |

## 3. Method

Studies dealing with the factors affecting housing prices at the scale of buildings and cities were examined. Since many factors affect the housing price, more than one variable group was used together instead of a single variable group in the studies. For this reason, it is possible to say that multiple regression analysis is commonly used in the analysis. Regression analysis is an important statistical method used for data analysis in many fields and is used to explain the relationship between variables. Regression analysis is the explanation of the relationship between a dependent variable and independent variables that are assumed to have an effect on the dependent variable with a mathematical model (Ural and Kılıç, 2005). According to the concepts obtained from the conceptual and theoretical framework, the characteristics of the housing unit are considered as independent variables. The study was carried out by examining the physical characteristics of 149 housing units for sale with the data obtained from hepsiemlak.com website in November 2022. The effects of physical characteristics on housing prices were examined and interpreted with multiple regression analysis.

## 4. Atakoy Study Area and Application of the Model

Atakoy is located on the European side of Istanbul, within the borders of Bakırkoy district (Figure 1). Atakoy region, which is separated from Bahçelievler by the E-5 highway in the north and extends to the Marmara Sea in the south, is adjacent to Bakırkoy in the east and is separated from Yesilkoy by the Ayamama Stream in the west. Atakoy, one of the first satellite city projects implemented in Turkey, started its operations in the 1950s as a project of Emlak Bank. It is a settlement above Turkish standards with its proximity to important centers such as Bakırkoy, Topkapı and Aksaray, having a coastline by the sea, richness of parks, green areas and common areas, and wide and spacious settlement texture. In addition, it is one of the important residential areas of Istanbul with a high quality of life, due to the fact that there are shopping centers, public and private hospitals around it, close to Atakoy Marina-Yacht Harbor, sea bus (IDO) and Atatürk Airport (Barutçular and Dostoğlu, 2019) (Figure 2).
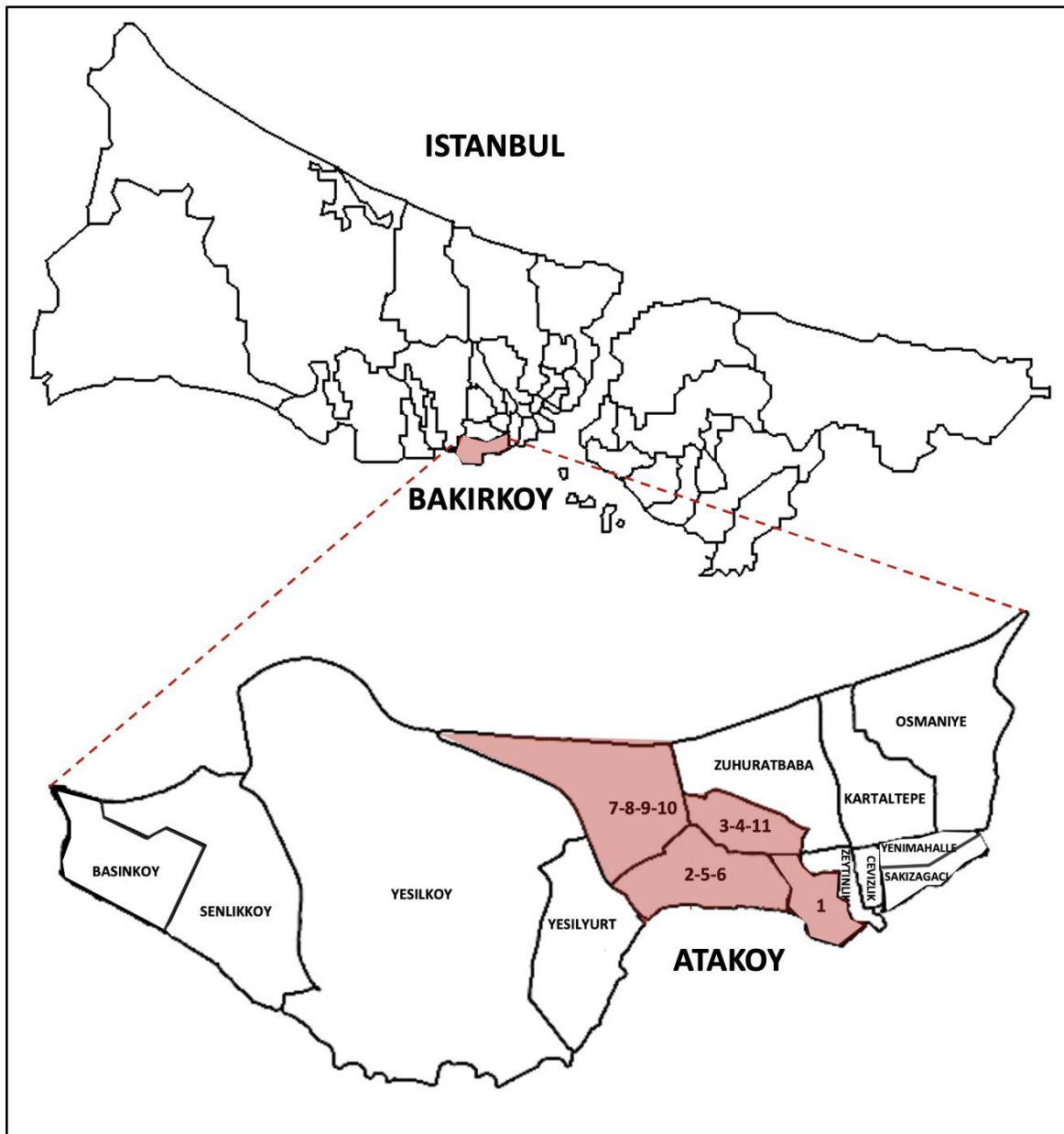
**Figure 1.** Location of Bakırkoy and Atakoy.

Atakoy was planned by the Baruthane Project Bureau based on the outputs of an urban design competition held in 1956. Then, this new urban area was named "Atakoy". The region was planned as 10 sections with the beach, touristic and social facilities, educational areas, sports facilities, bazaars and green areas on the coast, but the number of sections was increased to 11 with a partial plan amendment made in 1987. Atakoy is administered by 4 mukhtars today. These are: Atakoy 1st neighborhood, Atakoy 2-5-6th neighborhood, Atakoy 3-4-11th neighborhood and Atakoy 7-8-9-10th neighborhood. Neighborhood 1, covering an area of approximately 20 hectares, was built in 1957-1962. Atakoy neighborhood 1, designed for the high-income group, is one of the examples of modern architecture in Turkey. It is designed as residential blocks with large square meters, reminiscent of Le Corbusier structures rising from the ground on columns. There are 662 housing units in the 1st neighborhood. There are 852 housing units in the 2nd neighborhood, which was started in 1959 and completed in 1964 and has an area of 18 hectares. For the 2nd neighborhood, houses with smaller areas between 85 and 140 square meters have been designed. In its center, there is a bazaar consisting of single-storey shops and a primary school. Housing units of Atakoy 3-4th neighborhood are in the form of row blocks. Unlike the

1st section, 3-4th neighborhood were planned in accordance with the social housing needs. The construction of the 3rd and 4th which has 47 hectares started in 1963 and was completed in 1974. As there is no natural boundary separating neighborhood 3 from neighborhood 4, they are referred to together. There are a total of 2630 housing units in these two neighborhoods (Aktulga, 2016; Barutçular and Dostoğlu, 2019).



**Figure 2.** Functions in and around Ataköy (Yandex was used for the base map.).

Covering an area of 35 hectares, neighborhood 5 is the center of the settlement and includes 2993 housing units. The construction of the 5th neighborhood, which started in 1976, was interrupted in the following years due to the negative political and economic effects before the 1980 military coup, and was completed in 1983. In addition to the housing units, neighborhood 5 includes a large bazaar and two primary schools. Between 1957-1983, the constructions of the first five neighborhoods were completed. The development of Atakoy was continued with 9-10th neighborhoods instead of 6th neighborhood, and neighborhood 6 was planned to be built as a more prestigious neighborhood close to the sea after the completion of the other neighborhoods. 9-10th neighborhood is located in the northwest of the land allocated to Atakoy, on the border of the E-5 highway and consists of 3100 housing units. Its construction began in 1985 and was completed in 1988. In 1987, a partial plan amendment was made and the educational facilities area located next to Siyavuş Paşa Stream was converted into a residential area and the number of neighborhoods was increased to 11. The construction of the 7th, 8th and 11th sections, consisting of 4348 residences, started in 1989 and was completed in 1991. In the 2000s, with the arrangements and changes made in the Coastal Legislation depending on the housing policies, the area between the Coastal Road (Rauf Orbay Street) in the north, the Marina in the east and the Ayamama Stream in the west was opened for development (Akay, 2018; Barutçular and Dostoğlu, 2019). In this region, Atakoy Konakları, Sea Pearl and Yalı Atakoy residence projects have been built (Figure 3).

**Figure 3.** Neighborhoods of Atakoy (Google Maps were used for the base map.).

In November 2022, 149 housing units for sale in Ataköy were accessed through the website Hepsiemlak.com. When the distribution of the housing units type according to the neighborhoods is examined, it is seen that there are both flats and residences in neighborhood 7-8-9-10 and neighborhood 2-5-6. However, residences are particularly concentrated in neighborhood 2-5-6. On the other hand, type of the housing units for sale in neighborhood 1 and neighborhood 3-4-11 are completely flat. When the widths of the housing units are examined, it can be said that the housing units in neighborhood 1 are wider and that the neighborhood 1 is followed by neighborhood 2-5-6, neighborhood 7-8-9-10 and neighborhood 3-4-11 respectively. On the other hand, it is seen that some housing units (residences) in neighborhood 2-5-6 exceed 350 m$^2$. Considering the number of bathrooms, it is seen that there are mostly single-bathroom housing units in neighborhood 7-8-9-10 and neighborhood 3-4-11, and more two-bathroom housing units in neighborhood 2-5-6 and neighborhood 1. On the other hand, three-bathroom housing units are also available in neighborhood 2-5-6 and neighborhood 1, while there are also four-bathroom housing units (only in residences) in neighborhood 2-5-6 only. It can be said that the heating system of the houses is generally the central system. Unlike the others, neighborhood 2-5-6 has Fancoil unit and underfloor heating. Looking at the housing ages, there are generally older residences in neighborhood 3-4-1 and neighborhood 1, and newer residences in neighborhood 7-8-9-10 and especially in neighborhood 2-5-6 (Figure 4).

In the model application of the study, multiple regression analysis was preferred to examine the change of housing prices according to the structural/physical characteristics of the house. In the selection of the model, in addition to the fact that the examined property is a residential real estate with many different components, the model's compatibility with the purpose of the study by being based on measuring the factors affecting the natural logarithm of price and their degree of impact also played a role. When the results obtained are examined, it is observed that there is a strong relationship between the natural logarithm of the housing price and the statistically significant independent variables selected (R=0,93). The independent variables included in the model explain 86.6% of the change in the dependent variable of housing price (R2= 0,87) (Table 2). As a result of the Anova test, the F value was found to be 130,59 and the significance value was 1.3e-58, and it was determined that the model is significant (F=130,59 and significance F <0.05) (Table 3).
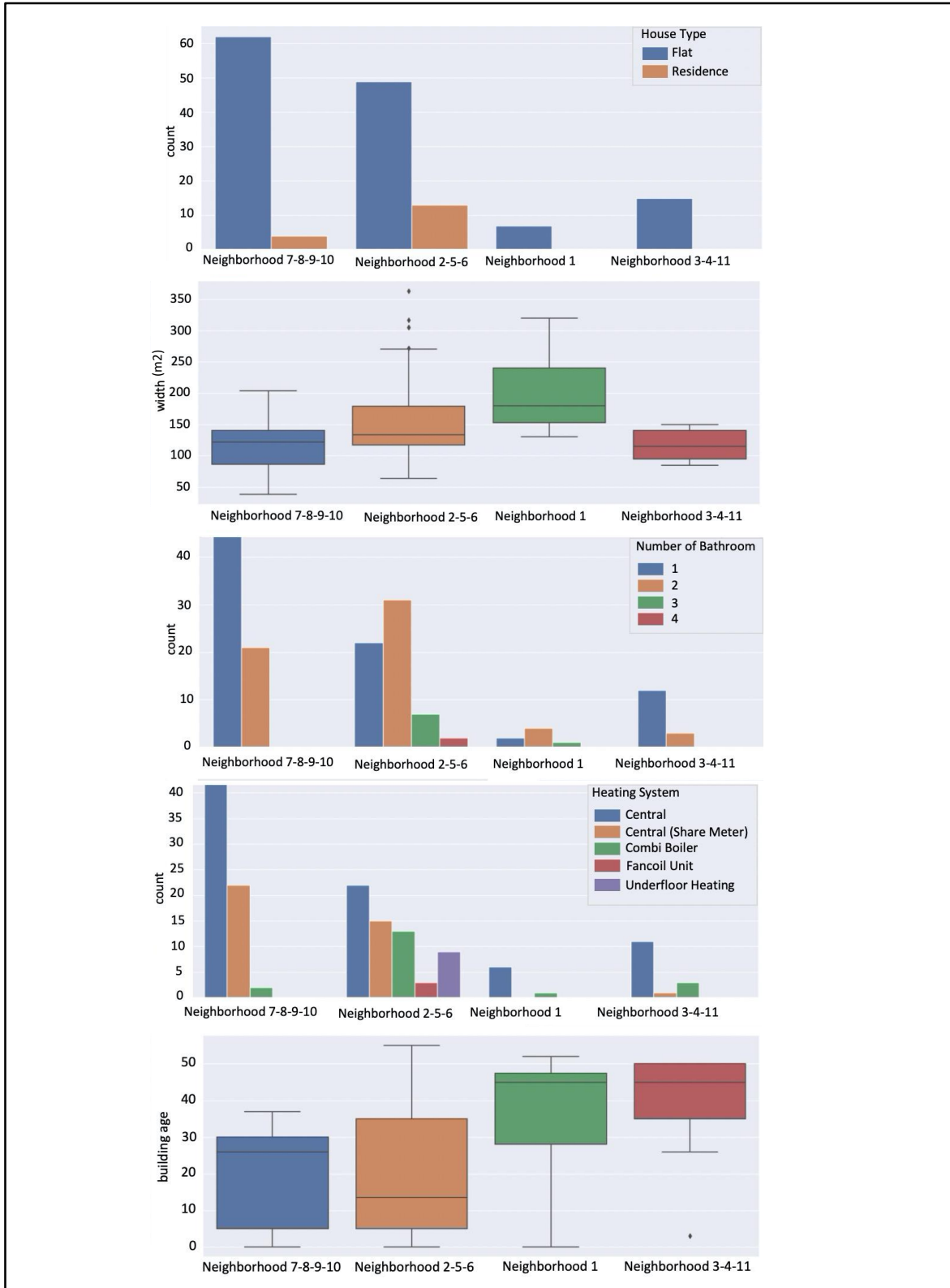
**Figure 4.** Characteristics of the housing units selected for the field study.

**Table 2.** Regression Statistics.

| Regression Statistics | |
|---|---|
| Multiple R | 0,93 |
| R Square | 0,87 |
| Adjusted R Square | 0,86 |
| Standard Error | 0,27 |
| Observations | 150 |

**Table 3.** Anova Test Results.

| | df | SS | MS | F | Significance F |
|---|---|---|---|---|---|
| **Regression** | 7 | 66,2 | 9,46 | 130,59 | 1,28E-58 |
| **Residual** | 142 | 10,28 | 0,07 | | |
| **Total** | 149 | 76,48 | | | |

The dependent variable is natural logarithm of the housing unit price. Independent variables are housing type (indicator variable), natural logarithm of housing unit width, number of bathroom in the housing unit, has the housing unit underfloor heating (indicator variable), is the housing unit in neighborhood 2 (indicator variable), is the housing unit in neighborhood 4 (indicator variable) and is housing unit newly builded (indicator variable) respectively. The regression coefficients obtained as a result of the model application are given in Table 4.

**Table 4**. Model Results.

| Variables | Coefficients | SE | t-stat | P-value | Lower 95% | Upper 95% |
|---|---|---|---|---|---|---|
| **Intercept** | 9,8 | 0,36 | 27,54 | 8,05E-59 | 9,09 | 10,5 |
| **Housing Type** | 0,46 | 0,08 | 5,5 | 1,73E-07 | 0,29 | 0,62 |
| **log(width)** | 1,13 | 0,08 | 14,08 | 9,97E-29 | 0,97 | 1,29 |
| **# of bathroom** | 0,18 | 0,05 | 3,62 | 0 | 0,08 | 0,28 |
| **Underfloor heating** | 0,24 | 0,11 | 2,26 | 0,03 | 0,03 | 0,45 |
| **neighborhood 2** | 0,32 | 0,07 | 4,49 | 1,49E-05 | 0,17 | 0,46 |
| **neighborhood 4** | 0,17 | 0,07 | 2,41 | 0,02 | 0,03 | 0,3 |
| **new building** | 0,16 | 0,06 | 2,71 | 0,01 | 0,04 | 0,28 |

The most influential variable on the natural logartihm of housing price is the natural logarithm of width of housing unit. Other variables according to the degree of impact are the type of housing unit, the situation where the housing unit is located in Atakoy neighborhood 2-5-6, the presence of underfloor heating, the number of bathrooms, the situation where the housing unit is located in Atakoy neighborhood 7-8-9-10 and the housing unit being 10 years or younger (Table 3).

Considering that mostly the upper and middle income groups and families live in Atakoy, it can be said that the width of the housing unit plays an effective role in the house prices, therefore it becomes the most important factor in determining the prices. Provided that other variables are kept constant, 1% increase in square meter increases the sales price of the house by 1.13%. The second factor that affects the housing sales prices is the housing type. If the housing unit for sale is a residence, the sale price is much higher than an apartment. This is because the residences are more luxurious and offer a high standard of living. Since the facilities such as security, parking, insulation, technical service and cleaning in a residence are not available in flats, it can be said that this is a natural result. Provided that other variables are kept constant, the housing type being a residence (increase corresponding variable by 1 unit) increases the sales price of the housing unit by 46%.

The third variable is the housing unit is located in 2-5-6th neighborhood. Atakoy 2, 5 and 6th neighborhood is close to Yesilkoy and Yesilkoy coast. Most of the residences in Atakoy are located here. In addition, Atakoy Konakları, Yalı Atakoy, Sea Pearl residence projects are located here. These projects are both the newest and most luxurious residences of Atakoy. Therefore, being in this neighborhood of Atakoy has made the neighborhood newer and more luxurious. Providing the other variables are kept constant, the fact that the house is located in Atakoy 2- 5-6th neighborhood (increase corresponding variable by 1 unit) increases the sales price of the house by 32%. The fourth factor influencing housing sales prices is the presence of underfloor heating. Underfloor heating systems do not create visual pollution compared to the heater and do not create unusable areas such as the front of the heater. Since it is a closed system, the risk of failure is less and does not require cleaning like a heater. Therefore, costs such as cleaning, maintenance and repair are much less. Underfloor heating systems consume much less power and energy than the normal heating system and cause less energy loss. In underfloor heating systems, the heat is distributed homogeneously to the floor and the heat rises in a balanced way. As it is a feature that increases the quality of life and comfort, underfloor heating is a feature that increases housing prices. Provided that other variables are kept constant, the presence of underfloor heating in the housing unit (increase corresponding variable by 1 unit) increases the sales price of the house by 24%. The fifth variable is the number of bathrooms in the housing unit. The presence of more than one bathroom in the residence increases the hygiene and comfort of the household. If the number of bathrooms is more than one in housing unit, there is usually an en-suite bathroom in addition to the shared bathroom. Especially for large families with children, the en- suite bathroom defines privacy for parents, as well as meeting the need for cleanliness and hygiene. In addition, in the event that the house becomes crowded like a guest, the bathroom stands out as an essential need. In the Covid 19 Pandemic, the issue of having more than one bathroom in the housing unit has gained even more importance in terms of both hygiene and isolation. Provided that other variables are kept constant, the one unit increase in the number of bathrooms increases the sales price of the house by 18%. The sixth factor affecting the housing sales prices is that the house is located in Atakoy 7-8-9-10th neighborhood. Atakoy 7-8-9-10th neighborhood is relatively new when compared to the rest of Atakoy. Moreover, it is close to Yesilkoy and is the only place where residences are located, except for the 2-5-6th neighborhood (Figure 5). Providing the other variables are kept constant, the fact that the house is located in Atakoy 7-8-9-10th neighborhood (increase corresponding variable by 1 unit) increases the sales price of the house by 17%.
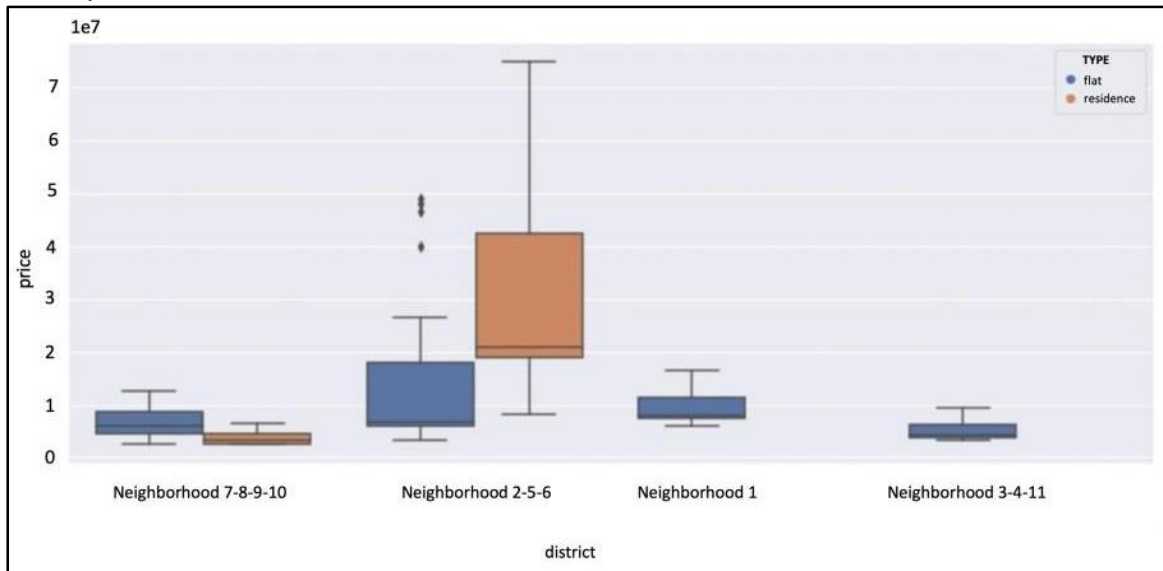


**Figure 5.** Relationship between housing type, neighborhood and sales price.

The seventh independent variable is the age of the house. Keeping the other variables constant, the fact that the building where the housing unit is located is 10 years old or younger (increase corresponding variable by 1 unit) increases the sales price of the housing unit by 16%. The fact that the building is new reduces the risk of

failure, maintenance and repair costs, and increases comfort. In addition, Bakırkoy and Atakoy are among the first degree risky districts according to their proximity to the fault lines. Therefore, the age of the building is also important in terms of earthquakes. As seen in Figure 6, when the relationship between building age and house price is examined, 10-year breakdowns are seen. For this reason, it is considered as 10 years old and below in the model.
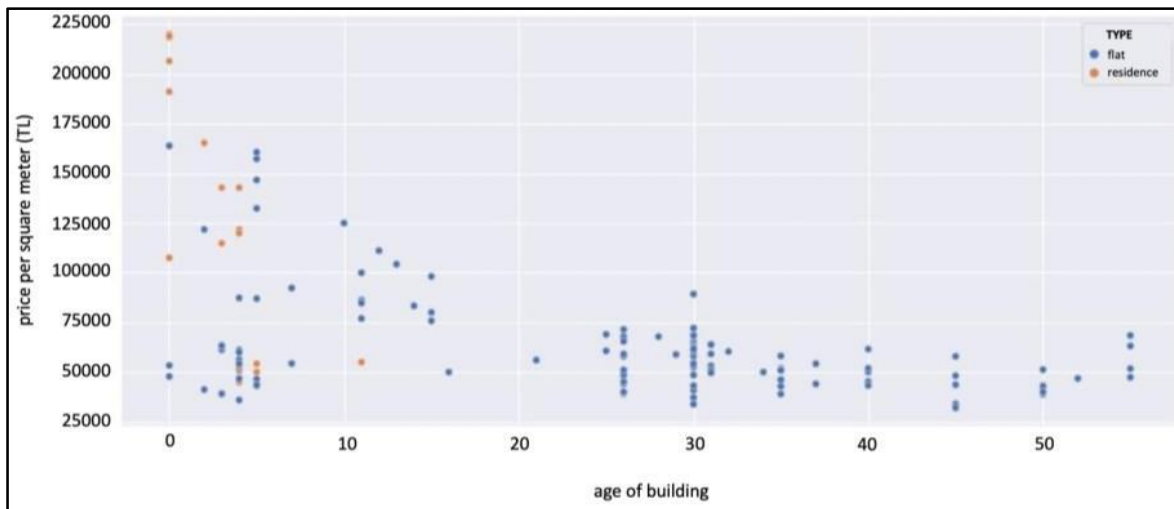


**Figure 6.** Relationship between building age and housing price.

## 5. Discussion and Conclusion

Housing is one of the most basic and important human rights and requirements. Housing expenditure is one of the largest lifetime expenditures of households. The economic and political importance of housing concerns all housing market actors and makes it important to examine the factors affecting housing prices. Atakoy is one of the residential areas of Istanbul with a high quality of life due to its urban texture, green areas, access to transportation and urban services, and proximity to the sea. The fact that there is no vacant land in Atakoy, the high demand and the high occupancy rate in the region have increased the housing prices considerably. This situation has increased the importance of the regional housing market in the Istanbul general housing market.

Housing prices are affected by structural variables of the housing unit and building, neighborhood unit variables, and natural and built environment variables. Parcel area, type of housing unit, construction style of the building, age of the building, size of the housing unit, number of rooms, number of bathrooms, construction quality, heating system, presence and size of the parking lot can be given as an example of structural variables of the housing unit and building. The quality of public services, distance to central business district, distance to centers and shopping centers, distance to health and educational facilities, distance to transportation axes and public transportation, socio-economic status of the neighborhood unit, access to other parts of the city can be given as an example of neighborhood unit variables. Also, natural constraints, landscape, climate, environmental pollution, highways and airport noise, storage areas can be given as an example of natural and built environment variables.

In the study, multiple regression analysis was preferred to examine the change in housing prices according to the structural/physical characteristics of the housing unit. Model outputs show that the most influential variable on the housing price is the width of housing unit. Other variables according to the degree of impact are the type of housing unit, the situation where the housing unit is located in Atakoy neighborhood 2-5-6, the presence of underfloor heating, the number of bathrooms, the situation where the housing unit is located in Atakoy neighborhood 7-8-9-10 and the housing unit being 10 years or younger.

The world has undergone a great change with the technological developments, neoliberal policies, globalization and increasing competition in recent years. All these developments have affected and changed the needs and expectations of individuals. In this context, there have been changes in the housing sector as in every field. In addition to being a tool that covers the need for housing for individuals, it has become a function that defines

people's lifestyles and social status. This situation necessitated housing manufacturers who want to maintain their presence in the market and to increase their market share by growing, to comply with customer preferences and expectations. One of the most important elements of increasing customer satisfaction in the housing sector is the supply of housing projects that will meet the needs and requirements of the customer. At this point, it is important to know the factors that affect the housing preference of the customers. Especially high and middle income group housing users do not use their houses only for shelter. Also, it can be said that high and middle income group users have higher expectations from their spaces. In addition to the functionality of the house, it can be said that there are expectations for it to be in line with the trends of the period. Considering that middle and high income groups and families generally live in Ataköy, it is an expected result that the width of the housing unit will become the most important factor in determining the housing prices. Residences have an impact on housing prices in terms of providing security, parking, isolation, technical service and cleaning, being more luxurious and offering a high standard of living. The fact that neighborhood 2-5-6 is close to Yeşilköy and Yeşilköy coast, and that Ataköy's newest and most luxurious residence projects are located here, also affected the housing prices, which made this neighborhood newer and more luxurious. Factors such as underfloor heating systems and the number of bathrooms in the residential unit are features that increase the quality of life and comfort and are highly preferred for residential users today. The fact that the housing unit is located in neighborhood 7-8-9-10, which is relatively new compared to the rest of Ataköy, also had an impact on the housing prices in terms of quality of life and spatial quality. However, the age of the building is very important in terms of earthquake as well as reducing costs and increasing comfort. In Istanbul, especially in districts with first degree risk due to their proximity to fault lines such as Bakırköy and Ataköy, the effect of housing age on housing prices is inevitable.

The results obtained in the whole study can guide the decision-making process of the actors in the real estate market. It can guide investors, homeowners, experts who provide intermediary services and conduct appraisal studies, in observing the current situation, evaluating the factors and determining the sales prices of the houses. In addition, the information obtained on residential areas in Atakoy can form a database for other scientific studies. In the next step of the study, it will be useful to compare the seasonal movements by obtaining the house sales price data for different seasons. It may also be important and complementary to analyze the characteristics of neighborhood unit variables or natural and built environment variables in Atakoy.

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