

**SURROUNDINGS OF METRO STATIONS AS
PUBLIC SPACES: USER PERCEPTIONS IN THE
CASES IN IZMIR**

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ABSTRACT

SURROUNDINGS OF METRO STATIONS AS PUBLIC SPACES: USER PERCEPTIONS IN THE CASES IN IZMIR

Metro stations are public transport stops with functional parts of the transport system. Moreover, these stations and their surroundings are public spaces where people as a group or individually come together for different purposes and use these spaces for resting, spending time, and entertainment. In addition to the functionality of the station structures, their spatial design integrated with its immediate environment and oriented to people needs are significant points to be considered. The metro station surrounding is a transit point for the transportation needs of many people during the day. This study deals within this area in terms of being used as a public space.

The main purpose of this study is to determine the physical and social factors that affect perceptions of people and use of space in the public space in the example of metro station surroundings and to determine how this situation differs depending on the individual characteristics of the users such as age, gender, income, education, working status. The method followed in this context; Evka-3, Konak, Fahrettin Altay (İzmir) includes collecting data through the field observations of perceptions of people and physical characteristics in the public space around the metro station, and the factors affecting user perceptions and space use, through a survey with 300 people.

There are many factors such as making you feel safe, aesthetic, attractive, comfortable, and visible among the physical and social factors affecting the use of the station surroundings. Land use and accessibility in the immediate vicinity of the station are other important factors that affect perceptions of people for the physical environment about the use of space. This study proposes urban design interferences to improve user perceptions of the metro station surrounding and increase the use of these areas.

Keywords: Public Spaces, Metro Station Surroundings, User Perceptions, Urban Design

ÖZET

KAMUSAL ALANLAR OLARAK METRO İSTASYONLARI ÇEVRELERİ: İZMİR'DEKİ ÖRNEKLERDE KULLANICI ALGILARI

Metro istasyonları birer ulaşım noktası olmakla beraber istasyon çevreleri insanların belli bir amaç için grup veya bireysel olarak bir araya geldikleri, dinlenme, vakit geçirme, eğlenme amacıyla kullandıkları birer kamusal alandır. Aynı zamanda toplu taşıma durakları teknik standartlara dayalı olarak inşa edilmesinden dolayı ulaşım sisteminin işlevsel parçalarıdır. İstasyon yapılarının işlevselliği dışında yakın çevresiyle bütünleşmiş ve kullanıcı ihtiyaçlarına yönelik tasarımı dikkat edilmesi gereken diğer noktalar. Bu çalışma, metro istasyonları çevresini gün içerisinde birçok insanın ulaşım ihtiyacı için geçiş noktası olmasının yanında birer kamusal alan olarak kullanılması açısından ele almaktadır.

Bu çalışmanın temel amacı, metro istasyon çevreleri örneğinde kamusal alanda insanların algılarını ve alan kullanımını etkileyen fiziksel ve sosyal faktörleri belirlemek ve bu durumun kullanıcıların bireysel özelliklerine bağlı olarak nasıl farklılaştığını tespit etmektir. Bu kapsamda izlenen yöntem; Evka-3, Konak, Fahrettin Altay (İzmir) metro istasyon çevrelerinde kamusal alanda insanların davranışları ve fiziksel özelliklere dair saha gözlemleri ve kullanıcı algılarını ve alan kullanımını etkileyen faktörler hakkında 300 kişi ile anket çalışması aracılığıyla veri toplamayı içermektedir.

İstasyon çevresinin kullanımını etkileyen fiziksel ve sosyal faktörler arasında; güvenli hissettirmesi, estetik, çekici, konforlu, görünür olması gibi faktörler bulunmaktadır. İstasyonun yakın çevresindeki arazi kullanımı ve erişilebilirlik, insanların fiziksel çevreye ilişkin algılarını ve buna bağlı olarak alan kullanımını etkileyen önemli diğer faktörlerdir. Bu çalışma, metro istasyonu çevresine ilişkin kullanıcı algılarını iyileştirmek ve bu alanların kullanımını artırmak için kentsel tasarım müdahaleleri önermektedir.

Anahtar kelimeler: Kamusal Alan, Metro İstasyon Çevreleri, Kullanıcı Algıları, Kentsel Tasarım

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CHAPTER 1

INTRODUCTION

1.1. Problem Definition

This study investigates that how can metro stations be more than just transportation nodes and examines the metro environments by considering them as not only transit points for transportation needs but also as public spaces. Also, this study examines the physical and social factors that affect how usage of public space in the case of metro station surroundings. In addition to that, the study examines how these factors affect the use of surroundings and how user perceptions differ by the field observations and applying user surveys on the case of the Izmir Metro. In three selected metro stations, physical and social environment observations were made around the metro station according to some criteria by the literature. Then, a survey was conducted to understand the experiences and ideas of the metro station surroundings about the public space. The user responses obtained by the survey study were evaluated with correlation, regression, and descriptive analysis. By comparing their results with the criteria obtained from the literature, urban design proposals for three metro stations are presented.

Metro station surroundings are examples of important public spaces where people can have a social life. Metro station design principles are for the functional purposes that facilitate transportation (Ghamari, Amor, and Mardomi 2014).

The surroundings of public transport stop are areas with high human flow. They can create and shape urban public spaces. The design of the public transportation stops is based on technical standards and are functional parts of the transportation system generally. From the urban design perspective, public transportation stops should not only be functional in the transportation system but also become a part of the environment in which they are located and are integrated into the urban context (Vitale Brovarone 2018).

Metro stations let to people to enter and exit the public transport at certain points and is creating density at these points. Surroundings of metro stations are environments where social interaction and social relations are intense. So, this brings to the metro stations as an important place in urban life (Ghamari, Amor, and Mardomi 2014).

While metro stations create new urban spaces, it's dynamic points and centers of the city. These points turn into gathering areas. At the points where the metro stations go underground, it breaks the visual connection of the passengers with the city. It is the point where people connect with the city after getting out of the metro. It becomes a part of daily life by creating a public space with different functions. Metro stations gain importance as the attraction places where there is flow, and it is bringing new functions to the city. It should be designed as both a visual and social environment to be easily accessible and visible for users, to provide a safe and protected environment. It should ensure that the stations form is a part of the urban design suitable for the urban environment (Kido 2006).

From the urban design perspective, the transportation infrastructures are more than just a functional element. Although it's generally considered in terms of its functionality, also they are a part of the urban space (Vitale Brovarone 2018). The most general approach taken in studies on the design of metro stations is about how to make easy of the transportation for users. It is limited to the functional evaluation of metro environments with this approach. This study will deal with how it can be more than a transportation point.

The lack of the thinking of transportation infrastructures integration with the city leads to inefficient use of resources. Especially since subway structures require high investments, the usage, and resources around them should be designed in an integrated manner by considering their environment. Vitale Brovarone (2020) took the approach of development of the public transport stops as urban spaces. She states that while public transport stops are a part of the transport system, they also play an important role in and are part of the urban environment. It improves the use of public transport while shaping the urban environment. This study assumes that the environment of metro stations should be designed as an urban public space integrated with its environment, where both physical and social activities take place. According to this study, it will contribute to the literature in terms of user perceptions and needs for physical surroundings design significantly.

1.2. The Purpose of the Study

This study aims to identify which characteristics of metro stations' surroundings influence user perceptions. It also aims to explore how the experience of user can be improved and how metro environments can be designed as an urban space. Following the aim, this study will answer the following research questions:

- What are the social and physical factors that affect the usage of metro station surroundings as public spaces?
- How do the social and physical factors affect to the usage of metro station surroundings according to the user perceptions?
- What kind of urban design implementations can improve the metro surroundings as public spaces?

1.3. Research Methodology and Study Site

Nowadays, under the dynamics of rapid urbanization, the relations that transportation and transportation stations establish with their surroundings are becoming increasingly important. The metro rail system is one of them that is one of the important means of transportation in the city. Accordingly, the metro station environments have been the subject of many studies with the multiple dynamics they contain. In the literature, it is seen that metro stations are discussed in various contexts. In this study, the metro station surroundings are the subject of the study as they are public spaces. This study examines the social and physical features that affect user perception in public spaces, in the example of the metro station environment. In line with the purpose and problem of the study, answers were sought to the questions of what social and physical factors affect the use of metro station surroundings as public spaces and how they affect them. For this purpose, a multi-stage methodology has been adopted. First of all, the transportation,

public space, and urban design literature were examined and the social and physical factors affecting the usage of public space were obtained. In order to understand and measure the impact of social and physical factors on users in metro surroundings, more than one method has been combined. Thus, it is aimed to reach more reliable information on the impact of the complex and multi-dynamic relationship between the metro station surroundings and the public space on users. In this study, site selection, analysis, detailed field observations, and finally a survey were conducted in Evka-3, Konak, and Fahrettin Altay in selected areas.

After the literature review, the Izmir metro station surroundings were determined as the area where the study will be carried out. Three metro stations were chosen as the main study area during the site visits at İzmir metro station stops. These metro stations are Evka-3 metro station, Konak metro station, and Fahrettin Altay metro station. After the determination of these three metro stations where the study will be carried out, observation and survey studies were started. For the observation study, an observation table was created based on the physical factors obtained from the literature. Afterward, observation studies were carried out around three selected metro stations. Metro circles were evaluated according to the criteria in the observation table. With the observation study, besides the physical factors around the metro, it was also possible to examine the social structure in these areas. Data on physical properties and the built environment were obtained with the observation study. Observation results are tabulated. Existing maps were obtained from Izmir Metropolitan Municipality.

A survey was conducted to evaluate user perceptions of station surroundings. This survey study includes the stages of creating the survey questions, testing these questions in the field with a preliminary study, and directing the survey questions to the participants. Survey questions were asked to 100 participants for each station. Thus, a total of 300 participants were interviewed face-to-face and asked to answer the survey questions. Paying attention to the balanced distribution of different age groups, a face-to-face survey was conducted with equal numbers of male and female users and 300 people. The survey was conducted twice a day, 3 days a week (Monday, Tuesday, Thursday) and on the weekend (Sunday), noon and evening.

Thus, data were obtained from the survey for user perceptions. A coding system was created to evaluate these data. The survey answers of 300 users were coded according

to this system. Afterward, the coded survey data were analyzed with correlation and multiple regression in Spss Statistics 20 program. In the descriptive analysis, the profiles and demographic characteristics of the participants were obtained. Correlation analysis was used for all dependent and independent variables. Regression analysis was used to reveal the relationships between independent variables and dependent variables. Finally, the data obtained by correlation, regression, and descriptive analyzes were evaluated with the public space literature and field observation study.

1.4. The Structure of the Study

This study examines the social and physical factors that affect user perceptions of the metro surroundings, and how the use of these areas differs according to the perceptions. The second part of the study defines the relationship between the public space and metro surroundings. Thereafter, it examines how the concept of perception is discussed in the literature in order to understand how user perceptions differ in the use of these areas.

The third chapter examines the factors that affect the use of metro surroundings. Firstly, this section examines how the use of metro surroundings differs according to the individual characteristics. These factors are individual factors that are related to the age, gender, income status, vehicle ownership, the purpose of travel, and the frequency of use. Secondly, the factors of access to the stations and destinations, land use, safety, comfort, aesthetics, and attractiveness are examined under social and physical characteristics. At the end of this section, it examines examples of urban design to develop and improve the use of public space in metro surroundings.

The fourth chapter describes the study area and the data collection method of this study. First, it mentions about the public transport data and the place of rail systems in public transport. Afterward, it explains the public transportation and rail systems of Izmir. The development process of Izmir Metro is presented. At the end of the chapter, observations on the environmental characteristics of the stations of Evka-3, Konak, Fahrettin Altay metro and its surroundings, which were examined within the scope of the study, and studies on user surveys are mentioned.

The fifth section shows the results of data collection. It discusses the results of the field observation of the metro surroundings and the results of the questionnaire.

In the sixth chapter, the results are summarized, and the findings are related to the literature through the discussion of the results.

CHAPTER 2

USER PERCEPTIONS AND METRO STATION SURROUNDINGS AS PUBLIC SPACE

The needs of people and the factors affecting the use of space are necessary to examine in order to use as public space integrated with the city of the metro station and its surroundings. These areas are shaped in line with the needs of the users, and at the same time, the characteristics of the physical environment affect the use of these areas positively and negatively. The roles of metro stations in the city are important and they can create and shape the public spaces. For this reason, it is necessary to examine the relationship between people and the use of public space.

This chapter focuses on the public space definitions and principles, and also the relation between the public space and metro station surrounding. After that, it aims to examine user perceptions to understand relations with the usage of space.

2.1. Public Spaces

Public space can be defined as the common usage areas where the people living in the environment, and they live in interact with both the built environment and each other. They are comfortable spaces that meet the needs of people and serve their primary needs, and these spaces are designed to allow participation and exploration (Carr et al. 1992). Public spaces are spaces used by various people with social, individual, and cultural differences open to all members of society. These are squares (city-scale squares, squares at transit points, small-scale squares at the intersection of streets), parks, recreation areas, playgrounds, shopping areas, streets, and roads (sidewalks,

pedestrianized areas). These areas are accessible to all age groups, from children to elder persons where they can attend to or watch activities (Ramlee et al. 2018).

According to Rapoport (1977), in public spaces, people should be able to experience the space freely, perform their daily activities in these areas, and communicate with each other. These areas have high density and interaction in the city. If definite criteria are met, the quality of public spaces will increase, and the use of these spaces will increase (Rapoport 1977). The activities in these areas also will develop and they become the areas that are used continuously and for a long time when sufficient opportunities are provided according to the physical characteristics and competencies of them. In this case, it is important to ensure the quality of the space. Also, it is important that people feel comfortable in a place. It is essential to create comfortable spaces too. This situation creates a good image (Erdönmez and Akı 2005).

Public spaces are an important part of public life, providing places of entertainment and recreation. They meet the various physical and social needs for users. Carr et al. (1992) consider three basic features of public spaces. These are that the public space responds to the needs of users as democratic and meaningful space. The needs of users in the public space are comfort, relaxation, passive and active engagement with the environment, and discovery. Activities in public spaces, according to user needs and participation in these activities, depending on their types, are shaped by the physical and social quality of the space (Gehl 1987). They are democratic spaces that ensure that the space appeals to different groups by protecting the rights of different user groups, which are formed depending on the socioeconomic, age and gender characteristics. Spaces that is enabling users to connect their individual lives are meaningful.

People go to public spaces for specific purposes such as eating, resting, having fun, and exercising. Physical comforts such as rest, sitting, and visual stimulation should offer a safe space. It must be accessible and provide equal opportunities for all, regardless of age, social status, or physical disability (Coxon, Burns, and de Bono 2008). Public spaces that should be accessible to all allow for a variety of activities. Gehl (1987) states that the characteristics of physical environment affect the activities in the public space. The factors affecting the user's preference of optional or planned social events are the quality and usability of the place. Gehl considers the activities of users in the urban space as necessary, optional, and social activities under three groups. Going to school or work, waiting for someone, or waiting for transport are the necessary activities. The fact that the necessary activity will also eliminate the choice of space. Walking, and sitting are

optional activities. Depending on the physical quality and comfort of the place, it will affect the preference of person for the place. Social activities are also a type of passive communication that occurs with seeing and hearing other people you are in the same place. Users participating in social activities are in communication with each other in the space they are in.

Carr et al. (1992) describe people's needs in the public space under five groups: comfort, relaxation, passive engagement with the environment, active engagement with the environment, and discovery. If the needs of people are not met, places that do not have an important function will not be used enough and will fail. Comfort is a basic need in public spaces. There is a need for food, drink, a place to rest when tired, and shelter that will protect from the sun. At the same time, the length of time that people stay in this area is also a return of comfort. The difference between relaxation and comfort is that the body and mind are relaxed. Psychological comfort is the prerequisite for comfort, such as the removal of physical tensions and the feeling of rest. Urban open spaces, especially parks, are relaxation places in the city. Spaces that offer a short pause that separates people from the routines and demands of urban life include rest and relaxation. Watching the stage and watching other people as a passive relationship with the environment is considered passive engagement because it involves just looking rather than doing things and talking. On the other hand, active engagement refers to more direct communication, contact, and experience with people in a place. The fifth reason people are in the public space is discovery, and it's a user need. People have the opportunity to observe of being done different things while walking around a place. The differences in the physical properties of the area, the variations in its physical design, the changing sceneries are essential for discovery. It must have varying physical characteristics and human activities so that people continue to be part of the experience in familiar places (Carr et al. 1992).

Public spaces are social spaces where people come together with different groups, encounter communities with different cultural and social characteristics, and interact with each other. The relationships of people with the physical environment, their behaviour in this environment, and their perception of space play an important role in the shaping and transformation of these urban spaces, and transformation takes place according to needs and expectations. The relationships of individuals with society begin in these urban spaces and, in summary, they are places of encounter where people come together.

Public spaces should be flexible and interactive space that is shaped according to the demands and needs. It should be designed by observing how people move rather than

forcing people to use it according to the perceived characteristics of the space. It should be an aesthetic approach that will create a sense of place and support psychological and physical comfort (Coxon, Burns, and de Bono 2008).

2.2. Metro Station Surroundings as Public Space

Metro stations are transportation points where people switch from walking to the rail system and bringing passengers to the rail system. Metro station entrances are the point where the travel action starts or ends. Stations are places that bring together the different layers of the city, namely the streets and the underground level, and include people in the underground system (Igalada 2015). It is essential that the entrance and exit points of the metro station are easily perceptible, accessible, and designed for establishing a relationship with their immediate surroundings. Metro transportation is an independent journey from the surface, city, and traffic. However, the connection between people and the city in the metro stations is interrupted because of an underground system. Metro entrances are the only places people interact with the city in this system.

Metro stations have not only been transportation points in the city, but also public spaces that reflect the identity of the city. The places encountered when going from the station to the street level can be a street, a square or a park. These areas define the relationship between the stations and the city. It turns into a meeting place or a place where people can spend time before starting their journey. While these areas function as preparation areas for passengers, they also serve as places where they can spend time for other users. These spatial formations interact at this point where the station interacts with the city and form the public space.

Metro stations are public spaces with various functions such as landmarks, meeting points, and shopping areas, in addition to being transportation structures (Kido 2013). They may also have other functions that they serve, linking to different activities. The design of the station structure with its external environment and its integration with various functions enable it to become multi-functional area apart from the transportation function. While metro stations are in areas where residential, commercial, and public activities are concentrated, the facilities around the station also determine the travel

demand and density. Metro stations, which also affect the accessibility to different parts of the city, are an important connection point for planners and designers.

2.3. Design Principles of Public Space

Public space around the station is where the station interacts with its surroundings. These areas are the first impression for visitors/passengers and a part of daily life for those who live there. Regardless of the size of these areas, they should be guiding areas where people decide what to do and where to go. Each station has varying needs for public space, depending on the size of the station, the needs of the local area, and its proximity to the city centre. Connections to other modes of transport, such as buses, should be close and direct. For visitors who use this area for the first time, there should be signs and guides to help find directions. The points to be considered in the stations are what kind of users they serve, from which direction the passengers arrive, what are the local connections and important transportation junctions, and whether there is a suitable area to wait. Spatial zones must be balanced in planning a successful station public space. Having an open area at the station entrances in case of emergencies or crowds, visibility of social areas, hosting various activities, and not obstructing the passenger flow, the seating area and landscaping should be considered as a breathing space away from the main flow and busy roads. The public space should benefit from the identity of the space in which it is located. It is necessary to provide quieter, slower areas for gathering, sitting, or walking around, and these areas also need to provide sight lines. Design elements such as afforestation, landscaping, and increasing biodiversity should be provided. It is important to make people feel safe when using these areas day and night at any time of the day. The whole area needs to be well lit, empty spaces, façades, avoiding blind corners, and keeping the area clean are the points to be considered. The name of station and logo must be clearly identified. The size of the station, the materials used and its continuity from the inside of the station to the outside, and its canopies are important to the station and provide its visual clarity. Canopies are also an important point to consider in terms of providing protection from the weather and reducing water entry into the station (Dewar and Anatole 2021).

Critical factors for the success of public spaces can be listed as follows: location, size, dimension, connection with adjacent features, the connection of activity areas within the space, routes, and arrangement. At the same time, the space surrounding of the public space affects how all this is used and how it is perceived. The fact that the public space is directly connected with the pedestrian network around it and provides passageways for a functional public space system. Public spaces offer people the opportunity to relax, have a good time, spend their free time, and socialize. They contribute to the local identity of the neighbourhood and develop a sense of place. If these areas are pleasant, active, and safe, they will cause more people to use and attract that people (“Public Spaces” n.d.).

Access

It should be ensured that users of public spaces have comfortable and safe access to these areas. It must be connected to the pedestrian networks around it. It should be in a way that you can clearly see the other entry and exit points of the entrance roads to the public space. Pedestrian paths must have clear and direct connection to each other. This also makes people to feel safer themselves. Frequent connections to the streets around the area will make people to feel safer, allowing them to find an escape route quickly (“Public Spaces” n.d.).

Attractive

It should be ensured that public spaces are attractive, lively, and active. It is important to be able to extend the usage period with various activities in these areas. It is necessary to make public spaces attractive at different times of the day for various users. Effective use of public space can be achieved with cafes, playgrounds, or collective usage areas. There should be features that will attract people to the area or features that will be positioned at the focal point, that is, in the center of the public space. Features that will invite people to the area, such as a tree, a large tree providing shade, water elements, a fountain, a sculpture, a playground, and a performance area provide focus to the center of the area. In addition, areas that have sales places or sales stalls should be created next to pedestrian roads (“Public Spaces” n.d.).

Activities

The edges of public spaces are the most used and crowded areas of people. Because people tend to use places that will provide a good vantage point to watch the activities in and around the area, and they tend to the edge of the areas. Activities in these areas should be established and supported (“Public Spaces” n.d.).

Visibility

Public areas should be arranged in such a way that they can be easily seen from the environment and provide a clear view. The topography of the area is also important. This can hinder lines of the sight and ease of access to the public space. High fences and obstacles should not be used in the transitions between the public and private areas (“Public Spaces” n.d.).

Safety

Playgrounds, rest areas, and public restrooms should be in active areas of the area and accessible. If they are located in invisible and remote areas, people will feel insecure and avoid using them. If children's playgrounds are located next to a crowded road, street or a bicycle path, low and transparent fences should be placed around them. There should be lighting for night use of the area, to provide visibility or to make roads and areas clear. Infrastructure elements should be located in a certain area. It should be in an area away from the recreation areas and main pedestrian roads. The reason for this is that the usable areas do not decrease, do not pose a danger to pedestrians and cyclists, and do not block the view (“Public Spaces” n.d.).

Comfort and Pleasure

Seating places should be provided by paying attention to the sun and wind in the public space. This should also be done by paying attention to the summer and winter conditions. Seating areas, roads and main areas should be arranged in a such way that they can be shaded in summer and receive sunlight in winter. Trees need to be positioned to create shaded areas and provide shelter. Windbreaks or trees should be positioned to

protect people from the wind. While doing this, care should be taken that it is not in a way that obstructs the view or offers the opportunity to hide.

The areas where people use intensely, are generally the points that can see the whole area well, the number of seating and benches should be increased. Seating places can be positioned at points that will provide people with a view of the area or in areas with an interesting view. Signs, information, maps showing connections, destinations, important facilities, estimated walking times or distances can be provided in larger areas, depending on the size of the public space (“Public Spaces” n.d.).

Sense of Place and Local Identity

Public spaces need to be arranged in a way that provides a strong sense of place and is supported by their local identities. Landscape and planting should be done that support the current character of this place and stimulates the senses. Urban art should be integrated, where people can interact and attract them into these spaces (“Public Spaces” n.d.).

Usage and Maintenance

Having a management committee that coordinates everything in public areas will facilitate the development and management of these areas. It is important to continue and ensure the continuity of the activities in the area, to make the program, and to organize events that include activities such as markets, performances, and shows to attract various users in this area, to ensure their use, and to continue this. A schedule should be established for damage, misuse, and other maintenance work in public spaces. It is necessary to have permeable surfaces in the area, which will ensure the absorption of rainwater and reduce the flow of rainwater (“Public Spaces” n.d.).

2.4. User Perceptions

Differences in the past experiences, future expectations, lifestyle, socioeconomic and cultural background of the people have an influence on how people perceive their surroundings (Norberg-Schulz 1971). At first, when people interact with the environment, they collect all the information in their minds. After, they code information to classify them to create a meaning out of the information. According to the meaning produced, people make choices, and remember these choices again (Downs and Stea 1973). Similar to Downs and Stea (1973), Türksoy (1986) describes the process of perceiving the environment as the process of coding, classifying, creating a meaning, making a decision and remembering them all again.

Rapoport (1977) also states that there is an evaluation process in the minds of people as the place where people experience and get information and like a process that occurs afterward and shows continuity as a whole. He emphasizes that the perception will change not only according to the external image, but also according to the emotions, thoughts, age, and gender alongside physical characteristics. Altman and Chemers (1980) describe it as the shaping of the information that we receive through our sense organs in our minds. Lang (1987) also considers the concept of perception as the process of gathering information from the environment.

Ittelson (1978) is one of the early contributors to the literature on environmental perception. He expands the aspects of environmental perception from interpersonal, cultural, and physical to the needs, actions, personal status, and cognitive processes. His work points out the difference between environmental perception and the notion of the perception itself in the psychology discipline. He defines environmental perception as a reciprocal relationship between human experience and its action. Change occurs in the city by the human experience and the action through this. There is a constant interaction between the space and its users. While space is shaped through the emotional and physical needs of the users, space shapes itself to the perception of the users. The design of the environment changes constantly according to these interactions between people and environment (Türksoy 1986).

Altman and Low (1992) have discussed the interaction between the user and the space in three dimensions as cognitive, behavioural, and emotional. The cognitive

dimension in this interaction is the elements of the perception of people in their environment and directing people. These points are the formal aspects of the spaces. In the behavioural aspect, functional relationship, and the perception of activity types in the relationship with the environment is mentioned. Emotional interaction is an important component that will establish a strong link between the individual and the place, which means the concept of place attachment. Rapoport (1977) also considers these relationships as cognitive, affective, and conative. The act of recognizing the environment of the individual which includes the process of perception, knowing, and thinking, is cognitive; and affective, which includes feelings and values about the environment; and the desire to take an active part in and participate in the environment is also explained as conative. This relationship emerges when people move in the space.

The user is psychologically affected by the environment and interacts with the environment. According to Cullen (1971), people perceive the space by combining their own experience and the appearance of it. Perception consists of the relationship between the user and the environmental space. Human behaviour occurs in a specific social and physical environment. People make sense of the physical structure of the environment they live in, and our perceptions, which are formed as a result of environment-human interaction and constitute spatial behaviour (Göregenli 2010).

2.5. Summary

In this section, the definitions, requirements, principles of public spaces, and how people perceive their environment in order to increase the use of metro station surroundings by evaluating them as public spaces are examined.

Public spaces are spaces that are shaped according to the needs of people and where physical and social interaction takes place. There should be spaces that are shaped and designed according to people, and not forcing people to use these spaces according to the features perceived from the space. They should provide people with a safe, comfortable, attractive, accessible, and visible environment. Various resting and activity places should be created in these areas where they can spend their free time and participate in physical or social activities. It should be designed to be an active area in the city,

offering various opportunities, providing continuity, and integrating with its surroundings. In this case, it is necessary to understand primarily and research the physical and social factors that affect the use of people in order to increase the use of metro station surroundings, which are public spaces. The next section details the factors that influence user perceptions in the use of these areas.

CHAPTER 3

FACTORS AFFECTING USAGE OF METRO STATION SURROUNDINGS

The stops of metro transportation systems and other transportation systems are public spaces where certain features determine the movement of people around them. These areas are used by various user groups for different purposes. The use of these areas is influenced by the physical and social characteristics of the immediate surroundings of the station. These characteristics also affect the perceptions of users, and these perceptions vary according to individual characteristics such as age and gender. Creating a pedestrian-friendly environment and increasing the active use of these areas are important for public spaces. Therefore, it is necessary to investigate the factors that affect user perceptions.

This section explores the social and physical factors that affect users and the use of metro station surroundings. This study firstly examines how perceptions of people differ depending on their individual characteristics. Then it explores how the social and physical factors of metro surroundings affect these areas. These factors are access of the metro stations/destinations, land use, perceived safety, comfort, aesthetics, and attractiveness. At the end of the chapter, it examines different urban design examples of public spaces in the case of metro station surroundings.

3.1. Individual Characteristics of Users

The features that are affecting public transportation travel vary depending on the personal characteristics. Various studies have revealed that women travel more frequently than men (Deniz 2016; Moreira and Ceccato 2021). Ingvardson and Nielsen (2021) found

that men prefer public transportation 22.8% less than women in their study. Men are more likely to walk than women. This situation may be due to the security concerns (Loutzenheiser 1997). He et al. (2018) examine the individual characteristics of passengers, which are effective in walking distances to the metro. In this study conducted in Nanjing, China, the gender factor did not affect the willingness of passengers to walk to the subway stations. In addition, in the study of Saygaonkar, Swami, and Parida (2016), 78% of Delhi metro users are men. According to this study children prefer public transport less because they usually travel with their parents or often walk or cycle to the school. The young and retiree persons prefer public transport more often (Ingvardson and Nielsen 2021). The elder persons are making fewer and shorter trips. They claim that because travelling by public transport has difficulties. As household income increases, the probability of choosing public transport decreases (Ingvardson and Nielsen 2021).

Another factor discussed in the literature is the effect of the safety perception on travel behaviour. In the studies, it has been mentioned how the perceptions of safety change depending on individual factors. Researchers have found that women feel more insecure (Ait Bihi Ouali, Graham, and Barron 2020; Coppola and Silvestri 2020; Hong and Chen 2014; Uittenbogaard and Ceccato 2014; Yavuz and Welch 2010). According to the study by Ceccato (2015), women feel more insecure, and worry about themselves and their immediate family and friends, and fear going out alone in the dark. When the safety perception according to gender is evaluated, the feeling unsafe for all women prevents them from walking, while for men this situation is only a deterrent (Ferrer, Ruiz, and Mars 2015). Perception of safety decreases with decreasing of the age in subways. Level of satisfaction increases after age 40 (Ait Bihi Ouali, Graham, and Barron 2020). More than 40% of young people feel insecure while using public transportation at night (Currie, Delbosc, and Mahmoud 2013).

A high income and a car in the household are the strongest deterrents to walking (Loutzenheiser 1997). Owning a car and having a driving license are linked negatively to the use of public transport (Ingvardson and Nielsen 2021). As the income of people increases, the tendency to walk decreases (Paydar, Fard, and Khaghani 2020; Saygaonkar, Swami, and Parida 2016), and those who do not have a car tend to walk more (Paydar, Fard, and Khaghani 2020).

The use of those who walk to and from the metro stations is mostly for educational purposes (Paydar, Fard, and Khaghani 2020). In the study of Saygaonkar, Swami, and Parida (2016), most of the passengers use the metro to reach their work or office.

For most age groups, walking for shopping or entertainment takes longer than walking to work or school (Sarker, Mailer, and Sikder 2020). Non-work walking has a higher frequency and longer duration than walking to and from work (Liu, Zhou, and Xiao 2021). People travelling for shopping and leisure purposes have higher security levels than the people who are travelling for work or school. Because of for shopping and leisure, they can define and travel according to their terms, and having the possibility to choose their route or time allows them to have a higher security level. Travel frequency also has an impact on safety perceptions. People rarely use public transport are more likely to feel unsafe (Ait Bihi Ouali, Graham, and Barron 2020).

3.2. Social and Physical Characteristics of Metro Surroundings

People have certain expectations in certain contexts. Perceptions and expectations change according to the context of whether the station is above or underground, whether it is in a small or large city. Public transport stops and the location of stations and design are important for public transport use. Stations are transit environments that contribute to the use of the surrounding areas or, conversely, can be a deterrent to the use of people. If these areas are well designed, they can become lively areas where they gather, and spend time. Thus, it will not remain a place where people come and go (Vogel and Pettinari 2002). It is also important that these spaces provide a high-quality environment that is legible, safe, sustainable, and attractive. User perceptions and behaviours vary depending on the activities around the station, the spatial organization of the station, its location, lighting, and the presence of people. Undesirable behaviour of other people, abandoned spaces, dark areas, and poor vision are common causes of negative experiences. User behaviours affect the use of public transport. Some public transport options are not preferred due to the certain factors. This situation causes some stops to be used sometimes. In order to increase the use of public transport, the needs of the users must be met.

Iseki and Taylor (2010) explore factors that are effective in improving user experiences at public transit stops and stations in Los Angeles. They handle these factors as "access", "connection and reliability", "safety and security", "amenities", and

"information". Among these factors, safety and security were observed to be the most effective, followed by connection and reliability. These factors are the ones that need the most improvement for the user experience.

The perception of safety has an impact on travel behaviour. Perceived safety is determined by a sense of person of fear or feeling that they may be the victim of a crime (Ceccato 2013). Fear of crime can deter travel (Cozens et al. 2003). Public spaces, where the sense of insecurity and fear of crime are high, can keep away people from places, public transport areas, subways, bus stops, etc. One of the most basic needs of individuals is to have a safe urban environment and residential area. A safe environment and an environment where pedestrians are not open to crime should be provided. There should be urban areas that give a sense of safety to the users.

Fields (2012) stated that safety, security, directness, ease of entry, comfort, and aesthetics criteria should be considered for pedestrians in station area planning. Ceccato, Uittenbogaard, and Bamzar (2013) state that the environmental conditions of the station and its surroundings have an impact on the perceived safety of users, and states that unsafe underground stations are associated with public disorder, poor surveillance, and visible social disturbance. Abenoza et al. (2018) also conducted their study at bus stops in Stockholm, investigating the factors that are affecting the perception of passengers about the crime and safety. It considers these factors as socio-demographic and travel, immediate bus stop surroundings characteristics, safety perceptions, previous victimization variables. Users prefer frequent and secure services over physical facilities. On-time performance is the most important factor affecting the station satisfaction of the users, followed by the presence of a security guard, adequate lighting, feeling safe all day long, and ease of navigation (Iseki and Taylor 2010).

3.2.1. Access to Metro Stations and Destinations

Access to and from the station to the destination is a part of the whole journey. Walking for transportation is influenced primarily by individual characteristics, then by urban design and station area characteristics (Loutzenheiser 1997). The degree to which the built environment supports and encourages walking by offering visual interest to journeys along the road and offering pedestrian comfort, safety and connecting them at

an appropriate effort and time is referred to as walkability (Southworth 2005). The most important factor in walking preference is walking distance (Sarker, Mailer, and Sikder 2020). The short distance from the starting point to the station is a feature that encourages walking to the metro stations. As the distance increases, the tendency to walk decreases, and people walk more frequently in short distances (Paydar, Fard, and Khaghani 2020). He finds that walking tendencies decrease when the walking distance to metro stations is more than 700 meters. Sun et al. (2016) stated that the average walking time from a metro station to a destination is 8 minutes. He et al. (2018) states that the connection of a metro station to the bus station should be within a 10-minute walk, while in metro-based business districts, the walking distance should be a maximum of 1 kilometer.

In addition to walking distance, factors such as land use and layout, street network structure, walking facilities, and connection to other public transport modes also affect walking (Chalermpong and Wibowo 2007). People prefer to walk more to avoid transfers (Alshalalfah and Shalaby 2007). It has been found that people walk more frequently within a shorter walking distance (Paydar, Fard, and Khaghani 2020), and the longer the distance to reach the station reduces their willingness to walk (S. Kim, Ulfarsson, and Todd Hennessy 2007). Passengers choose the direct and fastest route to access public transport stations. They are willing to walk more to access the train station and accept a longer walking distance to access other modes of public transport (Alshalalfah and Shalaby 2007; Sarker, Mailer, and Sikder 2020). Also, the distances to stations in the CBD are shorter because the public transport service is more concentrated in this area (Alshalalfah and Shalaby 2007). The presence of mixed-use buildings on the streets connecting to subway stations encourages walking (T. Kim, Sohn, and Choo 2017). In places with more intense connections, the built environment should be blocks with lower heights, vehicle speed should be low, and there should be short distances between land use functions (Ryan and Frank 2009).

The most important factor affecting perceived walk accessibility is safety. Factors affecting the safety are traffic signs and signals, streetlights, and police patrols. Increasing the perception of safety will also increase the satisfaction in walking to the station. After safety, another factors that affects the satisfaction in walking to the station are mobility and infrastructure. The criteria for this factor are continuity of sidewalks, raised sidewalks, sidewalk quality, and width of the sidewalk (Bivina, Gupta, and Parida 2019).

Proper pedestrian connections on streets that are connecting to the metro stations encourage walking (T. Kim, Sohn, and Choo 2017). There must be adequate pedestrian

road around the station (Kruger and Landman 2007). In addition, local accessibility can be increased by ensuring that the pedestrian roads are wide and straight (Zacharias and Zhao 2018). A positive correlation was observed between the road width and the pedestrian traffic volume near the metro station (0-400 m). Pedestrians preferred to walk on wider streets near the metro station. It showed a negative relationship in these areas as it moved away from a distance of 800 meters. They preferred to walk on narrower streets as they moved away from the station (T. Kim, Sohn, and Choo 2017). Wide sidewalks and low-traffic roads should be designed around the station. Sidewalk widths are an important factor affecting the choice of road, as well as walking. The presence of wide sidewalks, the presence of trees, and roads with low traffic will encourage walking (Ferrer, Ruiz, and Mars 2015). It is necessary to ensure traffic safety with vehicles such as speed bumps, traffic lights for pedestrians, and pedestrian crossings while crossing the street (Paydar, Fard, and Khaghani 2020). Physical barriers in front of pedestrians at the crossing will increase the walking time (Sun et al. 2016). Cars parked on the sidewalks, cafes on the sidewalks, and poles are physical barriers on the sidewalk. High traffic speed, high intersection density, poor coordination between consecutive pedestrian traffic lights, and long waits are the factors that weaken the walking experience. The presence of high density at pedestrian crossings is an obstacle to walking. The presence of major boulevards, roundabouts, and poor coordination of pedestrian traffic signals are factors that make pedestrian access difficult, and they can increase transit times and deter walking (Ferrer, Ruiz, and Mars 2015). As a result, the width, quality, maintenance, cleanliness, continuity, and connections of the pavements, as well as the perception of safety, are factors that increase walking.

3.2.2. Land Use

The most important factor in metro transportation is commercial land use (An et al. 2019). Because commercial land use includes a higher proportion of destinations (Zacharias and Zhao 2018), it allows for functional diversity and increased the usage of metro. It should be ensured that the land use around the station is balanced (An et al. 2019). (Jacobs 1961) states that the coexistence of different usage styles and different functional areas reduces the fear of crime. The physical and functional diversity of a place

creates a feeling of a safer space. In particular, the presence of commercial activities, kiosks, social facilities, or another public transport stops will make that place to feel people safer. Proximity to active businesses, and increased intensity of use of the area increases visibility and allows to seek help when needed (Loukaitou-sideris 1999). On the other hand, the Loukaitou-sideris study also states that crime rates are higher in areas with adverse land uses such as liquor stores, bars, seedy motels/hotels, and vacant lots/buildings (Loukaitou-sideris 1999; Liggett, Loukaitou-Sideris, and Iseki 2001).

About examining the impact of the built environment on rail transit, Gan et al. (2020) state that while the characteristics of the built environment have a greater impact on the journey in the morning than at the destination at the boarding stop, and the opposite is true for the afternoon rush hour and at night. The variables that are important in morning usage are the number of bus lines on the boarding side, the population density on the arrival side, and the transfer times, while in the afternoon, the four important variables are the population density on the boarding side, transfer times, route distance, and the number of bus lines on the arrival side.

In the study of Ning, Lyu, and Wang (2021), students (under 18) and the elderl persons (60 and above) state the land uses that will increase the share of metro use. The number of schools around metro stations and of bus stops is related to student use positively. A positive effect of the number of schools has also been observed on the elderly. This finding can be explained by taking children to school to support the family. The number of markets, hospitals, squares, parks, and points with views are also related to the use of the metro by the elder persons positively.

3.2.3. Perceived Safety

The safety factor, which is a basic need, affects the experience of passengers and the use of public transport depending on many physical and social factors. There are significant differences between the perceptions of safety men and women. It has been observed that women feel more insecure than men (Ait Bihi Ouali, Graham, and Barron 2020; Coppola and Silvestri 2020; Cozens et al. 2003; Yavuz and Welch 2010). These feeling limits the mobility habits of women, and for safety reasons, their movement habits and preferences are also affected and changed. Because they restrict their freedom of

access to the certain destinations or areas in order to ensure their safety (Deniz 2016; Stark and Meschik 2018). Similarly, Coppola and Silvestri (2021), in their study, state that women find train stations less safe than men. Safety also decreases with age, the elder people feel more insecure than younger people (Ait Bihi Ouali, Graham, and Barron 2020). Cozens et al. (2003) mentioned that passengers feel unsafe when using public transport, especially at night. Factors that increase perceived safety are the presence of a security guard (Abdul Hamid et al. 2015; Cozens and van der Linde 2015; Iseki and Taylor 2010), the presence of cameras (Abenoza et al. 2018; Cozens and van der Linde 2015), lighting (Abdul Hamid et al. 2015; Deniz 2019; Iseki and Taylor 2010; Kruger and Landman 2007; Loukaitou-Sideris 2006), the presence of commercial activities (Abenoza et al. 2018; Coppola and Silvestri 2021). The reason for this is that the presence of people in commercial areas such as restaurants, cafes, and stores increase the perception of safety (Abenoza et al. 2018). On the other hand, they also feel insecure in the environments with graffiti and litter (Cozens and van der Linde 2015; Loukaitou-Sideris 2006), crowded and uncontrolled about security measures (Coppola and Silvestri 2021; Deniz 2019).

The safety factor is the most important factor deterring walking. While women do not prefer to walk when they feel insecure, some men are just afraid to walk. The poor street lighting at night and the absence of people around prevents walking. In cases where street lighting is insufficient, people feel insecure at night, and it is an obstacle to walking (Ferrer, Ruiz, and Mars 2015). In addition to physical competence, lighting has also psychological effects on people. Forms, materials, and colors used in lighting have an effect. It should be designed for needs such as visual comfort, visual performance, and safety. The level of illumination is also important. Ferrer, Ruiz, and Mars (2015) show that the color of lighting also has an effect on safety. Compared to areas where yellow light is used, it is seen that they perceive their surroundings more clearly and feel more comfortable and safer in illuminations using white light.

It has been revealed that the presence of security personnel or security cameras, clean and well-maintained, good lighting, transparent shelters, and being able to see will increase their personal safety (Cozens et al. 2003). They state that the most important factor affecting safety is visibility. Visibility and natural surveillance are important. There is also an increase in perceived crime and safety at stations that are dark and cannot see the environment well, or vice versa stations that are not well observed from the environment (Liggett, Loukaitou-Sideris, and Iseki 2001).

Transit environments must be visible to users and observers to make them feel safe (Vogel and Pettinari 2002). The determinant of visibility is the presence of open space (Cozens et al. 2003; Kruger and Landman 2007). It makes it easier for people to see their surroundings clearly and to be observed by other people (Cozens et al. 2003). For this reason, in the design of these areas, walls, fences, and shrubs that may block the view should be considered. These design elements can block the view and hide the attacker in the areas (Vogel and Pettinari 2002). Similarly, transparent shelters allow passengers to see their surroundings and be seen from around. It prevents it from being used as a hiding place for criminals (Cozens et al. 2003). Lighting and illumination levels are important determinants of visibility and safety in transit environments, both day and night. For example, excessively bright lighting at a bus stop makes personal safety dangerous. The reason for this is that the passenger at the stop cannot see the outside, but it becomes easily visible from the outside. For this reason, lighting levels are an important factor. The presence of multiple lighting sources can provide even illumination. Fewer shadows will increase the sense of safety. There should be good visibility between the shop, sidewalk, stop, and street. The presence of people and the presence of facilities provide natural surveillance, and natural surveillance will be facilitated in places with good visibility (Vogel and Pettinari 2002).

3.2.4. Comfort

The presence of facilities and their number to spend longer time in the station area provide physical comfort. Having sufficient seating units, trash bins, public restroom, and shops nearby the station increase physical comfort. The absence of sidewalks, narrow sidewalks, and interruption of sidewalks affect comfort and safety negatively (Ferrer, Ruiz, and Mars 2015). Pavement floor quality, and the material used on the floor are important in providing comfort. Shade elements such as canopies, awnings, or trees provide shade on sunny days and are comfort-enhancing elements that provide protection in rainy and snowy weather.

Having alternative route preference, the existence of parks, and being accessible to them (Paydar, Fard, and Khaghani 2020), availability of parking lots is facilitating

factors (Ferrer, Ruiz, and Mars 2015). High pedestrian density and sloping streets are also deterrents (Ferrer, Ruiz, and Mars 2015).

Elements that provide protection against wind, precipitation, and hot weather conditions will increase the comfort and quality. The capacity and width of the road that will provide comfort in walking should be provided. (Fields 2012).

Orientation towards the landscape or towards a larger opening should be provided in urban space arrangements. In outdoors, people position themselves towards the view. They try to find a place where they feel their backs are protected. In order to provide a place where people will feel comfortable, a back that will make them feel safe and a view to a wider area should be provided. In this case, a small section with a back should be created and these spaces should be directed to an opening (Alexander 1977).

3.2.5. Aesthetics and Attractiveness

Graffiti, closed shops, empty lots, the presence of litter, and bridge crossings increase the feeling of insecurity at night (Ferrer, Ruiz, and Mars 2015). The areas with scenic views, the attractiveness of buildings, garbage-free roads, clean roads (Paydar, Fard, and Khaghani 2020), areas with pleasant resting routes, and the presence of green elements are aesthetic features and also provide a pleasant walking experience and encourage walking. Graffiti and cleanliness are factors associated with both aesthetics and safety. Cleanliness is associated with both crime and aesthetic perception. In areas that do not appear clean, there is a feeling of insecurity, such as the presence of garbage on the street. Also, while graffiti has a negative effect, it can also increase the attractiveness of the environment in some cases (Ferrer, Ruiz, and Mars 2015). Public art can have positive effects on the city. It can have a positive impact on people as well as optimize the image of the city and in their behavioural and psychological perspectives. When considered within the metro system, public facilities, signs, and logos regarding public art can be seen (Zhang 2014).

Aesthetic factors not only provide comfort to the passengers but also help increase the public safety. A balance must be ensured between form and function.

The well-maintained station areas increase their attractiveness, which creates a sense of order and gives a feeling of safety (Cozens and van der Linde 2015). According

to Ferrer, Ruiz, and Mars (2015), cleanliness and graffiti are the factors that increase attractiveness, while the presence of graffiti and litter reduces attractiveness (Cozens and van der Linde 2015; Loukaitou-Sideris 2006). In addition to that, the landscapes, attractive architecture, the existence of people, alive areas, good maintenance, variety of colors, order, low buildings, natural light, and greenery will increase attractiveness (Ferrer, Ruiz, and Mars 2015) The presence of shops and other facilities increases the attractiveness of the station, too. One benefit of such commercial activities is that it provides natural surveillance (Bláfoss Ingvarðson, Anker Nielsen, and Altaf 2018). The presence of benches or other urban furniture around the station will make that area more attractive (Ferrer, Ruiz, and Mars 2015; Kruger and Landman 2007; Bláfoss Ingvarðson, Anker Nielsen, and Altaf 2018).

3.3. The Cases of Metro Surroundings with Improved Public Space

This section examines a few examples of the use of metro surroundings as public spaces, addressing aspects of design, uses and activities, visibility, access, and safety.

3.3.1. Canary Wharf Underground Station, London

The Canary Wharf London Underground Station opened in 1999 as an extension of the Jubilee line (URL-1). The Jubilee line extension consists of eleven stations, with Canary Wharf station being the largest clearly. It is expected to be used more than Oxford Circus, which is currently the busiest station in London intensively. The station is 300 meters long completely underground and is built within the hollow of the former West India Dock. It has 3 station entrances, and they are located at ground level. These station entrances are integrated with a designed park as shown in Figure 3.1 that forms the Canary Wharf recreation area (URL-2).





Figure 3.1. The plan of Canary Wharf London Underground Station entrances and Canary Wharf recreation area
(Source: <https://wirtz nv.com/projecten/public-space-jubilee-park-london-uk/>, accessed date: 05.02.2022)

It is aimed to minimize the hustle and bustle and create calmness in a dense area with trees, raised grass, and water features designed in the park (Figure 3.2.) (URL-1).



Figure 3.2. The view from the Canary Wharf recreation area
(Source: <https://www.externalworksindex.co.uk/entry/107362/Fountains-Direct/Water-features-for-Jubilee-Park-Canary-Wharf-London/>)

The only visible station element in this park are the three curved glass entrance canopies (Figure 3.3). It can get plenty of sunlight into the depths of the station space, and at the same time prevents the wind and rain from entering with this structure. The natural light entering the station also helps to guide (Figure 3.4). Natural light is strikingly concentrated at these points, reducing the need for directional signs and signage (URL-2).

| | |
|---|--|
|  |  |
| <p>Figure 3.3. Entrance canopy of Canary Wharf (Source: https://www.fosterandpartners.com/projects/canary-wharf-underground-station/, Foster + Partners studio, accessed date: 30.01.2022)</p> | <p>Figure 3.4. The view from the natural light entering the station (Source: https://www.archilovers.com/projects/68513/gallery?500408, accessed date: 05.02.2022)</p> |

Escalators at the station entrance take passengers to the ticket office and then descend to the platform. When entering the station from ground level or descending to the platform level, there is only one route that can be read clearly, and this minimizes the need for direction signs. Administrative offices, kiosks, and other facilities are located on the side of the ticket hall. The main concourse is left blank. In this way, a sense of clearly perceptible simplicity has been created (URL-3). The station offers many complex security and technological innovations. The glass elevators in the station increase the safety and comfort of the passengers, and this situation deters vandalism (URL-2).



Figure 3. 5. Station Entrances and its Surrounding Usage
(<https://structurae.net/en/media/112272-jubilee-line-canary-wharf-underground-station>, International Database and Gallery of Structures, accessed date: 30.01.2022)

3.3.2. Union Square Station, Manhattan

Union Square Station is located at the intersection of Fourth Avenue and 14th Street at the lower entrance of Union Square in Manhattan, New York (URL-4). It is a popular area used by locals and tourists alike, and an important transit hub and transportation hub for Manhattan (Fishbein 2017). Many transfers can be made from Union Square station, located at the intersection of several routes, and from this station, they can go to Manhattan, Queens, The Bronx, or Brooklyn (Kachejian 2018).

Both the park and the station have a long history. There is a statue of George Washington in Union Square, the oldest statue in the city's park collection. At the same time, this square is the first commercial theatre district in the city. Before Times Square became the center of gravity of Broadway theatre in New York, Union Square was from 1860-to 1880. This area, which used to be used for political protests and public meeting places, was opened as a park in 1839. Acting Landscape Gardener E.A. Pollard has drawn up a new plan for the park in 1871. The next year, it redesigned by Frederick Law Olmsted, Sr., and Calvert Vaux. For ease of access for pedestrians, the fences in the park have been removed, the roads in the park have been arranged, and the sidewalks around it have been widened (URL-5). Today, Union Square 14th Street is one of Manhattan's top stops for shopping, dining, strolling, and more.



Figure 3.6. Uses around the Union Square Subway
 (Source: This figure was created by the author.)

There is a multi-purpose use in the station and its surroundings. There are eating and drinking areas, sales places, and socio-cultural activities around Union Square. Urban Square Park is located at the top of the station, and the most popular market of the city, Greenmarket, is established here (Figure 3.6.).

Union Square continues to serve as a multi-purpose square. Sometimes they gather for action in this square, and sometimes it hosts the most popular market in the city (Figure 3.7.). The station surroundings and the square are used intensively on days when there is no urban market (Figure 3.8. and 3.9.). Union Square Park, which is integrated with the station, also offers people the opportunity to visit and relax (Fishbein 2017).



Figure 3.7. Urban market
 (Source: https://www.instagram.com/p/CX4AVrcrD_A/, 2021, accessed date: 06.02.2022)



Figure 3.8. Union Square Station entrance
 (Source: <https://www.flickr.com/photos/n0thing/3760070985/>)



Figure 3.9. Union Square Metro station and square relationship
 (Source: <https://www.tclf.org/union-square-park>)

3.3.3. Nørreport Station, Copenhagen

Nørreport Station was first established in Denmark in 1916. It was modernized in 1934, in 2012 it was stated that it needed a fundamental refurbishment. After three years of construction work, the station was transformed into an open accessible urban area in 2015 (Figure 3.10.). It is a pedestrian and cyclist-focused project. It is Denmark's busiest

transport hub (URL-6). The project by COBE Architects has given a new look to the busiest station in Denmark, used by 250,000 people daily (Bilgiç 2017).



Figure 3.10. The top view of the Nørreport Station
(Source: <https://cobe.dk/place/norreport-station>, accessed date: 06.02.2022)

A station becomes an urban space

A large-capacity bicycle park at this station has been needed since 60% of daily business and educational trips in Copenhagen are made by bicycle. Previously, the bicycles were left randomly and scattered, creating a dysfunctional public space as seen in the image (Figure 3.11.). Later, it has become a tram, car and bus distribution line and turned into an area that neglected pedestrians and cyclists (URL-6).



Figure 3.11. The old version of the area where Norreport station is located
(Source: <https://cobe.dk/place/norreport-station>)

Lowered bicycle beds have been made in the new design of the station surroundings, and they clearly show where to park and where to walk. At the same time, these lowered areas also function as rainwater retention areas. Norreport station bike stands and entrances to the underground platform have roofs and circular glass structures that provide protection (URL-6).

Form follows people

The station area was previously a city block surrounded by traffic, making it difficult for pedestrians to access it. It has been transformed into an expanded public space with the design. It has now become a public space where pedestrians take priority. There is a traffic artery just north of the station. The connection of this area to Copenhagen's main shopping street has been improved. Station pavilions and bicycle parking spaces are placed between the main lines without disturbing the natural flow of movement (Figure 3.12.) (URL-6).

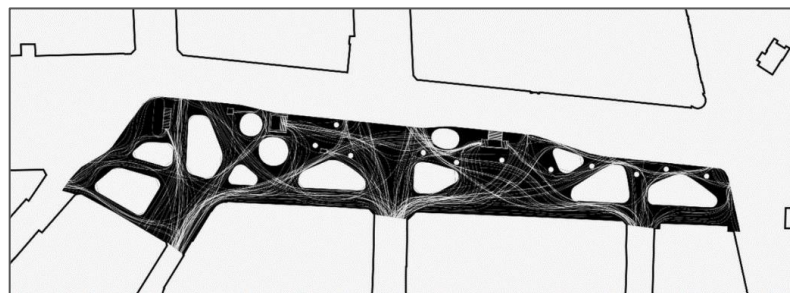


Figure 3.12. Design according to the natural movement flow
(Source: <https://cobe.dk/place/norreport-station>)

Public infrastructure is public space

The area where this station is located is Denmark's busiest, with more than 250.000 passengers passing through every day. Since the 1960s, it has been a lively station in the middle of the city, but it is an area that has become a large and chaotic intersection. While designing the station, research was conducted on the routes preferred by pedestrians and formed the basis of the design. An open and inviting public space has

been created for the needs of pedestrians and cyclists. Norreport Station is not only a transportation point, but also an urban landscape within the city and for people. While contributing to the view seen from above, it also absorbs rainwater (Figure 3.13.) (URL-6).



Figure 3.13. Green roof of the station (Source: <https://cobe.dk/place/norreport-station>)

Round-shaped structures made of glass give people a sense of safety. It provides both low maintenance requirements and functions as materials with natural surfaces by using white concrete, granite, glass, and stainless steel. The large towers that give light in the dark have the function of ventilating the underground platform and are also informational structures surrounded by benches. Solar-powered fixtures are also used in the covered bicycle beds, and the built-in bicycle beds are illuminated by the lights coming from each of the bollards (URL-6).

Over time, this area has been transformed into an open, easily navigable, and accessible urban area for the needs of pedestrians and cyclists. This area, which used to have a bad urban identity, was chaotic, noisy, and unsafe, has become an area that connects the safe, comfortable, efficient station with the surrounding urban life after the transformation (URL-6).

3.4. Summary

This chapter details factors affecting usage of metro station surroundings. According to the literature, Table 3.1. shows the effects of social and physical factors on people's usage of space.

Table 3.1. Expected effects of social and physical factors on people's use of space

| | | | |
|-------------------------------------|---|---|---|
| Individual Characteristics of Users | Women travel more frequently | | Deniz 2016; Moreira and Ceccato 2021; Ingvardson and Nielsen 2021 |
| | Women feel more insecure compared to men | | Ait Bihi Ouali, Graham, and Barron 2020; Coppola and Silvestri 2020; Hong and Chen 2014; Uittenbogaard and Ceccato 2014; Yavuz and Welch 2010 |
| | Young and retirees prefer public transport more often | | Ingvardson and Nielsen 2021 |
| | As the income status increases, the option to use public transport decreases. The tendency to walk decreases. | | Ingvardson and Nielsen 2021; Paydar, Fard, and Khaghani 2020; Saygaonkar, Swami, and Parida 2016 |
| | Car ownership reduces the tendency to walk. | | Loutzenheiser 1997; Ingvardson and Nielsen 2021; Paydar, Fard, and Khaghani 2020 |
| | Their usage time increases, and they feel safer when they are used for work and non-school purposes. | | Sarker, Mailer, and Sikder 2020; Liu, Zhou, and Xiao 2021 |
| | Those who use public transport less often feel more unsafe. | | Ait Bihi Ouali, Graham, and Barron 2020 |
| Access to metro stations | As the walking distance increases, the tendency to walk decreases. | - | Paydar, Fard, and Khaghani 2020 |
| | Increase in traffic speed and density | - | Ferrer, Ruiz, and Mars 2015 |

(cont. on next page)

Table 3.1. (cont.)

| | | | |
|------------------|--|---|---|
| and destination | Increase in safety perception (traffic calming, traffic lights, crosswalk) | + | Bivina, Gupta, and Parida 2019 |
| | Wide sidewalks | + | Ferrer, Ruiz, and Mars 2015; Zacharias and Zhao 2018 |
| | Obstacles on the sidewalks | - | Ferrer, Ruiz, and Mars 2015 |
| Land Use | Mixed-use and balanced land use distribution | + | An et al. 2019; Zacharias and Zhao 2018 |
| | The presence of liquor stores, bars, and vacant lots/buildings increase crime rates and insecurity | - | Loukaitou-sideris 1999; Liggett, Loukaitou-Sideris, and Iseki 2001 |
| | The presence of schools and parks around the metro increases usage | + | Ning, Lyu, and Wang 2021 |
| Perceived Safety | Presence of security guard | + | Abdul Hamid et al. 2015; Cozens and van der Linde 2015; Iseki and Taylor 2010 |
| | Presence of security cameras | + | Abenoza et al. 2018; Cozens and van der Linde 2015 |
| | Presence of commercial activities | + | Abenoza et al. 2018; Coppola and Silvestri 2021 |
| | Presence of lighting | + | Abdul Hamid et al. 2015; Deniz 2019; Iseki and Taylor 2010; Kruger and Landman 2007; Loukaitou Sideris 2006; Cozens et al. 2003 |
| | Clean and well-maintained areas increase perceived safety | + | Cozens et al. 2003 |
| | Visibility and natural surveillance | + | Cozens et al. 2003; Liggett, Loukaitou-Sideris, and Iseki 2001; Vogel and Pettinari 2002 |
| | Environments with graffiti and litter reduce perceived safety. | - | Cozens and van der Linde 2015; Loukaitou-Sideris 2006 |
| | Crowded and uncontrolled security measures reduce perceived safety. | - | Coppola and Silvestri 2021; Deniz 2019 |
| | The presence of open space | + | Cozens et al. 2003; Kruger and Landman 2007 |
| | Obstacles on the view (wall, fence, shrub) | - | Vogel and Pettinari 2002 |
| | Lighting at night | + | Ferrer, Ruiz, and Mars 2015; Vogel and Pettinari 2002 |
| | Presence of people and facilities | + | Cozens et al. 2003 |
| Comfort | The presence of seating units, trash bins, public restroom, kiosk, shops | + | Ferrer, Ruiz, and Mars 2015 |
| | The absence of sidewalk | - | |
| | Narrow sidewalk | - | |
| | Quality of sidewalk (material) | + | |

(cont. on next page)

Table 3.1. (cont.)

| | | | |
|-------------------------------|---|---|---|
| | The presence of elements that provide protection from sun, rain, wind | + | Fields 2012 |
| | The presence of parks nearby | + | Paydar, Fard, and Khaghani 2020 |
| | Availability of parking lots | + | Ferrer, Ruiz, and Mars 2015 |
| | High pedestrian density | - | Ferrer, Ruiz, and Mars 2015 |
| Aesthetics and Attractiveness | Clean and well-maintained station area increases attractiveness | + | Ferrer, Ruiz, and Mars 2015; Paydar, Fard, and Khaghani 2020 |
| | Architecture and low buildings | + | Ferrer, Ruiz, and Mars 2015 |
| | Greenery and landscapes | + | Ferrer, Ruiz, and Mars 2015 |
| | The presence of shops and other facilities, commercial activities | + | Bláfoss Ingvarðson, Anker Nielsen, and Altaf 2018 |
| | The presence of benches and other urban furniture | + | Ferrer, Ruiz, and Mars 2015; Kruger and Landman 2007; Bláfoss Ingvarðson, Anker Nielsen, and Altaf 2018 |
| | The presence of closed shops, empty lots | - | Ferrer, Ruiz, and Mars 2015 |
| | Well-maintained buildings | + | Cozens and van der Linde 2015 |
| | The presence of green elements, trees | + | Ferrer, Ruiz, and Mars 2015 |
| | The presence of public art | + | Zhang 2014 |

Improvements in vehicle traffic (traffic speed and density, pedestrian crossings, traffic lights, traffic calming elements) create a safe walking environment and increase the tendency to walk. Wide sidewalks around the station will encourage walking. Improvements to pavement attributes and connections support walking. The existence of commercial activities and mixed-use areas in metro surroundings creates a feeling of safer space and increases usage. The presence of another public transport stop in the immediate vicinity of the station increases the preference for use of the station and its surroundings. The presence of a security guard and the presence of security cameras increase perceived safety. The presence of lighting and security personnel is one way to increase perceptions of safety. One of the functions of lighting elements is to provide safety. It is necessary to ensure that users can access in a comfortable and safe environment during evening and

dark times. Since it gives a sense of safety to the users, it will also extend the time they stay in the place. Improving the physical and safety conditions will allow more people to use this area, which will make them feel safer. The most important feature of station access is to provide the shortest distance and direct access. The presence of commercial activities such as cafes, restaurants, shops, and the presence of people in these areas increase users' perception of safety. The presence of lighting increases the perceived safety. At night, when street lighting is insufficient, users feel insecure and prevent them from walking. Clean and well-maintained areas create a feeling of safer space. It provides an increase in safety in areas where visibility and natural surveillance are provided. The existence of seating units, trash bins, public restrooms, kiosques, and shops nearby the station increases physical comfort. Improvements in the quality and width of sidewalks increase users' tendency to walk to the station. The presence of elements that provide protection from sun, rain, and wind provides a more comfortable space. The presence of parking in the immediate vicinity of the station and access to parking lots increase comfort. Good and well-maintained buildings and clean areas increase the aesthetic perception and make them feel safe. The presence of green elements, the presence of commercial activities and shops, and the presence of benches and other urban furniture increase the choice of use of the space and make it attractive.

CHAPTER 4

STUDY SITE AND METHODOLOGY

4.1. The Study Site

The city of Izmir is one of the third largest and most important metropolitan centers in Turkey. The population of İzmir showed increased rapidly. The population of Izmir is 4.425.789 as of 2021 (URL-8). The projected population for 2030 is 6.181.155 people. It is estimated that 10.2 million journeys will be made daily according to the 2030 Izmir Transportation Plan. At least 26% will be made by public transportation considering the trends of these journeys. The public transportation system in Izmir is the transportation system that uses the city's transportation infrastructure most efficiently (“UPİ 2030 İzmir Ulaşım Ana Planı” 2019).

When the total changes in the journey distributions are taken into account, it is expected that there will be a 3,8% decrease in the use of private vehicles, an increase of 4,6% in the public transportation, a decrease of 2,8% in the service use and an increase of 0.9% in the number of pedestrians, according to the 2015 existing data and the 2030 trend data in the transportation master plan (Table 4.1.). There is an increase in the use of public transportation for 2030. It takes place in transportation preferences with a rate of 26,5%.

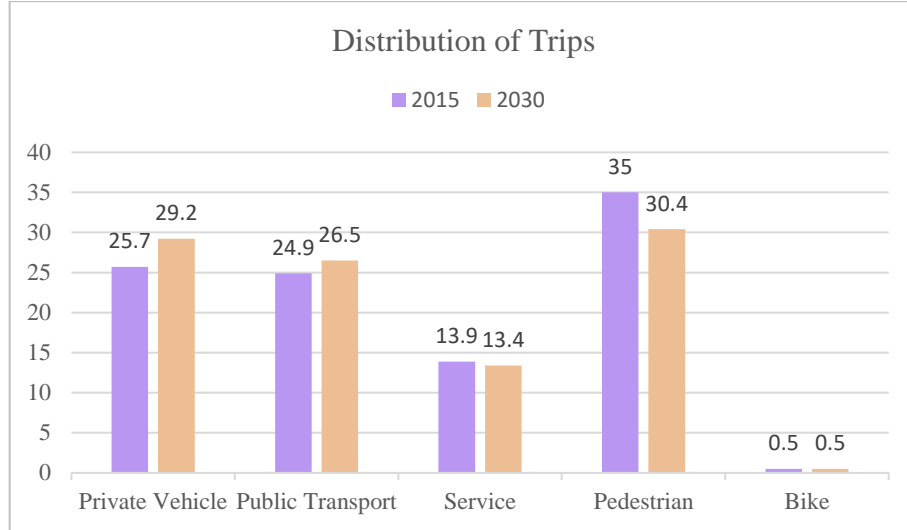


Table 4.1. Distribution of trips according to 2015 current and 2030 trends
(This table has been rearranged from İzmir Ulaşım Ana Planı (UPİ 2030) Sonuç Raporu 2017 data.)

The rate of rail systems in public transportation was 19% in 2015. It is expected to be 34,9% in 2030 (Table 4.2.). The share of metro among public transportation types is 13,96% according to 2015 data (Table 4.3.) (“İzmir Ulaşım Ana Planı (UPİ 2030) Sonuç Raporu” 2017).

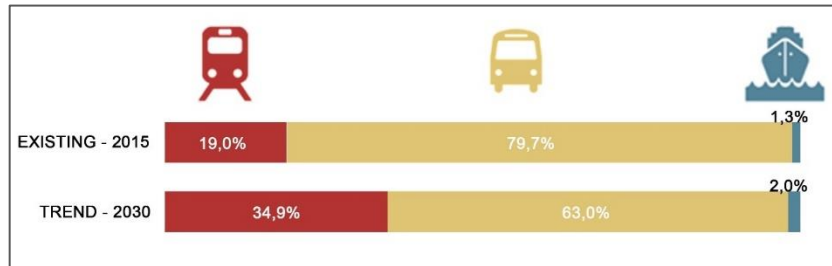


Table 4.2. Comparison of the distribution of public transport passenger numbers
(Source: İzmir Ulaşım Ana Planı (UPİ 2030) Sonuç Raporu, pg. 62, 2017)

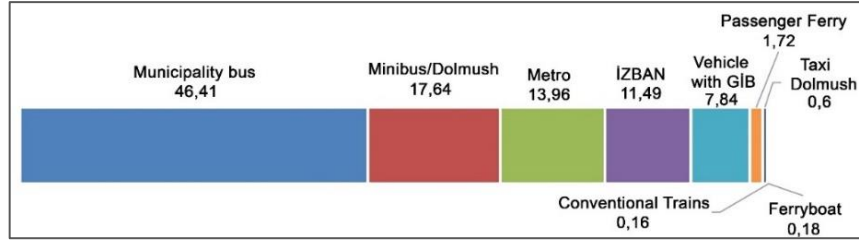


Table 4.3. Share of public transport types in the system (%)
 (Source: İzmir Ulaşım Ana Planı (UPİ 2030) Sonuç Raporu, pg. 11, 2017)

The transportation mode with the highest increase in transportation preferences in İzmir will be public transportation in 2030. Public transport modes offer an integrated, fast, and environmentally friendly as alternative to vehicle use in İzmir. There are İzban, Metro, Tram, Eshot, İzulaş, İzdeniz, and Bisim in the system that constitutes the public transportation. Rail systems will have the highest share considering the usage rates in public transportation (“İzmir Ulaşım Ana Planı (UPİ 2030) Sonuç Raporu” 2017). There is a light rail system (metro) extending from the east to the west of the city and a suburban rail system (İzban) extending from the north to the south in İzmir rail system (Figure 4.1.). This study discusses with the metro within the rail system as a subject of investigation.

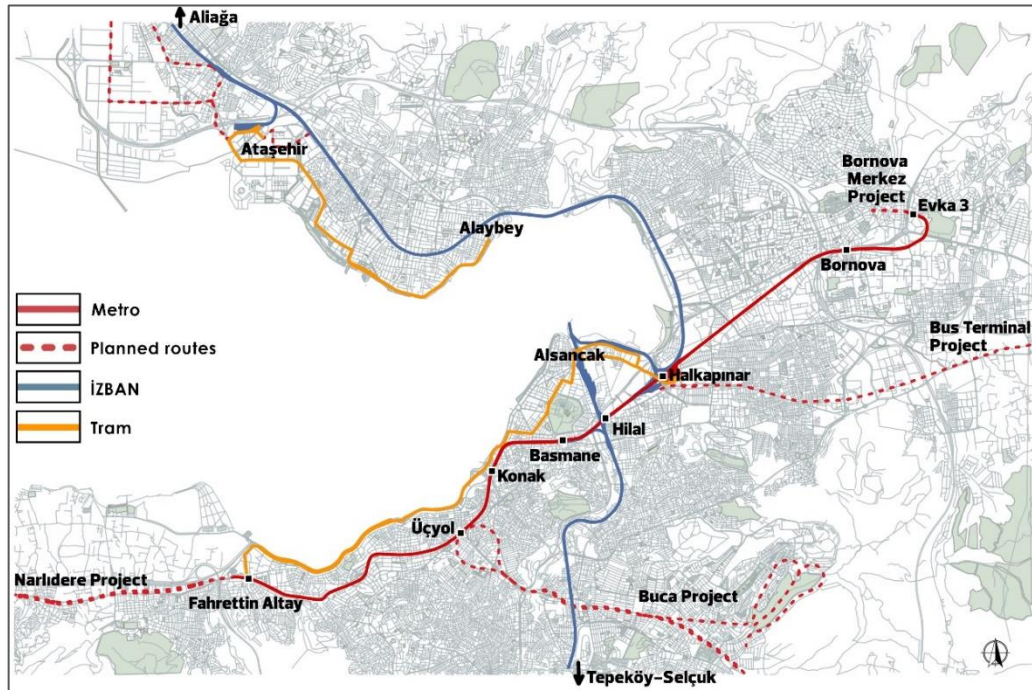


Figure 4.1. İzmir Rail System Map (The map was produced by the author in QGIS.)

4.1.1. The Development of Urban Rail Systems in Izmir

There has been an increase in urban travel demands due to intense housing growth. The first works for the Izmir metro started in 1989. Heusch und Bosefeldt, a German organization, started counting on the main arteries of the city. The Transportation Master Plan was prepared as a result of the traffic counts carried out for two years. Firstly, four endpoints of the city were selected in this plan. They are Bornova, Buca, Narlıdere and Çiğli. A 50 km metro system was proposed for 2010. The first tender was held in June 1992. But priority was given to the busiest part of the metro system in this tender. Izmir Metropolitan Municipality signed a contract with ABB- Building Center in January 1993, and an agreement was reached as a design and built consortium. The metro route was re-evaluated in 1994. As a result, the part of the route extending to Fahrettin Altay was canceled. Basmane-Bornova line was purchased from TCDD with a 50-year agreement. The contract for the final version of the Izmir metro project was signed in March 1995 with a delay. As a result of all these, the delivery date of the project was April 2000. İzmir Metro A.S. was established in 2000 as a municipal metro operator. It was established as a joint stock company affiliated to Izmir Metropolitan Municipality in order to operate the metro system. Thus, the metro rail system in İzmir started to serve with 10 stations in May 2000. The length of the first stage metro line is 11.6 km, and these 10 stations are as follows, from east to west of the city: Bornova-Bölge-Sanayi-Stadyum, Halkapınar-Hilal-Basmane-Çankaya-Konak-Üçyol (URL-8).

Izban rail system was put into service in 2010 between the northern axis and the southern axis of the city, where the borders of the metropolitan area have expanded. Meanwhile, new projects continued in the Izmir Metro. Evka-3 and Ege University stations started operating in March at the beginning of 2012. 2.25 km line length has been added. Work has also been started on the Üçyol-Fahrettin Altay route. İzmirspor and Hatay stations, the first two stations of this route, started operating in December at the end of 2012. Later in 2014, other stations of the line were opened. Firstly, Göztepe station was put into service in March. The total line length has been 16.5 km with this station. So, the last two stops to complete the route were Poligon and Fahrettin Altay stations. These stations were put into operation in July 2014 and the line length reached 20 km. Thus, the 20 km route consisting of 17 stations was completed between Evka 3 - Fahrettin Altay (Figure 4.2.) (URL-8).

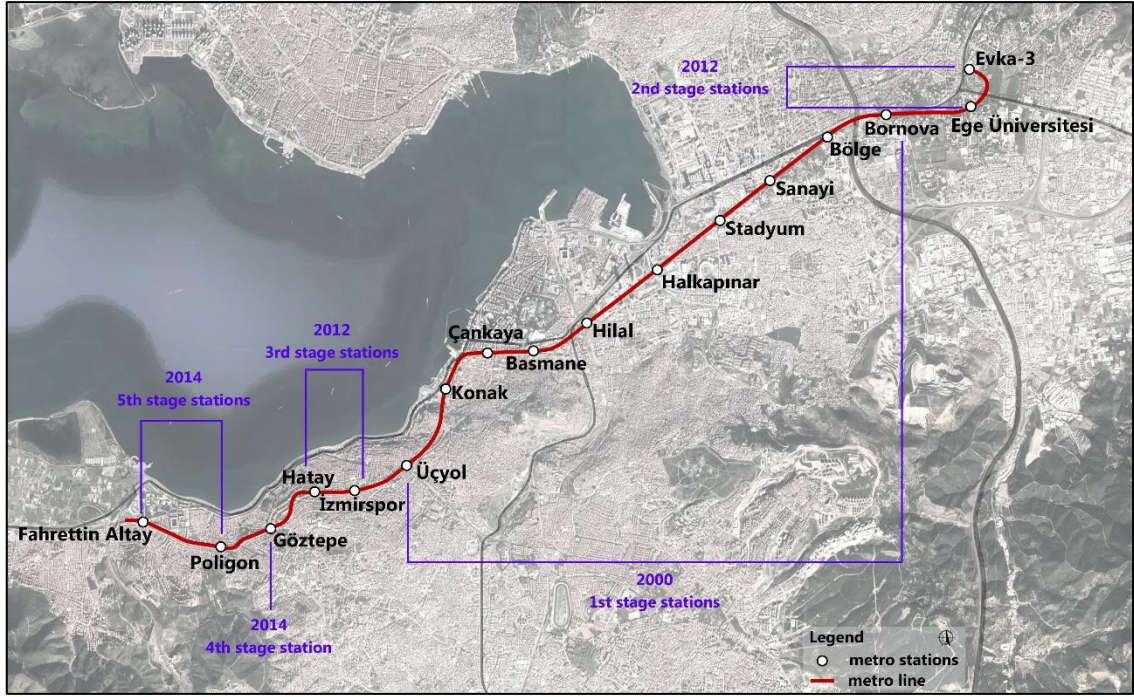


Figure 4.2. İzmir Metro line, Stations, and Stages

Another investment within the public transportation system in İzmir was the tram that started operating in 2017. The first stage of Tram İzmir was the Karşıyaka tram (14 stops) between Ataşehir and Alaybey in the north of the city. It started operation in July 2017. In the second stage, the Halkapınar-Fahrettin Altay line (19 stops) as the Konak tramway in the south of the city was put into operation in July 2018 (URL-9).

Currently, the Fahrettin Altay-Narlıdere metro construction work continues. Work has also started for the Üçyol-Buca Metro and Halkapınar-Bus Terminal projects. In addition, there is a metro line extension project from Evka-3 to the center of Bornova. Fahrettin Altay-Narlıdere metro line started to work in 2018. It is expected to enter service in 2022. This line is 7 km long. A total of 7 stations are planned as Balçova, Çağdaş, Dokuz Eylül Üniversitesi Hastanesi, Güzel Sanatlar Fakültesi, Narlıdere, Şehitlik and Kaymakamlık stations. An uninterrupted metro journey from Evka-3 to Narlıdere will be possible with the completion of this line. It is expected to reduce the bus and minibus traffic along the line and save time (“İzmir Metro A.Ş. Stratejik Planı 2020-2024,” n.d.). Buca metro project (11 stations) planned to be 13 km starting from the existing Üçyol station of the line. There is a return line at the beginning of the route, and it is connected to the main metro line at Üçyol (It is seen in Figure 4.1). This line intersects with the

Metro in Üçyol and with İzban in Şirinyer. The foundation of the Buca metro was laid in February 2022 and it is expected to be completed within 4 years (“İzmir Metro A.Ş. Stratejik Planı 2020-2024,” n.d.).

4.1.2. Immediate Surrounding Relations of Metro Stations in Izmir

The metro system constitutes an essential mode of transportation that connects Balçova (Cable car, urban forest, shopping, and residential areas), the city center (Konak, Çankaya, Basmane), and the Ege University, Ege University Hospital in the Bornova district. It is possible to transfer from Evka-3 to Eshot and dolmush. Halkapınar Station serves as a transfer station and offers passengers the opportunity to transfer from the metro system to İzban, bus, and tram. In addition, Hilal station, as the second transfer station, offers the opportunity to pass from the metro to İzban. Konak metro is a transfer station, and it has the opportunity to transfer to all other types of public transportation (ferry, bicycle, tram, Eshot). There is also the opportunity to transfer to public transportation modes such as ferry, tram, bicycle, Eshot, dolmush from the Fahrettin Altay station.

According to the population distribution of the neighborhoods in the vicinity of the Izmir metro, it is observed that the population density in the settlements around Üçyol, İzmirspor, Hatay, and Göztepe stations has increased (Figure 4. 3.).



Figure 4. 3. Population distribution according to Izmir 2021 population data (The map was produced by the author in QGIS.)




Konak metro serves the administrative and historical center of Izmir. Since it was the only station with a connection to sea transportation at that time, it increased its importance. Considering the spatial change of the station surroundings between 1989 and 2010, no change was observed except for the open space and recreation arrangements. Hilal station surroundings have less land use and passenger numbers compared to other stations. While the number of passengers using the station was 1.07% in 2004, it decreased by 0.81% in 2012. According to the 2030 İzmir Master Plan, Hilal station surroundings have been determined as the Central Business Area. Halkapınar Station became a transfer station with the commissioning of İZBAN in 2010, and an increase of 359.31% was observed in the number of passengers. According to the Izmir Master Plan, the area around the station was determined as the CBD and sports area. The surroundings of the Stadyum station are also indicated in the plan as the CBD, the sports field, and the regional recreation area. There was a 91% increase in passengers from 2004 to 2012. An increase in the density of residential areas has been observed around the Bölge station. This station serves the surrounding educational areas. Bornova station serves education and residential areas. The increase in the density of residential areas in Manavkuyu and

Atatürk neighborhoods caused an increase of 67% in the number of passengers using this station (Eğercioğlu and Yalçiner 2013).

According to the Izmir Metro A.S. 2001 survey of the metro, the accessibility area of the metro was determined as 800 meters. The fact that the stations are in busy working, educational and residential areas cause an increase in the number of passengers, while the most important reason for the decrease in the number of passengers is that the urban areas within 800 meters of walking distance are not used (Eğercioğlu and Yalçiner 2013).

4.1.3. Study Sites as the Metro Stations Surroundings

In the first stage, the typological classification of the entrance/exit points of Izmir metro stations and the intersection areas with the city was made to select the study sites. When looking at the station entrances in İzmir, it is seen that it has two typologies: those coming out to the square and the roadside. Most of the stations are open to the roadside. There are six stations opening to the square: Evka-3, Bornova, Basmane, Konak, Göztepe, and Fahrettin Altay (Figure 4.4.). The other 11 stations open to the roadside. Bölge, Sanayi, Stadyum, Halkapınar, and Hilal stations, which are connected to the roadside, are on the viaduct and pedestrian access is realized by stairs, escalators, or elevators to the road level (Figure 4.5.). Çankaya, Üçyol, İzmirspor, Hatay, Göztepe, and Poligon station entrances are located on the sidewalk (Figure 4.6.).

| | | |
|---|--|---|
|  |  |  |
| Figure 4. 4. Konak metro entrances | Figure 4. 5. Bölge metro entrances | Figure 4. 6. Poligon metro entrances |

Squares are public spaces where regular or accidental social encounters take place and various actions take place. In line with the purpose of this study, Evka-3, Konak, and Fahrettin Altay stations were chosen as the study area (Figure 4.7.) among the stations opening to the square.

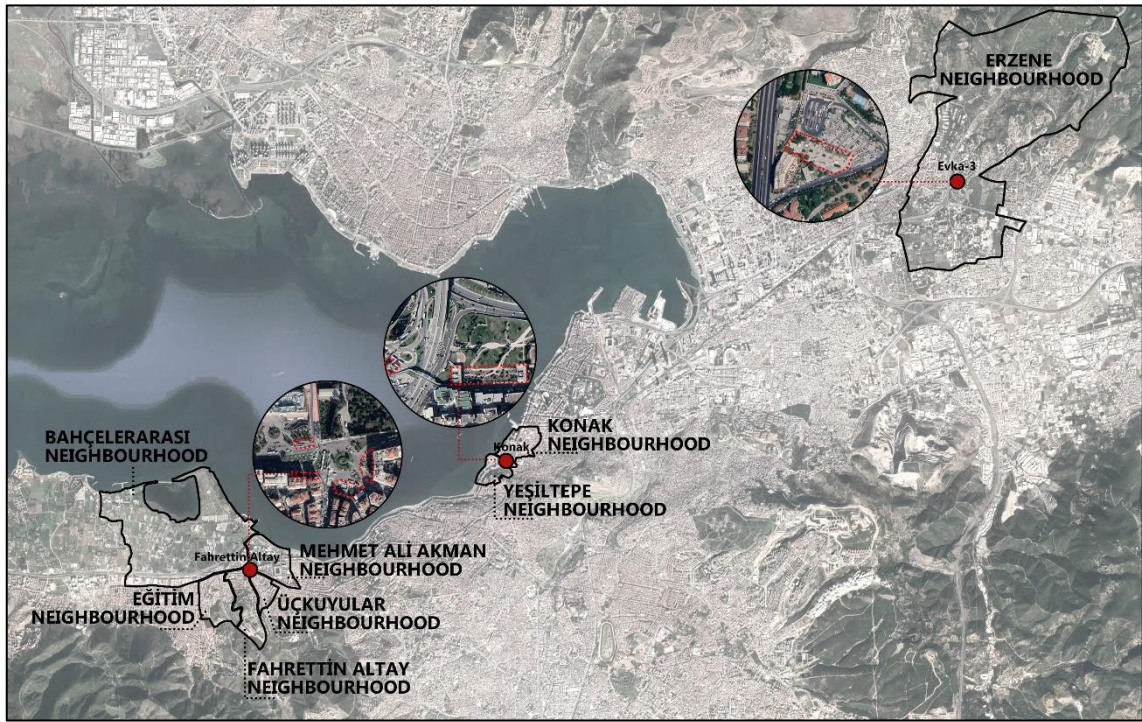


Figure 4. 7. Location of selected 3 metro stations and boundaries of their located neighbourhoods

Evka-3 is the first station of the metro route. It is an area that is close to the center of Bornova has a close relationship with the residential fabric and is surrounded by the university campus and lodgings. It is in a location that is easily accessible to the student group. Istanbul Street, where intercity travel is made, forms the border and the green axis continues along this road. To the north of the area where the metro is located, there is the Eshot transfer center and parking area. To the south, there is a commercial area with cafes, a gym, and a market (Figure 4.8.).



Figure 4. 8. Land use analysis around the Evka-3 metro station (Created by the author)

There are only landscaping, passive green areas, and metro elements in the area (Figure 4.9.).



Figure 4.9. Evka-3 metro station area

Konak, which is a social, commercial, and administrative center, is an area where all transportation modes intersect, where different social groups intersect, where commercial uses are intense, and activities are carried out.

Konak has many different types of land use around the metro. There are many administrative buildings, commercial areas, Kemeraltı trade region, social and cultural areas, and health areas around it. There is an Eshot transfer center, Eshot stops, tram stop, bicycle and walking paths, bicycle parking spaces, multi-storey parking lot, and 3 open parking lots. There is a green area arranged around the Konak metro. This area is close to the sea, the pier, Kemeraltı, historical buildings, and historical and touristic spots such as the Clock Tower (Figure 4.10.).

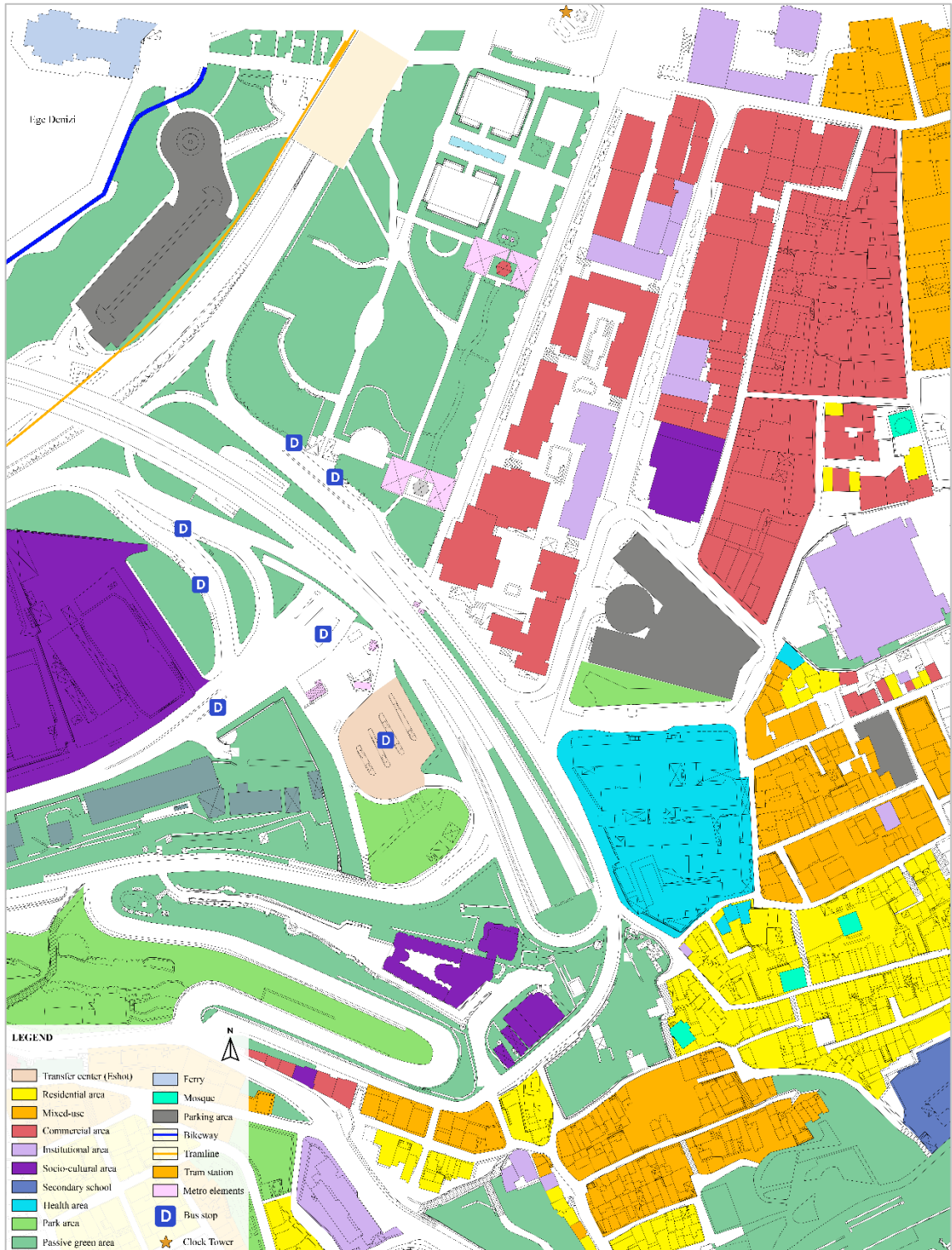


Figure 4. 10. Land use analysis around the Konak metro station (Created by the author)

In this area, there are green areas, covered subway entrances, pedestrian crossings, shaded seating areas, landscaping, planting, sitting areas, and benches.



Figure 4.11. Konak metro station area

Fahrettin Altay has mixed-use land use where residential and commercial are intense (Figure 4. 13.). There are 5 metro entrances. Within the scope of the study, the square around each entrance was handled separately. To the north of the area is the İstinye Park shopping mall, which was opened in 2021. With the construction of this area, changes such as green space arrangements in front of the shopping center, change of location in the transfer center, new road arrangements, new tram stop, and pedestrian crossing roads arrangement took place. In this area, there are green area arrangements, shaded seating, and benches (Figure 4. 12.).

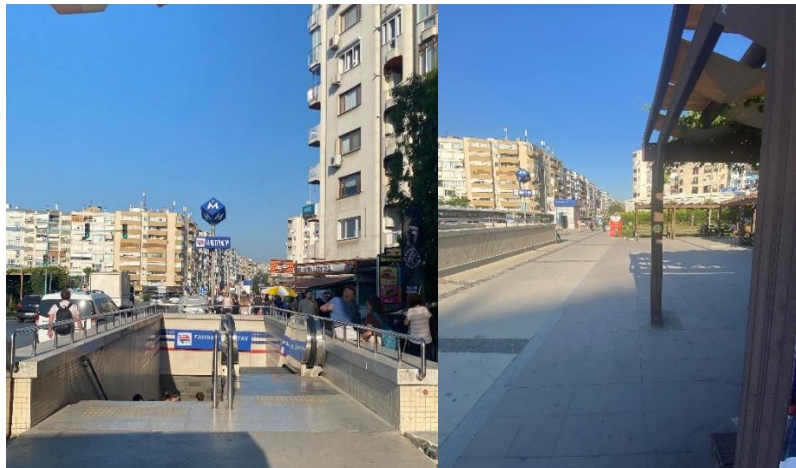


Figure 4. 12. Fahrettin Altay metro station area

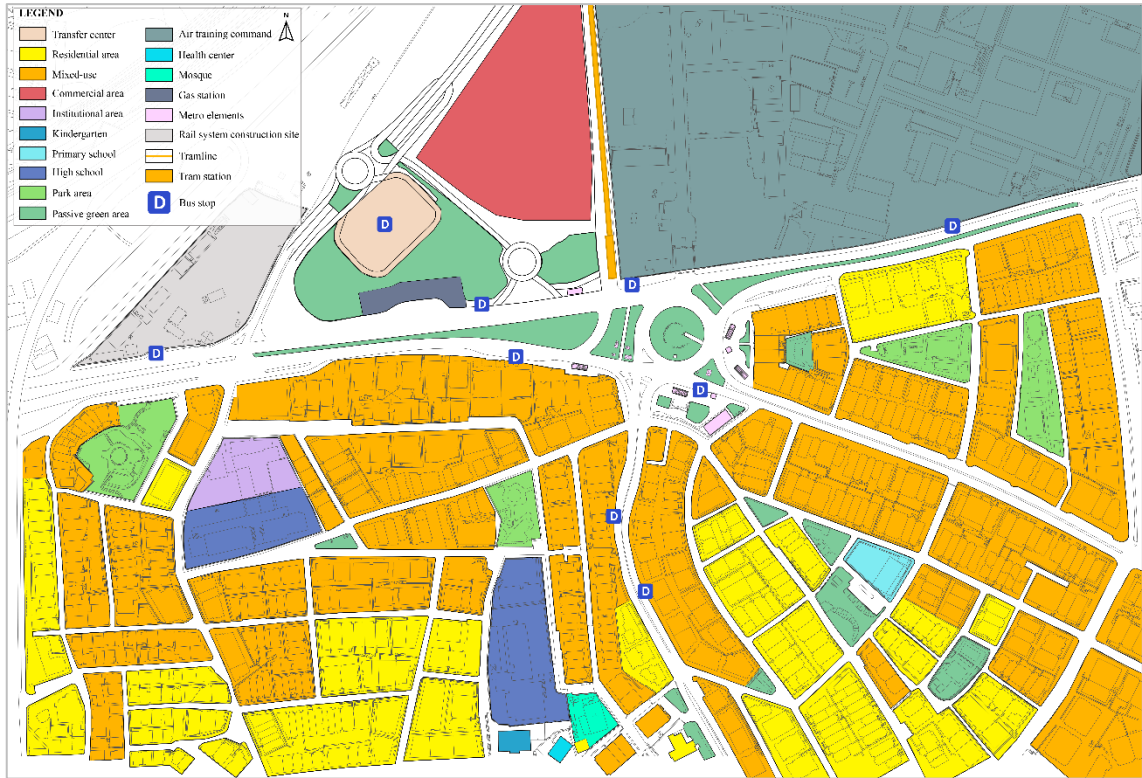


Figure 4. 13. Land use analysis around the Fahrettin Altay metro station (Created by the author)

4.2. Research Methodology

The subject of this study is the examination of metro station surroundings as public spaces. Selected metro stations in İzmir were determined as the research areas of the study. The study aims to answer the questions of what social and physical factors affect the use of İzmir metro stations as public spaces and how they affect them. The study's methodology consists of evaluating the change in user perceptions in İzmir metro stations in the light of public space literature. In this context, the literature on public space, transportation, and metro stations has been examined. In the context of urban design in the literature, studies on metro station surroundings have been examined.

In this study, more than one method was used together. Observation, survey, descriptive analysis methods, correlation, and regression analyzes were performed in the study. The steps followed are described below.

Selection of metro stations

In this study, metro stations are considered public spaces. The literature on the factors affecting the use of public space has been reviewed. These factors are social and physical factors. Afterward, research was carried out on the history, development, and stops of the Izmir metro line. Preliminary fieldwork was conducted for two weeks at all İzmir metro stations for site selection. As a result of the research, the metro stops were grouped within themselves. As a result of the preliminary field study, two different typologies were determined in the metro station surroundings. The first of these is the metro stations that lead to areas such as roadside and pavement. The second group consists of metro station stops opening to wide squares. Since the subject of the study is the use of metro stations as public spaces, the following three stations were chosen among İzmir metro stops: Fahrettin Altay metro station, Evka-3 metro station, and Konak metro station.

Observation, survey, descriptive analysis methods, correlation, and regression analyzes were carried out together as a method in this study.

Observation

The literature on the factors affecting the use of public space has been reviewed. An observation table was created from these factors. Observation studies were carried out in the metro surroundings based on the physical factors in this table.

Survey

After the observation, a survey was conducted around Evka-3, Konak, and Fahrettin Altay metro stations. In the literature, individual factors, and social and physical factors affecting the use of public space were examined. These factors are safety, comfort, aesthetics, accessibility, and land use. Questionnaires were formed based on the variables affecting these factors. The survey questions were arranged as multiple-choice and fill-in-the-blank. In addition, the participants were asked to score according to the "Insufficient - Partially - Sufficient" scale in order to measure the adequacy of the physical items. In the total of questionnaire, 22 questions were asked to the participants. The survey was conducted face-to-face with the participants. This study was conducted with a total of 300 participants. 100 participants were interviewed at each of the three different stations designated as the study area. In this study, attention was paid to the balanced

distribution of gender and age groups. An equal number of male and female users were interviewed. In June, the survey was tested out on-site at three metro stations. The survey questions were revised according to the test study. Fieldwork was carried out in July. The survey was conducted 3 days a week (Monday, Tuesday, Thursday) and on weekends (Sunday). Studies were carried out in these areas twice a day, in the afternoon and evening. Participants were asked about their individual characteristics such as age, income, education, occupation, vehicle, and bicycle ownership. Questions were asked about the effect of safety, comfort, aesthetics, accessibility, and land use factors obtained from the literature on user perceptions. After the results of this survey, the analysis phase was started.

Descriptive Analysis

The individual characteristics of the participants were examined with descriptive analysis. With this analysis, a data set was obtained about the individual characteristics of the participants, such as age, income, education, occupation, vehicle, and bicycle ownership.

Correlation Analysis

A coding system was developed for each question after the survey was completed. According to this system, the answers of 300 participants were coded one by one. Correlation analysis was performed with each variable in SPSS Statistics 20 program.

Regression Analysis

Among all variables, two dependent variables were determined, namely length of stay and frequency of use. The independent variables are individual, social, and physical factors. The effect of independent variables on the dependent variable was examined by regression analysis.

CHAPTER 5

RESULTS

This chapter examines the public spaces in the case of Evka-3, Konak, and Fahrettin Altay metro stations surrounding. It includes site observations, individual characteristics of the respondents, and factors affecting the use of public spaces in the case of metro station surrounding.

5.1. Site Observation

For site observations, firstly, the usages of the vicinity of the metro were mapped and the metro entrances were numbered to facilitate the analysis of physical characteristics. Afterwards, site observations were carried out on weekdays and weekends, as well as during the day (12:00-15:00) and at night (18:00-21:00).

Social and physical factors obtained from the literature were tabulated for observation study (Table 5.1.).

Table 5.1. The observation about physical elements on 3 study sites

| Physical Elements | Evka-3 | Konak | | Fahrettin Altay | | | |
|---------------------|-----------------|-----------------|---------------|-----------------|-----------------|---------------|---------------|
| | Entrance no 1-2 | Entrance no 1-2 | Entrance no 3 | Entrance no 1 | Entrance no 2-3 | Entrance no 4 | Entrance no 5 |
| Seating units | + | + | - | - | + | + | - |
| Shaded seating area | - | + | - | - | - | + | - |
| Lighting | + | + | + | + | + | + | - |
| Park/Green area | + | + | - | + | - | - | - |
| Walking path | + | + | - | - | - | - | - |
| Bikeway | - | + | - | - | - | - | - |
| Bike parking | + | + | + | - | + | - | - |
| Car parking | + | + | - | - | - | - | - |
| Garbage container | + | - | + | - | + | - | - |
| Rubbish bin | + | + | + | - | + | + | - |
| Pedestrian crossing | - | + | - | + | + | + | + |
| Wide sidewalks | + | + | - | + | + | + | - |
| Security personnel | + | - | + | + | - | + | - |
| Security cameras | + | + | + | + | + | + | + |
| Public restroom | + | - | + | - | - | + | - |

In addition, during the observation study, information about the social structure, densities, and users of the metro environments was obtained. Observation studies were carried out around Evka-3, Konak, and Fahrettin Altay metro stations. The field observations obtained for the three stops as a result of the observation are given below:

Fahrettin Altay metro station

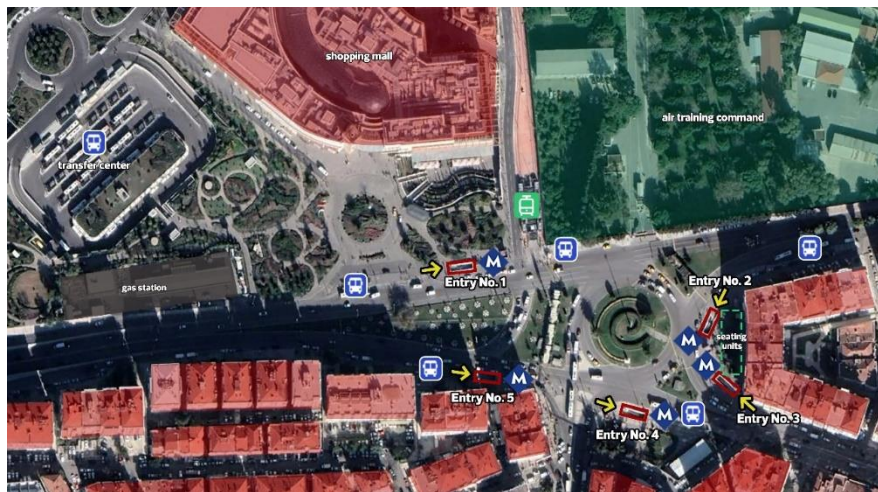


Figure 5.1. Fahrettin Altay station surrounding

Fahrettin Altay metro station is the last stop of the İzmir metro line as of 2022. Another stop is Evka-3 metro station. Fahrettin Altay station has 4 different entrance and exit points.

At metro entrance point 1, the metro entrance walls are higher than the other three entrance points. There is also more green space around this point. However, there is garbage around. Trash cans are not enough. This results in a neglected and unclean appearance. There are no sitting places right next to the entrance point. This lack of seating causes some people to use lighting elements as seating units. Since the seating units with green areas, which have been landscaped, belong to İstinye Park Shopping Center, they do not have public use. There are security cameras that see this point. There is also an elevator and a card-filling point next to this exit point. In terms of access to other transportation points, there are ESHOT stops, and taxi stands within walking distance. This creates a constantly waiting crowd around the exit point. It is an area constantly alive with the presence of the shopping mall and is a transfer point for other types of transportation. Therefore, the deficiencies of elements such as trash cans and seating units are felt more.

Metro entrance point 2-3 has the most waste collection and garbage bins among the Fahrettin Altay metro station entrances. Although this area is neglected, there is a limited green area. In terms of seating areas, there is a seating group consisting of 4 single benches and five benches in the middle area. However, there is no protective element for these seating areas to protect them from the sun or outdoor conditions. Sitting groups are not protected by elements such as visors and sunshades. This makes the seating units unusable in extreme weather conditions. It was observed that the negative effects of hot weather in the summer months, when this observation study was conducted, hindered the use of seating units. In terms of transportation, a bus transfer is made right in front of this exit. There is also a parking lot for 7 bicycles for bicycle transportation. There is also an elevator in this area. Area 2 and 3 has restaurants and 1 grocery store. Therefore, we can talk about a noisy environment caused by restaurants and traffic noises.

Entrance 4 is the area with the most positive physical environmental characteristics around Fahrettin Altay metro station. There is also an elevator in this area and there is a bicycle parking lot for bicycle transportation. There are seating areas and additionally a few benches. These seating units have a green cover coat. There are clean green areas that have been landscaped according to other entrances in this area.

The area is always crowded as there is a taxi and ESHOT station right next to entrance number 5. With its narrow subway exit, it condenses the crowd and makes walking difficult. The high number of people using the area and the density of cafes around create a great noise. There is no elevator and seating in area 4. In addition to these, a negative impression was observed in terms of environmental cleanliness.

Konak metro station



Figure 5.2. Konak station surrounding

Entrance number 3

This stop opens to the departure and arrival area of Eshot buses. Therefore, it has extensive use. Right next to this exit, there is a fixed buffet that is usually open. Food and drinking products can be purchased here. It is seen that the users meet their various needs between the metro station and bus stops from the buffet here. In addition, there are toilet cabins open to public use in this area, which can be used for a low fee. It is seen that cleaning works are carried out frequently by municipal officials around this metro station, which is heavily used.

Entrance number 2

Right next to entrance 2, there is a bicycle parking area reserved for BISIM. Again, there are seating areas in the form of four benches. Following this entrance, there is a walking path extending towards ESHOT bus stops. However, it was observed that the

use of seating units in this area was less. This area usually has users from various profiles waiting. There is a heavy flow on this road that reaches the Eshot stop. However, it is seen that the highest density is on the walking path that reaches the Konak İskele, Tram line and Eshot bus stops. Since the circulation rate of the users in this area is high, the number of people waiting along the road is very low.

Right next to entrance 2, there are garbage bags instead of trash cans. There are security cameras that see the area. Users reach Kemeraltı historical shopping bazaar with this exit. In addition, there is a shopping center, kiosks, various shops, and banks across the metro exit. It was observed that night and evening usage decreased as these shopping areas were closed after a certain time. It is used continuously with the seating elements placed along the road where entrance 1 opens. However, it was observed that these benches remained in the dark due to the lack of lighting during night use.

Entrance number 1

There is a square to the right of this entrance. During night observations, it was observed that this square was generally empty. There is also a buffet that is open at night. However, it is not intense due to the number of users falling in night use. Again, as in other Konak metro entrances, cleaning activities are carried out by the cleaning staff of the municipality during the day and at night. From this exit, there is a view of the Konak Square Clock Tower. It is seen that users often take photos in this area. There are small sales stands from this entrance to the pier. Examples of these are peddlers selling pickles and corn. Again on this road, vendors are selling various clothing materials by laying a blanket on the ground. This road is heavily used because of is the route to the Eshot bus stops. The woodland and concrete square, which we come across as we walk along this road, remain quite dark at night. It was observed that one lighting element placed in this area was insufficient to illuminate the road and the square. It was observed that the users did not use the concrete seating unit frequently where the metro exit was opened. There is a small pool in the middle of the square here. There is also a promotional installation for the city of Izmir in this area. Although this area was still in dim darkness, it was observed that users were sitting chatting, and consuming their drinks. The use of the covered area next to the tram stop is quite high. Again, around the Clock Tower, it appears as a usage area where users sit, chat, and consume their food and drinks. There are also various peddlers in the Clock Tower square.

Evka-3 metro station

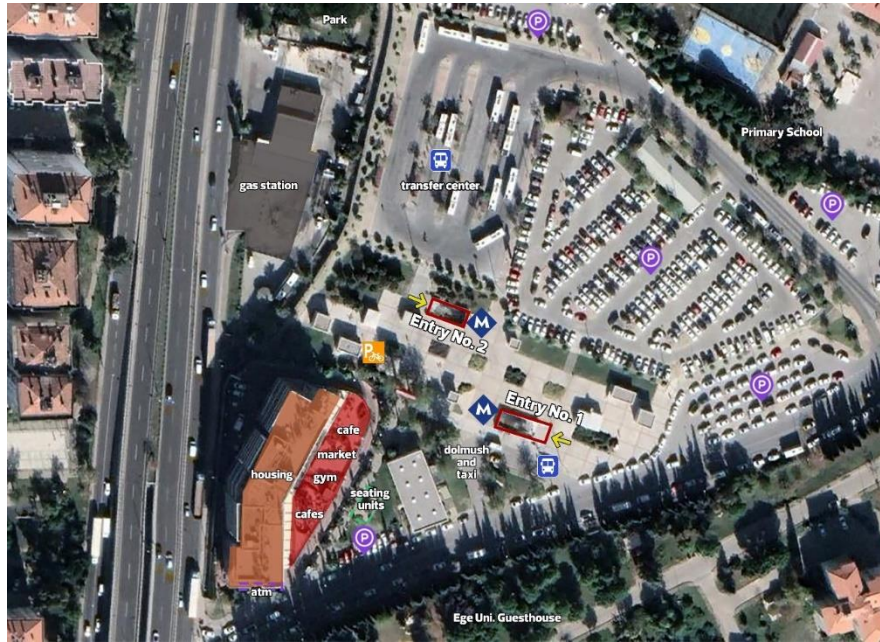


Figure 5.3. Evka-3 station surrounding

Evka-3 metro station is one of the two extreme stops of the İzmir metro line as of 2022. Another end stop is the Fahrettin Altay metro station. Evka-3 station has 2 different entrance points. While one of these exits opens to the road, the other one opens to the waiting area where Eshot bus stops are located.

There is a fixed seller selling bagels right next to the exit where the number 2 Eshot bus stops. This vendor's small kiosk is instantly recognizable in an environment with low night lighting. There is no seating in this area. That's why it was observed that people usually stand, spend time, or sit on the wall. The elements in the bicycle parking lot are also used as seating, apart from their actual use. There are people sitting on the floor right at the metro entrance. This situation shows the lack of seating units at the Evka-3 metro station stop. There are taxi stands and Eshot bus stops nearby for other transportation possibilities. In addition, there is a parking lot reserved for private bikes, not Bisim bikes. However, due to insufficient lighting, this entrance remains quite dark.

While walking from entrance 2 to 1, there are shopping places such as a market, coffee shop, and sports center, restaurants. There are more elements in terms of lighting in this intermediate passage where the market is located, compared to the entrances. However, there is still a dark impression. Again, on this passageway, there are benches with a limited green area. The seating elements in this area are actively used. This area is heavily used around the Evka-3 metro station. The lack of seating at Evka-3 metro station creates a standing crowd. People in this area often chat or consume the food and drink they buy. In general, no garbage pollution was observed in metro circles. In the morning and evening observations made in this field, the lack of seating units was constantly observed. However, the lack of lighting elements draws attention in night observations. It was observed that the areas around the Evka-3 metro station where you spend time in the evening and at night are the areas with rare lighting in the region.

5.2. Individual Characteristics of the Survey Respondents

Table 5.2. below shows the data collected regarding the descriptive findings regarding the demographic and individual characteristics of the respondents.

Table 5. 2. Summary Table About Respondent's Socio-demographic Profile

| Variables | Components | Frequency (N=300) | Percentage (%) |
|------------------|------------------------|------------------------------|-----------------------|
| Age | 17-29 | 96 | 32 |
| | 30-54 | 151 | 50.33 |
| | 55+ | 53 | 17.67 |
| Gender | Male | 50 | 50 |
| | Female | 50 | 50 |
| Education | No | 3 | 1 |
| | Primary school | 2 | 0.67 |
| | Secondary school | 12 | 4 |
| | High school | 99 | 33 |
| | College | 18 | 6 |
| | University | 136 | 45.33 |
| Income | Graduate | 30 | 10 |
| | Below the minimum wage | 94 | 31.33 |
| | Minimum wage | 68 | 22.67 |

(cont. on next page)

Table 5.2. (cont.)

| | | | |
|-----------------|-------------------|-----|-------|
| Income | Minimum wage x 2 | 94 | 31.33 |
| | Minimum wage x 3 | 38 | 12.67 |
| | Minimum wage x 4+ | 6 | 2 |
| Occupation | Student | 51 | 17 |
| | Housewife | 21 | 7 |
| | Retired | 35 | 11.67 |
| | Unemployed | 21 | 7 |
| | Employee | 44 | 14.67 |
| | Civil servant | 41 | 13.67 |
| | Self-employment | 55 | 18.33 |
| | White collar | 32 | 10.67 |
| Car ownership | No | 217 | 72.33 |
| | Yes | 83 | 27.67 |
| Bike ownership | No | 233 | 77.67 |
| | Yes | 67 | 22.33 |
| Group of usage | Alone | 87 | 29 |
| | Friends | 100 | 33.33 |
| | Colleagues | 11 | 3.67 |
| | Wife | 38 | 12.67 |
| | Child | 22 | 7.33 |
| | Relative | 9 | 3 |
| Length of usage | No | 136 | 45.33 |
| | 0-10 min | 23 | 7.67 |
| | 10-20 min | 31 | 10.33 |
| | 20-30 min | 33 | 11 |
| | more than 30 min | 77 | 25.67 |

Age

Considering the age distribution of the participants, according to the general whole station survey data, 96 people are between the ages of 17-29, 151 people are in the range of 30-54, and 53 people are between the ages of 55 and over (Figure 5. 4.). Looking at the distribution of men and women among age groups, it is seen that women with a rate of 23% and men with a rate of 27% are between the ages of 30-54 (Figure 5. 5.).

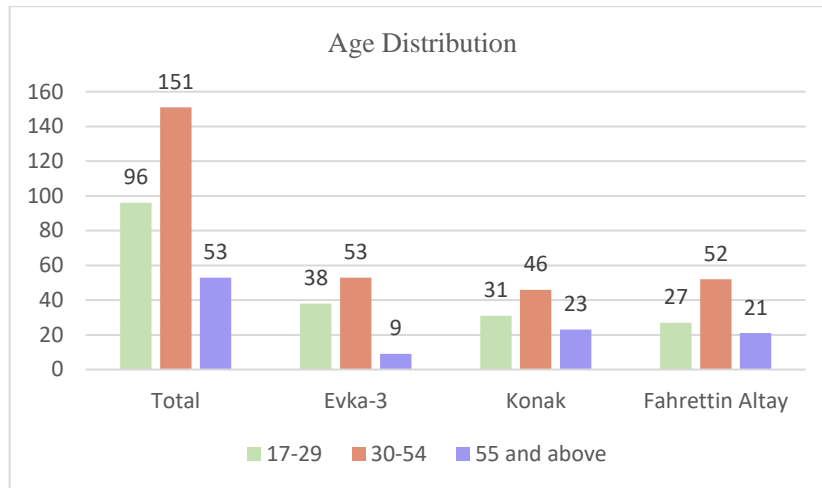


Figure 5. 4. Age distribution of participants according to each station and total

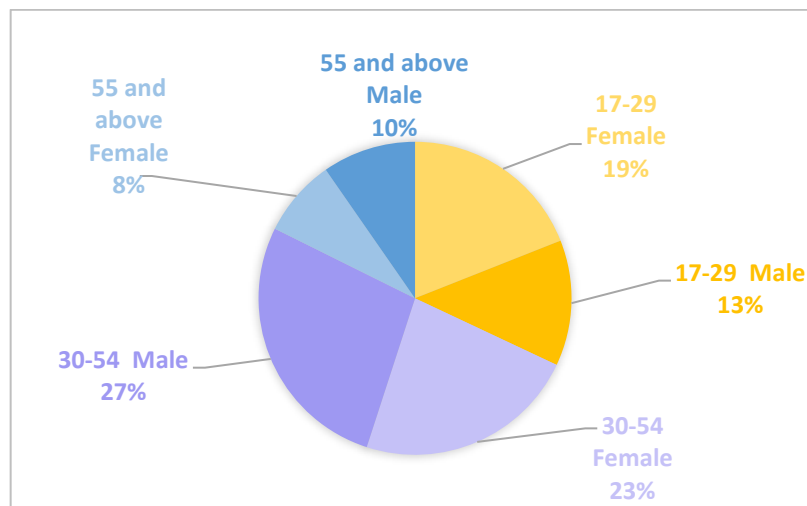


Figure 5. 5. Gender of total participants by age distribution

Education Level

Considering the educational status of the participants, it is seen that most of them are university graduates at each station (Figure 5. 6.). Among university graduates, the highest number of female participants is from Evka-3 station, and the highest number of male participants is from Fahrettin Altay station (Figure 5.7.).

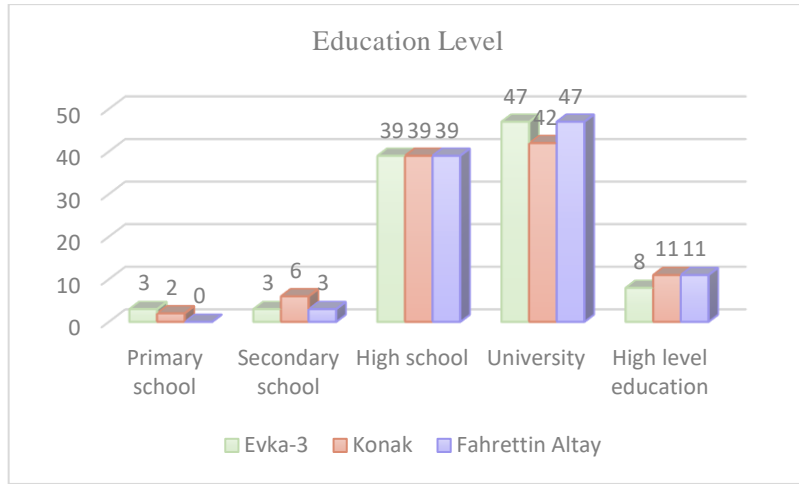


Figure 5. 6. Education level distribution by stations

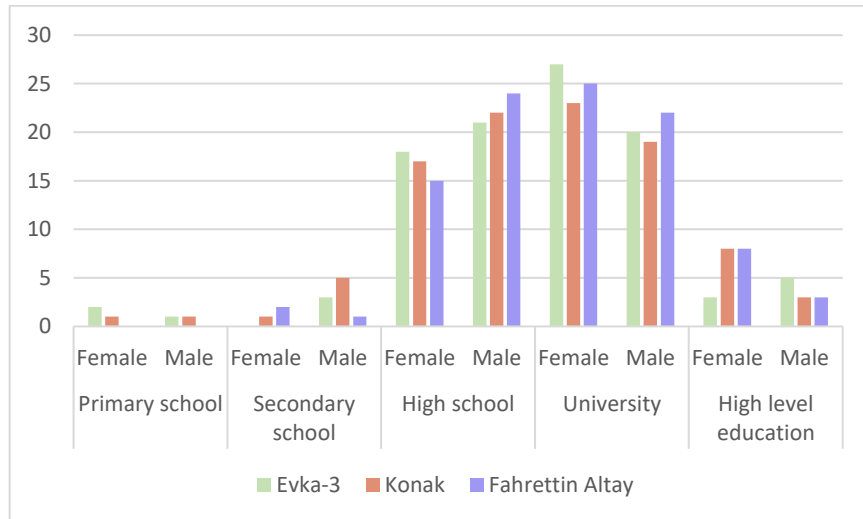


Figure 5. 7. Distribution of male and female participants by education level

Income Level

According to the income status results, it is observed that the highest rate is below the minimum wage in Evka-3 and Konak, and between the minimum wage and double in Fahrettin Altay (Figure 5.8., Figure 5.9.).

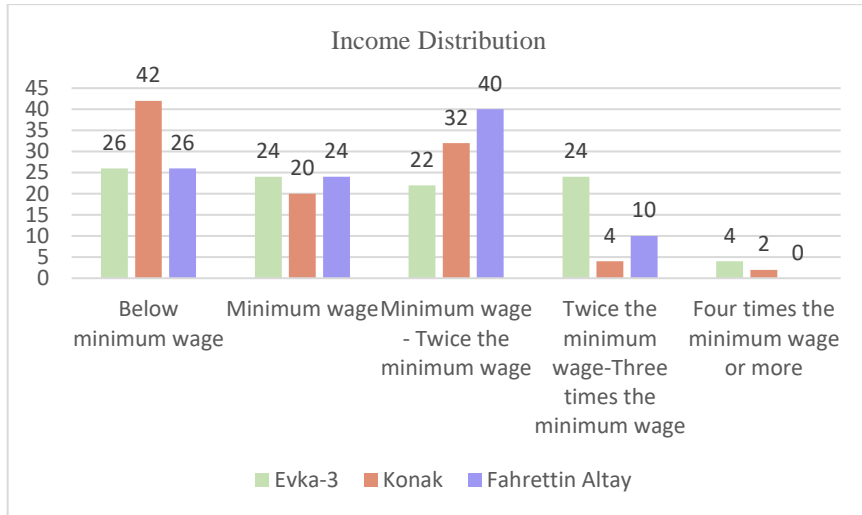


Figure 5. 8. Income distribution

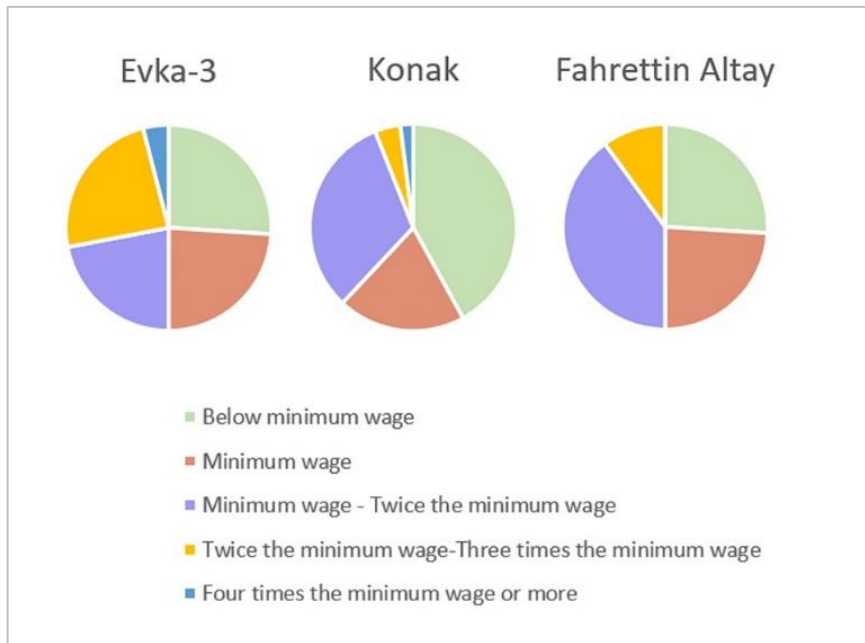


Figure 5. 9. Income distribution by stations

It is seen that the working participants are mostly among the Evka-3 participants (Figure 5.10.). The group with the highest share among the participants who do not work is the students in Evka-3, the retired group in the Konak and Fahrettin Altay (Figure 5.11).

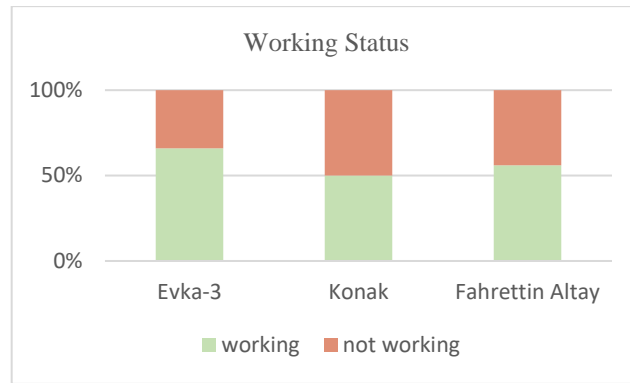


Figure 5. 10. Working status of participants by stations

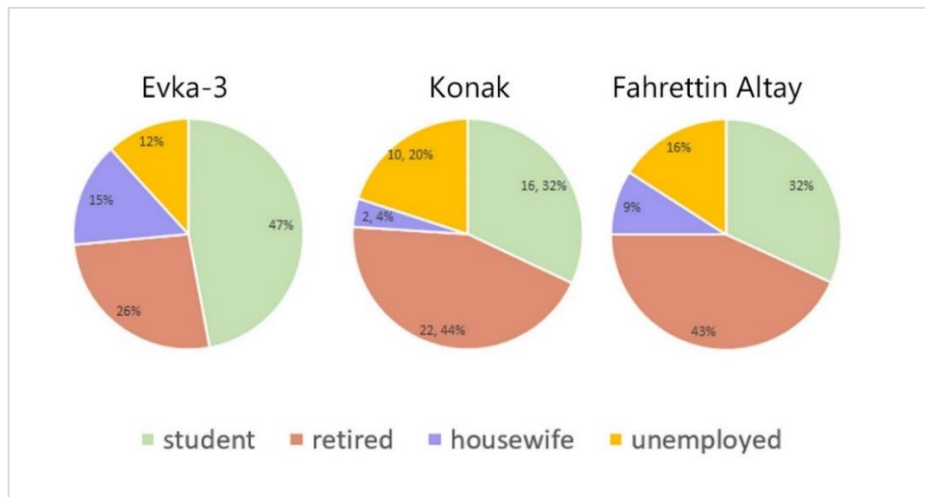


Figure 5. 11. Distribution of non-working participants by stations

5.3. Relationship between Public Space Usage and Respondents

The Respondents' Use of Public Space

It is seen that the shopping areas in Konak are the most used places in the use of the area around the metro by the survey participants. Konak is used more than other areas in terms of commercial areas, recreational areas, and parks. Commercial areas are used a lot in Evka-3, and both shopping areas and commercial areas are used a lot in Fahrettin Altay (Figure 5. 12.).

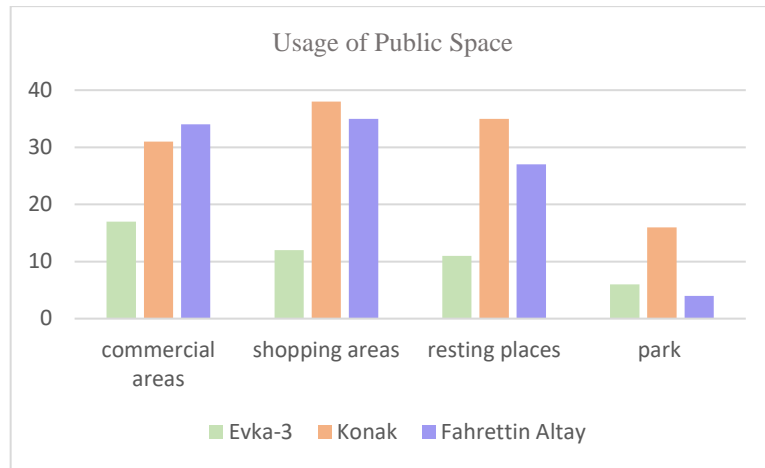


Figure 5. 12. The respondents' usage of public spaces

Number of People Using Public Space

The respondents were asked whether they use the public space around the metro, and mostly the participants in Konak answered that they use it. The use of the metro area was observed at least in Evka-3 (Figure 5. 13.).

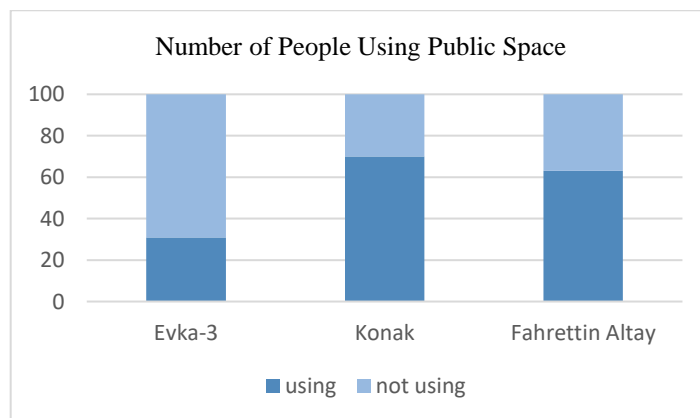


Figure 5. 13. The number of people who spend time in the public space

Usage Time of Public Space

Among the respondents, those who said that they use public space were asked how long they spent in this space. 43 participants answered that they spend more than

half an hour in Konak. The mansion is seen as the place where more participants stay in the area for more than half an hour than in other areas. Evka-3 is seen as the area where the least number of people stay in the area for a long time. Among the answers given for the use of this area, it is the use of 20-30 minutes with the highest number of participants (Figure 5. 14.).

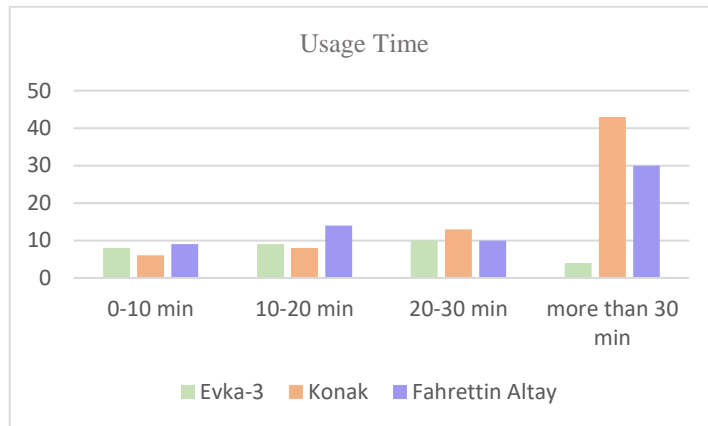


Figure 5. 14. Space usage time of the participants

Time for Using Public Space

Evka-3 is an area that is more used during working hours, especially in the morning, among other areas. Konak and Fahrettin Altay are areas that are used intensively at any time of the day, even outside working hours (Figure 5. 15.).

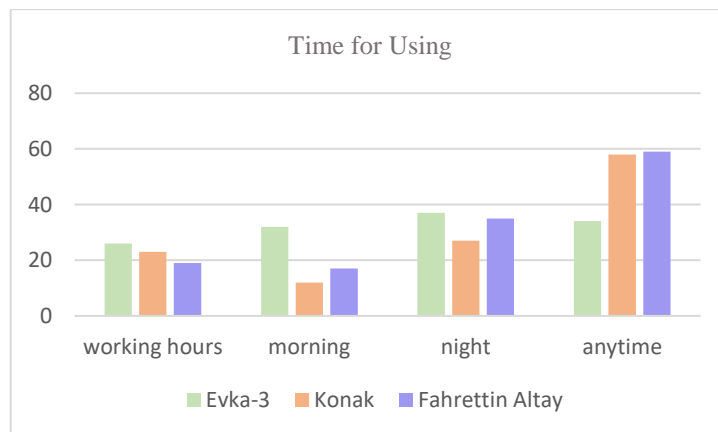


Figure 5. 15. Time for using of public spaces of respondents

Respondents' Metro Usage Purpose

The use of Konak and Fahrettin Altay for social purposes is quite high compared to Evka-3. All three areas seem close to each other for work purposes. It is seen that public space users in Konak are mostly used by those who come to this region for work purposes after those who use it for social purposes. It is seen that the usage for shopping and entertainment purposes is more in Konak (Figure 5. 16.).

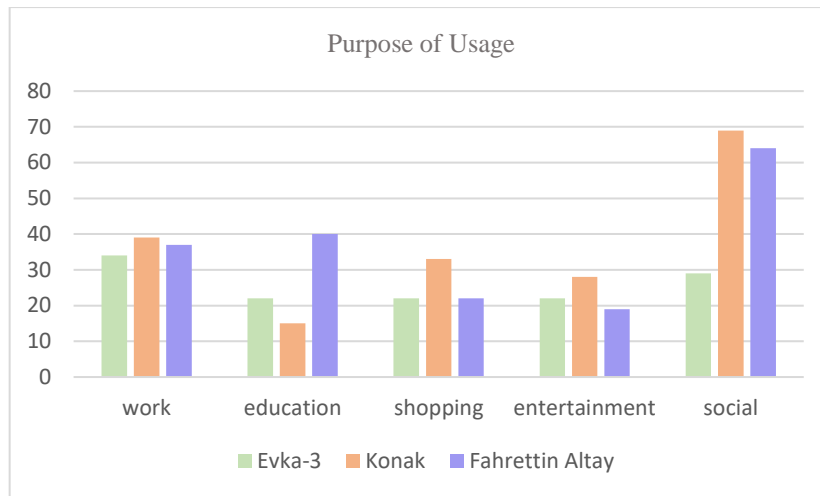


Figure 5. 16. The general purpose of the respondents to use these areas

5.4. Factors Affecting Usage of Metro Station Surroundings

5.4.1. Safety Perception

Respondents were asked if they felt safe in using public spaces. In general, the number of those who felt safe in all three areas was higher. According to the answers given, it was seen that the number of men who felt safe was higher than women in all three areas (Figure 5. 17.).

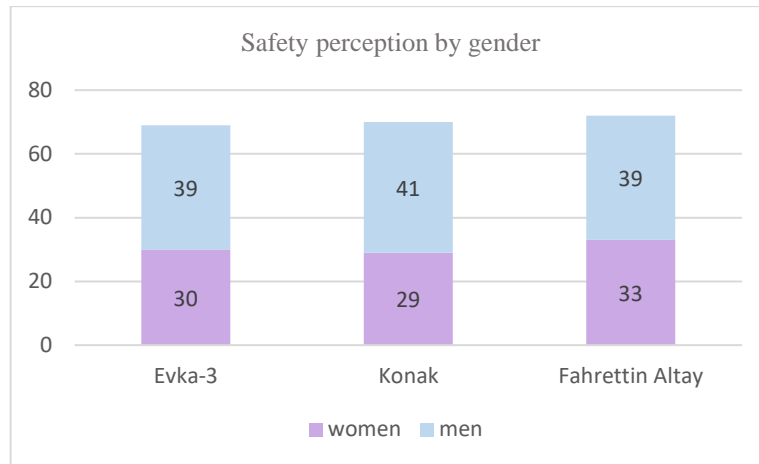


Figure 5. 17. Distribution of those who feel safe by gender

When we look at the age distribution of women who feel secure, it is seen that higher rate between 30-54 years old in Evka-3 and Fahrettin Altay, and between 17-29 years old in Konak. Fahrettin Altay has the highest number of women aged 55 and over who feel safe (Figure 5. 18.).

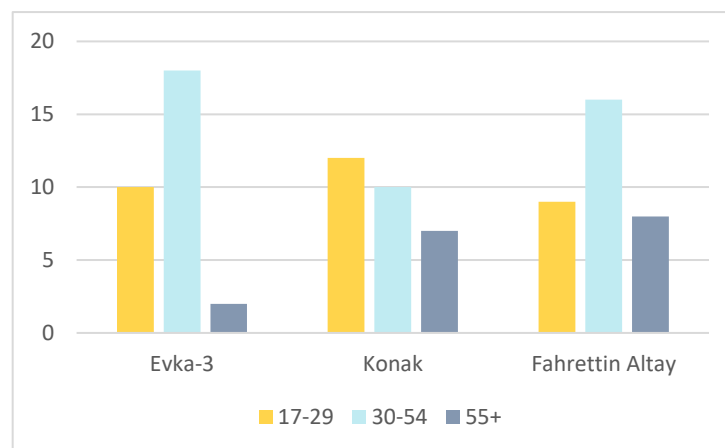


Figure 5. 18. Distribution of women who feel safe by age

It is seen that men who feel safe are mostly in the 30-54 age range in all three areas. It was observed that the young people aged 17-29 said that more respondents in Evka-3 said they felt safe (Figure 5. 19.).

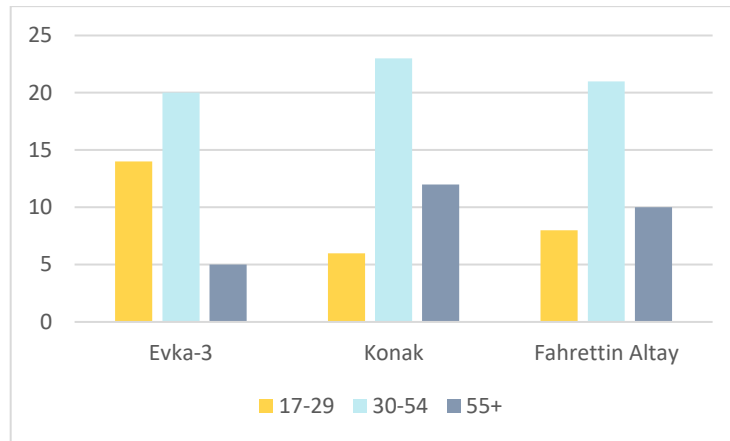


Figure 5. 19. Distribution of men who feel safe by age

When we look at the reasons that make the participants feel safe; it is a central area for Konak that received the most response from both women and men. This is followed by the presence of commercial activities in the surrounding area. It is seen that the answer to the fact that the presence of a security camera makes women feel safe is mostly found in Evka-3 and it is expressed more than men. Since there is a visible open area in Evka-3, men gave the answer more I feel safe. The opposite was observed in Konak as well, women mostly gave this answer (Figure 5. 20.).

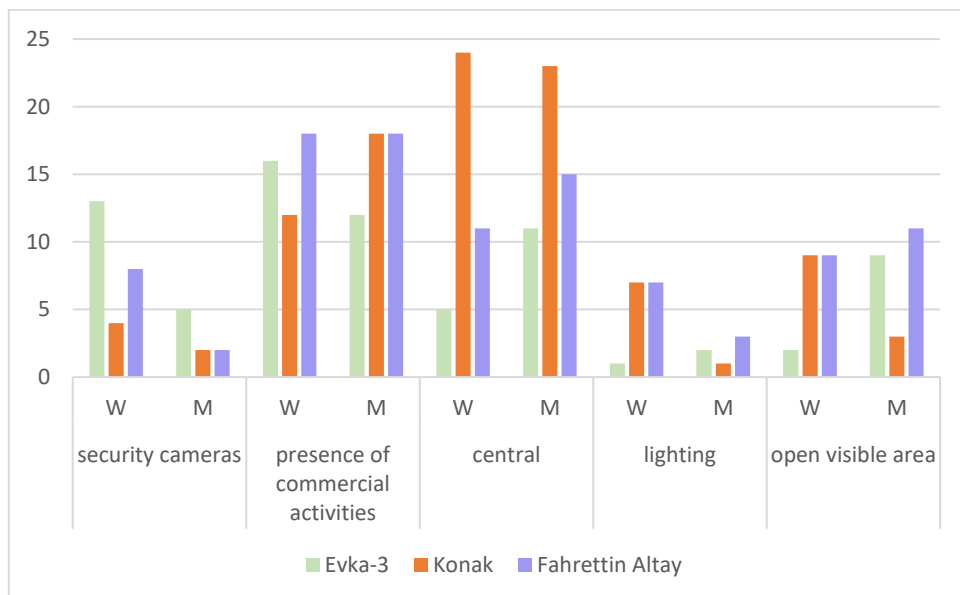


Figure 5. 20. Reasons why participants feel safe

Among the respondents, it is seen that women feel more unsafe (Figure 5. 21.).

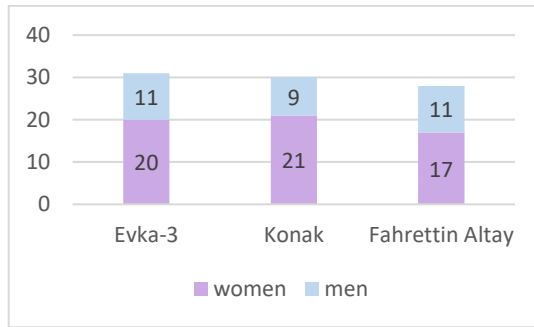


Figure 5. 21. Distribution of those who do not feel safe by gender

Among the women who feel unsafe, it is seen that the young people between 17-29 feel unsafe the most in Evka-3, the young people and middle age group between 17-54 in Konak, and the middle age group of 30-54 in Fahrettin Altay (Figure 5. 22.).

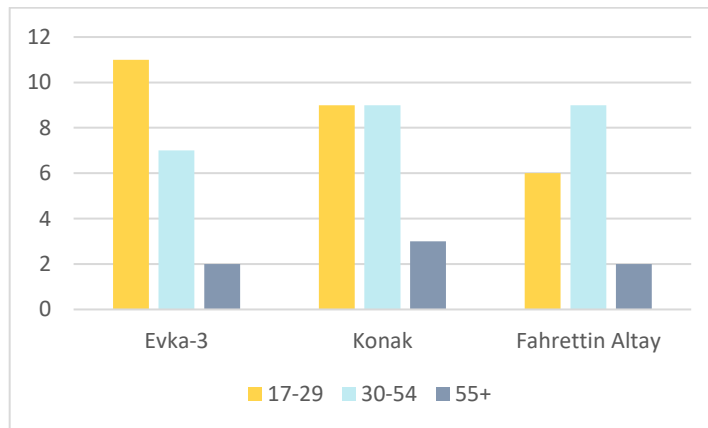


Figure 5. 22. Distribution of women who do not feel safe by age

When the age distribution of men who feel unsafe is examined, it is seen that 55 and above are very few. The area where middle-aged men feel insecure is seen as Evka-3 (Figure 5. 23.).

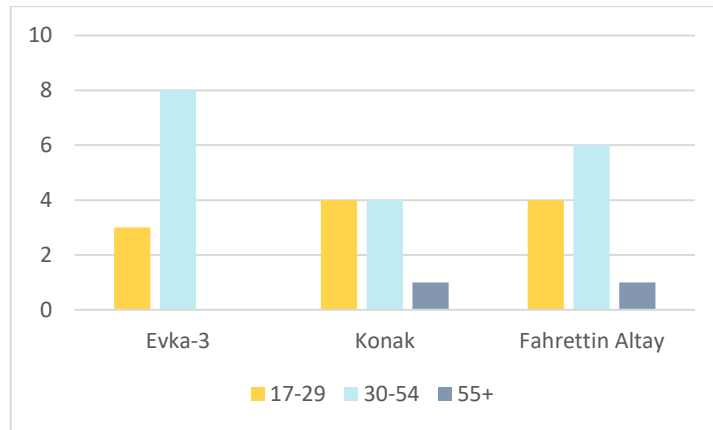


Figure 5. 23. Distribution of men who do not feel safe by age

One of the most important reasons that made women feel unsafe when using these areas was the crowd. And it was seen that the respondents mostly gave this answer in Fahrettin Altay. Among the reasons for the men feeling unsafe, they answered that they felt unsafe due to the crowd and followed by the absence of a security camera in Evka-3. It is seen that women in Konak and Evka-3 feel unsafe especially at night due to insufficient lighting and few people (Figure 5. 24.).

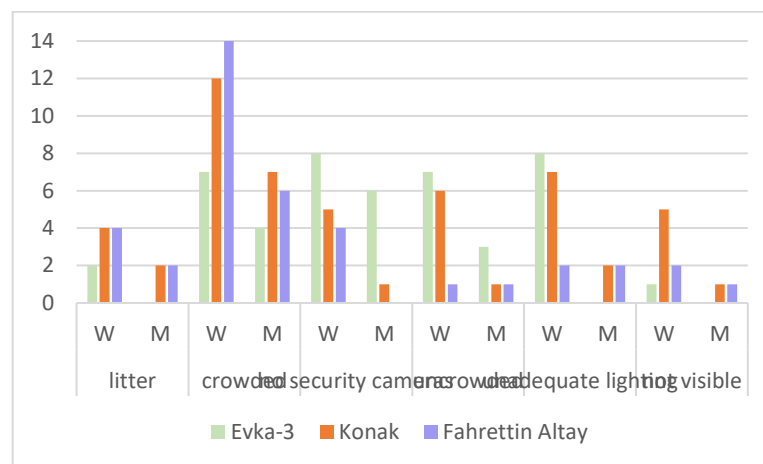


Figure 5. 24. Reasons why participants did not feel safe

5.4.2. Comfort

Among the three areas, it is seen that Konak has the highest number of participants who answered yes to the question "Do you feel comfortable in this area?" (Figure 5. 25.).

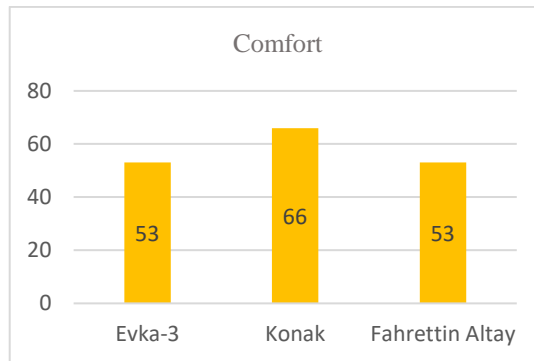


Figure 5. 25. Number of people feeling comfortable

5.4.3. Attractiveness

Among the three areas, it is seen that Konak has the highest number of participants who answered yes to the question "Do you like the physical environment?" (Figure 5. 26.).

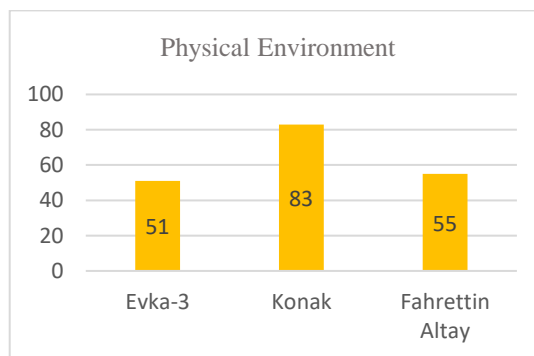


Figure 5. 26. Number of people satisfied with the physical environment

5.4.4. Improvements

Among the answers given by the participants to what they want to improve or add, are the shaded areas and more resting places. In Evka-3, buffets, green areas, resting places, benches, shaded areas, cultural activities, more shopping places, and bicycle parking spaces were requested the most. It was stated that there was a lack of guidance and information in Konak. The demands for cleaning and maintenance are mostly in Fahrettin Altay (Figure 5. 27.).

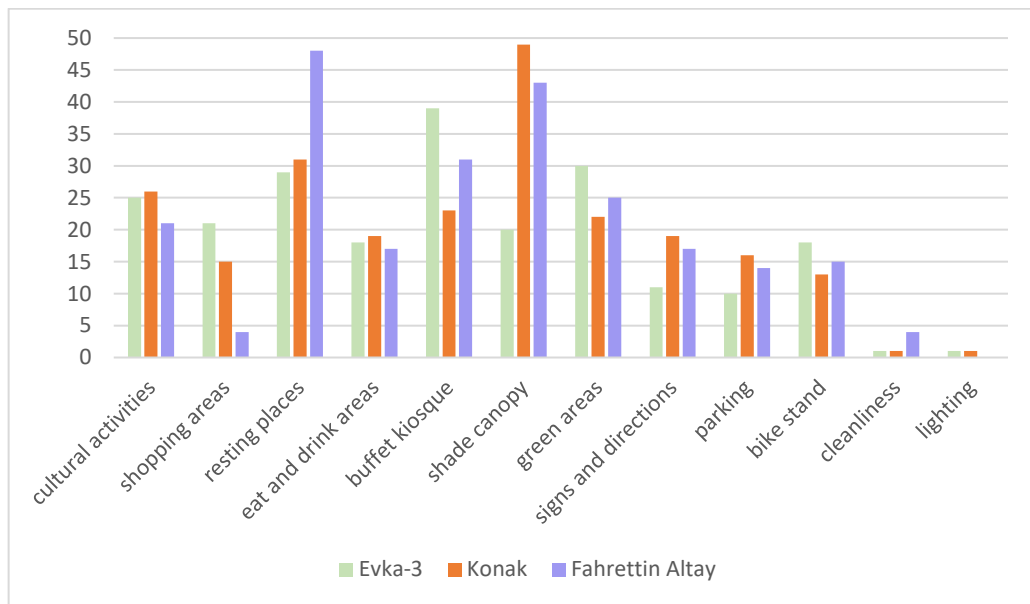


Figure 5. 27. Features that respondents' want to improve or add

5.4.5. Adequacy of Features According to Respondents

In Evka-3, its connection to other modes of transportation, and lighting was found to be sufficient. Cleanliness, direction, signage, park/green areas, and aesthetics seem to be partially more response (Figure 5. 28.).

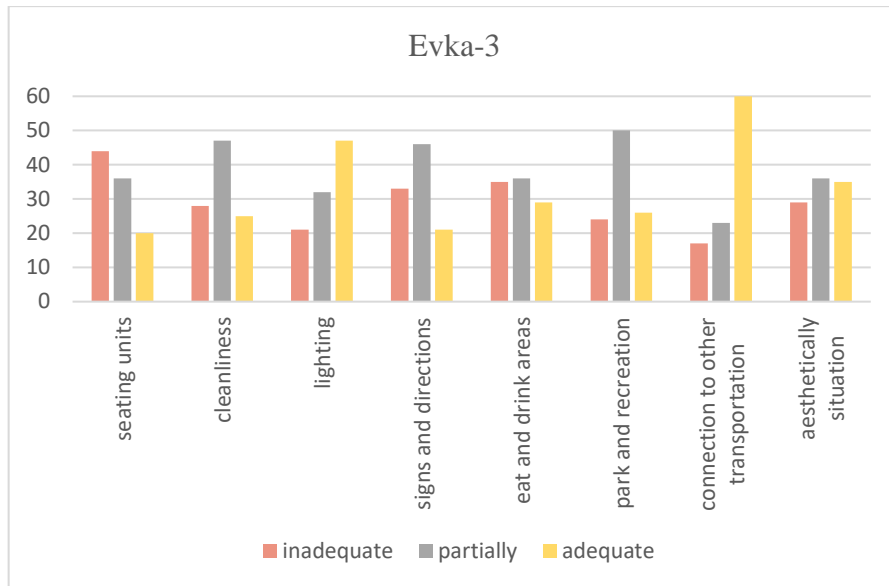


Figure 5. 28. Adequacy of features according to participants in Evka-3

Except for cleaning and directing, it was found sufficient in Konak (Figure 5. 29.).

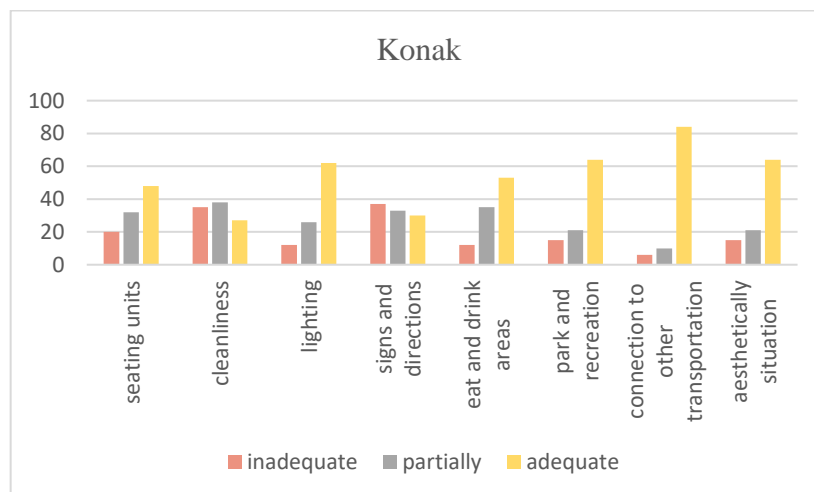


Figure 5. 29. Adequacy of features according to participants in Konak

Seating units, directions and signs were found insufficient in Fahrettin Altay. Lighting, eating and drinking areas, especially its connection with other types of transportation were found to be sufficient (Figure 5. 30.).

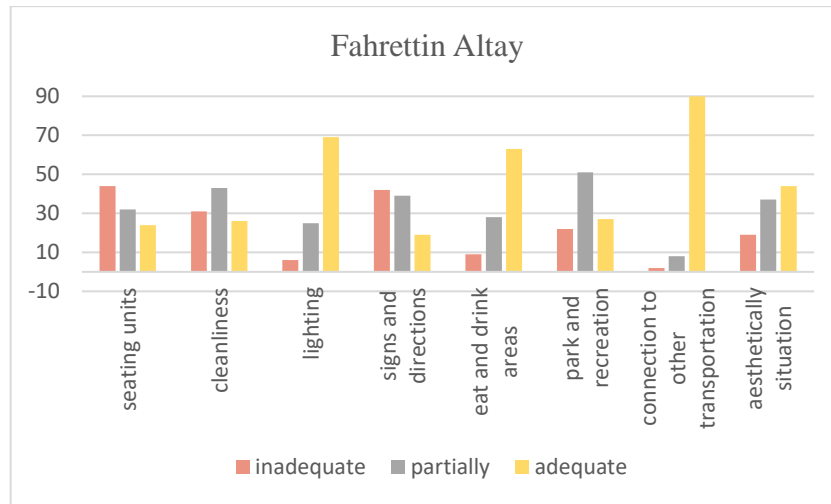


Figure 5. 30. Adequacy of features according to participants in Fahrettin Altay

5.4.6. Lack of Facilities/Features in Public Spaces

There is a lack of seating units in Evka-3 and Fahrettin Altay. Among the three areas, the lack of lighting, eating and drinking areas, the lack of park and green areas and the lack of aesthetics emerged in Evka-3 the most (Figure 5. 31.).

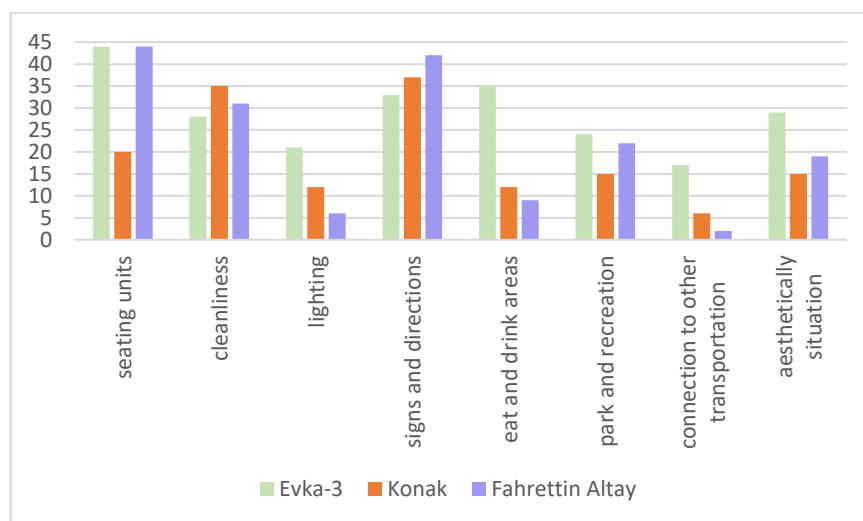


Figure 5. 31. Lack of facilities in public spaces

5.4.7. Land Use

Usage time and Land Use Types Relationship

Considering the relationship between the types of land use used in all three areas and the length of stay; it is observed that Konak is the area where they spend the most time in commercial area use, Fahrettin Altay for shopping, then Konak, and Konak is the area where they spend the most time in resting places and green areas.

Table 5.3. The length of stay according to land use

| Length of stay | Types of land use | | | | | |
|----------------|-------------------|-------------|-----------|-------------|-----------|-------------|
| | Commercial | | | | | |
| | Evka-3 | | Konak | | F.Altay | |
| | F | % | F | % | F | % |
| 0-10 min | 6 | 35.29 | 3 | 9.68 | 5 | 14.71 |
| 10-20 min | 4 | 23.53 | 4 | 12.90 | 11 | 32.35 |
| 20-30 min | 6 | 35.29 | 6 | 19.35 | 8 | 23.53 |
| More than 30 | 1 | 5.88 | 18 | 58.06 | 10 | 29.41 |
| Total | 17 | 100% | 31 | 100% | 34 | 100% |

| Length of stay | Types of land use | | | | | |
|----------------|-------------------|-------------|-----------|-------------|-----------|-------------|
| | Shopping | | | | | |
| | Evka-3 | | Konak | | F.Altay | |
| | F | % | F | % | F | % |
| 0-10 min | 1 | 8.33 | 2 | 5.26 | 2 | 5.71 |
| 10-20 min | 6 | 50 | 2 | 5.26 | 3 | 8.57 |
| 20-30 min | 3 | 25 | 8 | 21.05 | 3 | 8.57 |
| More than 30 | 2 | 16.67 | 26 | 68.42 | 27 | 77.14 |
| Total | 12 | 100% | 38 | 100% | 35 | 100% |

| Length of stay | Types of land use | | | | | |
|----------------|-------------------|-------------|-----------|-------------|-----------|-------------|
| | Resting Places | | | | | |
| | Evka-3 | | Konak | | F.Altay | |
| | F | % | F | % | F | % |
| 0-10 min | 2 | 18.18 | 2 | 5.71 | 3 | 11.11 |
| 10-20 min | 2 | 18.18 | 5 | 14.29 | 11 | 40.74 |
| 20-30 min | 5 | 45.45 | 6 | 17.14 | 6 | 22.22 |
| More than 30 | 2 | 18.18 | 22 | 62.86 | 7 | 25.93 |
| Total | 11 | 100% | 35 | 100% | 27 | 100% |

| Length of stay | Types of land use | | | | | |
|----------------|-------------------|-------------|-----------|-------------|----------|-------------|
| | Park | | | | | |
| | Evka-3 | | Konak | | F.Altay | |
| | F | % | F | % | F | % |
| 0-10 min | 0 | 0 | 1 | 6.25 | 0 | 0 |
| 10-20 min | 0 | 0 | 2 | 12.50 | 0 | 0 |
| 20-30 min | 3 | 50 | 4 | 25 | 1 | 25 |
| More than 30 | 3 | 50 | 9 | 56.25 | 3 | 75 |
| Total | 6 | 100% | 16 | 100% | 4 | 100% |

5.4.8. Correlations Between Variables

Table 5. 4. shows the correlations between the variables of this study. Among the social factors, the dependent variable time spent in the space, and the ones other than the safety factor (aesthetics, attractiveness, comfort) seem to have a positive and significant relationship. No significant relationship was observed between these factors and the dependent variable frequency of use. In general, no significant relationship was observed between the safety factor and other variables. There is a weak negative correlation between gender and safety. There is no significant relationship between physical factors and the dependent variable frequency of use. Spent time dependent variable and all physical factors show a positive and significant relationship. The use of shopping and social areas is positively correlated with spent time, while the use of commuters and business hours is negatively correlated with spent time. The strongest positive correlation between the variables of who they use the space with, and time spent was the use with friends. A moderate positive correlation is observed between those who use it with their spouse and children, those who use it alone, and the dependent variable.

Table 5. 4. Correlation Analysis

| | AGE | GENDER | INCOME | EDUCATION | WORKING | RESIDENCE | COMFORT | SAFETY | WALKING | SPENT | USAGE PURPOSE: WORK | USAGE PURPOSE: EDUCATION | USAGE PURPOSE: SHOPPING | USAGE PURPOSE: ENTERTAINMENT | USAGE PURPOSE: SOCIAL | USAGE PURPOSE: RESTING | USAGE PURPOSE: PARK | USAGE PURPOSE: ALONE | USAGE PURPOSE: FRIENDS | USAGE PURPOSE: CO-WORKERS | USAGE PURPOSE: WITH WIFE | USAGE PURPOSE: WITH CHILD | USAGE PURPOSE: RELATIVE | | | | | | | | |
|------------------------------|--------|--------|--------|-----------|---------|-----------|---------|--------|---------|--------|---------------------|--------------------------|-------------------------|------------------------------|-----------------------|------------------------|---------------------|----------------------|------------------------|---------------------------|--------------------------|---------------------------|-------------------------|--------|--------|--------|--------|--------|--------|-------|---|
| AGE | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GENDER | -0.111 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| INCOME | 0.085 | -0.121 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EDUCATION | -0.411 | 0.121 | 0.281 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WORKING | -0.112 | -0.141 | 0.638 | 0.227 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RESIDENCE | 0.218 | -0.127 | -0.100 | -0.226 | -0.039 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| COMFORT | 0.055 | -0.013 | 0.013 | -0.161 | -0.028 | 0.216 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| SAFETY | 0.161 | -0.197 | 0.085 | -0.181 | 0.070 | 0.174 | 0.428 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| WALKING | -0.083 | 0.059 | -0.162 | -0.037 | -0.112 | -0.148 | -0.074 | 0.190 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| SPENT | 0.143 | 0.035 | -0.139 | -0.124 | -0.172 | 0.247 | 0.122 | 0.219 | 0.034 | 0.086 | 0.341 | 1 | | | | | | | | | | | | | | | | | | | |
| USAGE PURPOSE: WORK | -0.083 | -0.111 | 0.336 | 0.077 | 0.591 | 0.006 | 0.027 | 0.039 | 0.070 | 0.443 | -0.086 | -0.166 | 1 | | | | | | | | | | | | | | | | | | |
| USAGE PURPOSE: EDUCATION | -0.033 | 0.114 | -0.077 | -0.025 | -0.106 | 0.005 | -0.018 | -0.135 | 0.048 | -0.028 | -0.012 | -0.102 | -0.130 | 0.022 | 1 | | | | | | | | | | | | | | | | |
| USAGE PURPOSE: SHOPPING | 0.111 | 0.084 | 0.055 | -0.069 | -0.091 | 0.083 | 0.044 | 0.008 | 0.081 | -0.185 | 0.131 | 0.260 | -0.225 | -0.067 | -0.049 | 1 | | | | | | | | | | | | | | | |
| USAGE PURPOSE: ENTERTAINMENT | -0.288 | -0.103 | -0.259 | 0.164 | -0.213 | -0.085 | -0.041 | -0.008 | -0.217 | -0.108 | 0.135 | -0.001 | -0.235 | -0.055 | -0.009 | -0.131 | 1 | | | | | | | | | | | | | | |
| USAGE PURPOSE: SOCIAL | 0.116 | 0.027 | -0.083 | -0.096 | -0.184 | 0.058 | 0.029 | 0.060 | 0.074 | -0.392 | 0.183 | 0.249 | -0.188 | -0.055 | -0.009 | -0.131 | -0.188 | 1 | | | | | | | | | | | | | |
| USAGE PURPOSE: RESTING | -0.084 | -0.064 | 0.214 | -0.106 | 0.374 | -0.072 | 0.016 | -0.047 | 0.038 | 0.477 | -0.173 | -0.238 | 0.612 | -0.063 | -0.209 | -0.107 | -0.235 | -0.069 | -0.234 | 1 | | | | | | | | | | | |
| USAGE PURPOSE: PARK | -0.171 | 0.041 | -0.046 | 0.052 | -0.087 | -0.024 | 0.034 | 0.061 | -0.071 | 0.256 | -0.045 | -0.122 | -0.023 | -0.126 | -0.031 | 0.265 | -0.069 | -0.234 | -0.031 | 0.256 | 1 | | | | | | | | | | |
| USAGE PURPOSE: ALONE | -0.111 | -0.007 | -0.026 | 0.079 | -0.035 | 0.078 | 0.032 | 0.053 | 0.052 | 0.172 | 0.076 | -0.006 | -0.083 | 0.010 | -0.007 | -0.038 | -0.035 | -0.177 | -0.035 | -0.177 | 0.280 | 1 | | | | | | | | | |
| USAGE PURPOSE: FRIENDS | 0.181 | 0.007 | -0.099 | -0.165 | -0.176 | 0.086 | -0.035 | 0.040 | 0.028 | -0.381 | 0.097 | 0.268 | -0.240 | 0.141 | 0.202 | -0.012 | 0.234 | -0.322 | -0.393 | -0.551 | 0.303 | -0.551 | 1 | | | | | | | | |
| USAGE PURPOSE: CO-WORKERS | 0.030 | -0.030 | -0.052 | -0.058 | -0.057 | 0.125 | 0.121 | 0.114 | 0.087 | 0.032 | -0.007 | 0.411 | -0.001 | 0.068 | 0.068 | -0.033 | 0.161 | -0.028 | -0.031 | -0.001 | 0.116 | 0.116 | 0.116 | 1 | | | | | | | |
| USAGE PURPOSE: WITH WIFE | 0.077 | 0.141 | 0.016 | -0.003 | -0.037 | -0.145 | 0.019 | 0.145 | 0.096 | -0.107 | 0.250 | 0.850 | -0.095 | 0.156 | 0.359 | 0.008 | 0.076 | -0.164 | -0.115 | -0.017 | 0.160 | 0.160 | 0.160 | 0.160 | 1 | | | | | | |
| USAGE PURPOSE: WITH CHILD | -0.140 | -0.023 | -0.088 | -0.103 | -0.166 | 0.005 | 0.097 | 0.016 | -0.040 | -0.046 | 0.031 | 0.449 | -0.045 | 0.022 | 0.111 | -0.070 | -0.051 | -0.159 | -0.140 | -0.016 | -0.051 | -0.159 | -0.140 | -0.140 | -0.140 | 1 | | | | | |
| USAGE PURPOSE: RELATIVE | -0.039 | 0.000 | -0.088 | 0.021 | 0.139 | -0.014 | 0.002 | 0.089 | -0.111 | -0.113 | 0.164 | 0.323 | -0.087 | -0.045 | 0.063 | 0.085 | 0.165 | -0.110 | -0.097 | -0.115 | 0.188 | 0.188 | 0.188 | 0.188 | 0.188 | 0.188 | 1 | | | | |
| USAGE PURPOSE: OTHER | -0.080 | -0.007 | 0.025 | 0.113 | 0.036 | -0.087 | -0.132 | -0.012 | -0.007 | 0.090 | -0.030 | 0.329 | 0.168 | -0.039 | 0.045 | 0.035 | 0.059 | 0.022 | -0.013 | -0.060 | 0.091 | 0.350 | 0.350 | 0.350 | 0.350 | 0.350 | 1 | | | | |
| USAGE PURPOSE: UNDEFINED | 0.044 | 0.085 | -0.143 | 0.015 | 0.200 | -0.138 | -0.110 | 0.146 | -0.005 | -0.060 | 0.305 | 0.719 | -0.197 | -0.103 | 0.151 | -0.101 | 0.298 | -0.248 | -0.059 | 0.000 | 0.238 | 0.375 | 0.403 | 0.390 | 0.184 | 0.171 | 1 | | | | |
| USAGE PURPOSE: UNDEFINED | -0.088 | -0.018 | 0.057 | 0.086 | 0.134 | -0.060 | -0.011 | -0.034 | 0.088 | 0.014 | -0.038 | 0.190 | -0.146 | 0.088 | 0.007 | -0.022 | 0.038 | -0.146 | -0.069 | -0.069 | 0.052 | 0.199 | 0.153 | 0.055 | 0.003 | 0.149 | 1 | | | | |
| USAGE PURPOSE: UNDEFINED | 0.268 | 0.040 | 0.074 | -0.154 | -0.094 | 0.152 | 0.085 | 0.105 | 0.094 | -0.181 | 0.088 | 0.363 | -0.103 | 0.097 | 0.235 | -0.137 | 0.070 | -0.134 | -0.083 | 0.074 | 0.118 | 0.149 | 0.294 | 0.251 | 0.132 | -0.033 | 0.071 | 1 | | | |
| USAGE PURPOSE: UNDEFINED | 0.188 | 0.077 | 0.048 | -0.104 | -0.040 | 0.149 | 0.088 | -0.110 | 0.071 | -0.070 | 0.116 | 0.315 | -0.082 | 0.069 | 0.245 | -0.083 | -0.023 | -0.030 | -0.079 | -0.061 | 0.100 | -0.068 | 0.362 | 0.079 | 0.186 | -0.011 | -0.009 | -0.055 | 0.546 | 1 | |
| USAGE PURPOSE: UNDEFINED | 0.065 | 0.059 | -0.015 | -0.098 | -0.005 | 0.040 | -0.008 | 0.013 | 0.029 | -0.115 | 0.008 | 0.209 | -0.134 | -0.014 | 0.120 | -0.050 | 0.123 | -0.065 | -0.040 | 0.001 | 0.097 | 0.024 | 0.236 | -0.009 | -0.054 | 0.000 | 0.124 | 0.070 | -0.109 | 0.025 | 1 |

*. Correlation is significant at the 0.01 level (2-tailed).
 *. Correlation is significant at the 0.05 level (2-tailed).

5.4.9. Multiple Regression Analysis

Multiple linear regression analysis was performed in this study to examine the relationship between a dependent variable and more than one independent variable. The dependent and independent variables of the study are as follows.

Dependent Variables

Spent time in public space.

Frequency of use of public space.

Independent Variables

Individual Characteristics.

Gender

Age

Education

Income

Working status

Travel purpose

Travel frequency

Physical factors.

Facilities/Land use

Traffic safety elements

Walking facilities

Green elements/Greenery

Social factors.

Aesthetics

Safety

Attractiveness

Comfort

Wan, Shen, and Choi (2020) used hierarchical linear regression analyzes in their study. According to this analysis method, regression analysis was performed with three different models in the study. Each model was applied separately according to the total data set and the three areas were determined as the study areas. These analysis methods were also made separately according to the two dependent variables determined. In each model, individual characteristics were entered as control variables. In the second model, physical factors are entered together with individual characteristics. In the third model, social factors were also included. At each stage, it was evaluated in terms of the amount and significance values affecting the variance.

Table 5.5. Regression results with attitudes toward length of stay as the dependent variable

| | Model 1 | | | | Model 2 | | | | Model 3 | | | |
|---|---------|--------|-----------------|-------|---------|--------|-----------------|--------|---------|--------|-----------------|--------|
| | Evka-3 | Konak | Fahrettin Altay | Total | Evka-3 | Konak | Fahrettin Altay | Total | Evka-3 | Konak | Fahrettin Altay | Total |
| Individual Characteristics | | | | | | | | | | | | |
| Age | -.163 | .073 | .087 | .129* | -.007 | -.068 | .101 | .045 | -.024 | -.043 | .123 | .045 |
| Gender | -.041 | .068 | .129 | .030 | -.007 | -.016 | -.005 | -.022 | .002 | -.041 | -.004 | -.026 |
| Income | .126 | -.044 | -.082 | -.075 | .114 | -.044 | -.085 | -.056 | .131 | -.042 | -.141 | -.051 |
| Education | .142 | -.324* | -.081 | -.031 | -.040 | -.181* | .049 | -.028 | -.054 | -.167* | .060 | -.020 |
| Working status | -.070 | -.168 | .025 | -.098 | .005 | -.063 | -.032 | .001 | .001 | -.074 | .009 | -.004 |
| Physical Factors | | | | | | | | | | | | |
| Usage area- commercial | | | | | .391** | .299** | .297** | .311** | .390** | .293** | .291** | .304** |
| Usage area- shopping | | | | | .410** | .377** | .688** | .514** | .407** | .391** | .677** | .512** |
| Usage area- resting place | | | | | .263** | .350** | .186* | .271** | .270** | .335** | .176* | .271** |
| Usage area- park | | | | | .365** | .133* | .086 | .141** | .373** | .124 | .077 | .139** |
| Walking distance | | | | | .030 | .194* | .206* | .163** | .027 | .160* | .209* | .165** |
| Connection to the other transportations | | | | | -.007 | .212* | -.013 | .059 | -.017 | .158 | -.001 | .044 |
| Parks and recreation areas | | | | | -.019 | .016 | -.029 | .041 | -.024 | .000 | -.044 | .016 |
| Social Factors | | | | | | | | | | | | |
| Aesthetics | | | | | | | | | .067 | .183 | -.081 | .064 |
| Comfort | | | | | | | | | -.034 | .016 | .061 | .053 |
| Attractiveness | | | | | | | | | -.031 | -.114 | .062 | -.012 |
| Safety | | | | | | | | | .001 | -.104 | .055 | -.032 |
| <i>R</i> ² | .074 | .210 | .037 | .051 | .796 | .708 | .757 | .723 | .801 | .731 | .769 | .728 |
| <i>Adj. R</i> ² | .025 | .168 | -.014 | .035 | .768 | .667 | .724 | .711 | .763 | .679 | .725 | .713 |
| <i>F</i> | 1.505 | 5.004 | .719 | 3.144 | 28.368 | 17.542 | 22.592 | 62.431 | 20.872 | 14.115 | 17.276 | 47.349 |

Note. Standardized coefficients are reported.

p* < .05. *p* < .001.

Table 5. 6. Regression results with attitudes toward the frequency of use as the dependent variable

| | Model 1 | | | | Model 2 | | | | Model 3 | | | |
|---|---------|-------|--------------------|--------|---------|--------|--------------------|---------|---------|--------|--------------------|---------|
| | Evka-3 | Konak | Fahrettin Altay | Total | Evka-3 | Konak | Fahrettin Altay | Total | Evka-3 | Konak | Fahrettin Altay | Total |
| Individual Characteristics | | | | | | | | | | | | |
| Age | -.135 | -.211 | -.155 | -.200* | -.168 | -.360* | -.164 | -.227** | -.142 | -.351* | -.187 | -.234** |
| Gender | -.079 | .025 | -.209* | -.079 | -.084 | .108 | -.151 | -.060 | -.090 | .110 | -.117 | -.050 |
| Income | .052 | -.073 | -.316* | -.102 | .025 | .067 | -.332* | -.098 | .059 | .042 | -.300* | -.087 |
| Education | .004 | .105 | .035 | .072 | .022 | .178 | .012 | .081 | .006 | .193 | .066 | .077 |
| Working status | -.078 | .316* | .391* | .201* | -.067 | .241 | .409* | .191* | -.079 | .254 | .380* | .188* |
| Physical Factors | | | | | | | | | | | | |
| Usage area- commercial | | | | | .062 | .258* | -.088 | .036 | .026 | .241* | -.070 | .033 |
| Usage area- shopping | | | | | -.081 | -.087 | -.149 | -.062 | -.079 | -.095 | -.166 | -.071 |
| Usage area- resting place | | | | | .011 | .268* | -.063 | .030 | .033 | .278* | -.042 | .046 |
| Usage area- park | | | | | -.040 | -.077 | -.121 | -.089 | -.064 | -.089 | -.089 | -.100 |
| Walking distance | | | | | -.206 | .000 | .014 | -.077 | -.217 | .000 | -.021 | -.098 |
| Connection to the other transportations | | | | | .032 | .293* | -.045 | .076 | .005 | .245 | -.041 | .042 |
| Parks and recreation areas | | | | | -.011 | -.010 | .115 | .050 | -.033 | -.039 | .065 | .011 |
| Social Factors | | | | | | | | | | | | |
| Aesthetics | | | | | | | | | -.036 | .033 | .128 | .073 |
| Comfort | | | | | | | | | .055 | -.024 | -.181 | -.068 |
| Attractiveness | | | | | | | | | .137 | .081 | .088 | .093 |
| Safety | | | | | | | | | -.108 | -.006 | .088 | -.049 |
| <i>R</i> ² | .024 | .187 | .207 | .101 | .080 | .366 | .266 | .132 | .098 | .371 | .306 | .149 |
| <i>Adj. R</i> ² | -.027 | .143 | .165 | .085 | -.047 | .279 | .165 | .096 | -.076 | .250 | .172 | .101 |
| <i>F</i> | .471 | 4.315 | 4.920 | 6.588 | .628 | 4.193 | 2.625 | 3.644 | .564 | 3.060 | 2.282 | 3.098 |

Note. Standardized coefficients are reported.

p* < .05. *p* < .001.

Firstly, the multiple regression analysis with all the data in the three fields will be interpreted.

The results of attitudes towards length of stay are presented in Table 5.5. While the individual characters in Model 1 explain 3.5% of the variance, in Model 2, when physical factors are included, they explain 71.1% of the variance. Areas of use and walking distance were significant at *p* < .001 and contributed an additional 67.6% of variance versus Model 1. Areas of use and walking distance provide a significant relationship to the length of stay. When social factors were included in Model 3, it explained 71.3% of the variance. An expected effect of these factors on the dependent variable was not observed.

The results of attitudes towards the frequency of use are presented in Table 5.6. While the individual characters in Model 1 explain 8.5% of the variance, in Model 2, when physical factors are included, they explain 9.6% of the variance. Age was significant at *p* < .05 and shows a negative effect with duration of use. No significant effect of physical factors on attitudes of use was observed. As seen in Model 3, including social factors, it constitutes 10% of the variance and did not have much additional contribution.

In the next step, multiple regression analysis for each domain was interpreted separately.

Evka-3

Length of stay

In the first model, no significant association of individual factors was observed. While its contribution to the variance is 2.5%, it explains 7.6% of the variance when physical factors are included. In Evka-3, it is observed that the usage areas have a significant effect on the length of stay in the area.

Frequency of use

In all models, no significant relationship was observed with the frequency of use with the addition of physical and social factors.

Konak

Length of stay

Considering the relationship between individual factors and the dependent variable in the first model, it is seen that education has a significant effect at $p < .05$ and a negative effect with length of stay. While individual factors explain for 16.8% of the variance, in Model 2, when physical factors are also included, they explain 66.7%. Commercial, shopping, and recreational areas around the metro were significant at $p < .001$, park areas usage, walking distance, connection to other modes of transportation were significant at $p < .05$, and these factors contributed an additional 49.9% of variance according to Model 1. Usage areas and walking distance provide a significant relationship with the length of stay. When social factors are included in Model 3, it explains 67.9% of the variance. An expected effect of these factors on the dependent variable was not observed.

Frequency of use

Considering the relationship between individual factors and the dependent variable in the first model, a significant effect is seen in working status $p < .05$. After adding physical factors in Model 2, the working status became insignificant. There is a

significant effect with age at $p < .05$ and a negative effect with frequency of use. The use of commercial and recreational areas and connection to other transportation modes showed a statistically significant relationship. According to Model 3, an expected effect of social factors on the dependent variable was not observed.

Fahrettin Altay

Length of stay

Considering the relationship between Model 1 and individual factors with length of stay, it is not seen that individual factors contribute significantly to the variance. When physical factors are included in Model 2, it explains 72.4% of the variance. Commercial and shopping usage areas in the metro surrounding were significant at $p < .001$, and the usage of resting places and walking distance were significant at $p < .05$. These factors appear to contribute to the 73.8% variance relative to Model 1. When social factors are included in Model 3, it explains 72.5% of the variance. An expected effect of these factors on the dependent variable was not observed.

Frequency of use

Considering the relationship between individual factors and the dependent variable in the first model, a significant effect of gender, income status and working status is observed in $p < .05$.

While gender and income status had a negative effect on the frequency of use, a positive relationship was observed with working status. After adding physical factors in Model 2, gender became unimportant. After adding social factors in Model 3, an expected effect of these factors on the dependent variable was not observed.

CHAPTER 6

EVALUATION AND CONCLUSION

This study examines the social and physical factors that affect user perception of the metro surroundings and how the use of these areas differs according to perceptions. In the study, the social and physical factors that affect the user perceptions of the metro station surroundings as a public space and how they affect it are examined with the example of selected metro stations in Izmir. Site observations and survey data made at metro stations were evaluated with the public space literature. Thus, urban design interventions have been developed for metro station surroundings as public spaces.

This study is designed as six chapters. The first part of the study is the introduction part. In this section, the definition of the problem, the purpose of the study, the research methodology, and the study site are explained. The structure of the thesis work is presented.

The second part of the study focuses on user perceptions and metro stations as public spaces. This section defines the relationship between the public space and the metro surroundings. Then, to understand how user perceptions differ in using these fields, how the concept of perception is discussed in the literature is examined. In this section, first of all, the definition of public space and its features are discussed. Then, the metro station surroundings were examined as public spaces. One of the study's aims is to present urban design interventions that will increase the usage of public space for metro surroundings. For this reason, the design criteria of the public space were examined. And the chapter ends by focusing on user perceptions. With this section, the necessary background has been created to evaluate the data obtained through the survey and field observations. Thus, the relations between metro station surroundings, public space, and user perceptions are established in the second part.

In the third chapter, the factors affecting the usage of metro station surroundings are examined. These factors in the literature are presented as individual, social, and physical factors. Under the heading of individual factors, it examines how the use of the metro surrounding differs according to individual characteristics. These factors are individual factors related to age, gender, income status, vehicle ownership, the purpose of travel, and frequency of use. Afterward, social and physical factors were examined. Secondly, access to stations and destinations, land use, safety, comfort, aesthetics and attractiveness factors were examined under social and physical characteristics. Thus, the effective factors in the usage of metro station surroundings were obtained by literature study. Then, in this section, public space designs developed for metro surroundings are included. Canary Wharf Underground Station (London), Union Square Station (Manhattan), Nørreport Station (Copenhagen) were examined. At the end of this section, examples of urban design are examined to develop and improve the usage of public space around the metro.

In the fourth chapter, the study area and data collection method of this study are explained. First, public transportation data and the place of rail systems in public transportation are mentioned. Then, the public transportation and rail systems of Izmir are explained. The development process of the Izmir Metro is explained. At the end of the chapter, observations on the environmental characteristics of Evka-3, Konak, Fahrettin Altay metro and its surroundings, which were examined within the scope of the study, and studies on user surveys are mentioned.

The fifth section shows the results of the data collection. Discusses the results of the site observation of the metro surrounding and the survey results.

In the sixth chapter, the results of the study are presented. In this section, the findings are discussed and associated with the literature.

Metro stations are both transit environments and public spaces. The social and physical characteristics of metro surroundings affect to use of public spaces. This situation also differs according to individual characteristics. This study examines how physical and social factors affect the usage of metro station surroundings according to perceptions of people.

This study tries to understand what it affects the use in the public space and how it affects user perceptions. For this, after examining the urban design, planning, and transportation literature, it also includes site observations and questionnaire studies on the

physical factors affecting the use of Izmir metro surroundings and how people use and perceive this area. The dependent variables of this study are the length of stay in public spaces and the frequency of use. Aesthetics, safety, attractiveness, and comfort were determined as social factors. According to the regression results of total data, the effect of individual characteristics on the length of stay in these areas was not observed. A significant and positive effect of physical factors was observed. The variety of land use in the metro surroundings will extend the length of stay in the area. The walking distance increases circulation and the length of stay in the area. The connection to other types of transportation has been observed as an area that increases its use in three areas. Compared to the other dependent variable, the effect of individual characteristics on the frequency of use was observed. Frequency of use is negatively associated with age and positively associated with working status. When we look at all data in general, the frequency of use and physical and social factors have no significant effect. When we look at the station basis, it is seen that it has a significant and positive relationship with commercial areas, resting places, and connection to other types of transportation in Konak. The results of this study did not show a significant relationship between the safety factor and other factors. There is a negative correlation between safety and gender. In this case, the result that women feel more unsafe matches the literature. Those who used the space with their friends showed the strongest relationship with the length of stay. It is followed by those who use it with their family and those who use it alone. According to the regression result, if the circulation areas and walking areas increase, the usage time of the area will increase. There was no effect of physical and social factors on the other dependent variable frequency of use.

When we evaluate each area one by one according to the site observations and survey results, there are not many users of the public space in Evka-3. In this area, there is no area for usage except transportation, and resting areas, benches around the metro. There is no variety of uses and alternatives here. There are too many metro elements in this area, so it restricts active usage areas. Lighting and the presence of few people create a difficult situation in terms of night use. In addition, it has been seen that people who travel between cities use this area a lot. People who travel to the city center by metro after using the parking area have requested more directive, defined, and more cafes, seating areas, markets, and shopping areas in this area. Konak is the most active and long-term area where people spend time in resting and green areas. Commercial area usage and length of stay are also long. People are generally dissatisfied with this area. Although this

area is a central location, it is not an effective area. Green area arrangements should be made, pedestrian connections should be strengthened, a regular activity area should be established, playgrounds for family users, more information boards, especially shaded elements, and seating areas should be built. The existing shaded seating areas are not comfortable. But this area is the most comfortable and attractive area among other areas. This area has advantages such as greenery, openness, being a historical place, access to the sea, commercial proximity, transportation to everywhere, proximity to the sea, having different uses, and supporting physical and social features that will make the area alive. In Fahrettin Altay, they spend most of their time in shopping areas. They do not have comfortable sitting areas in this area, and it is generally a crowded area. Pedestrian priority should be found, crossings should be facilitated, traffic density should be reduced, active green space uses should be added, and activities such as pavement arrangements, lighting, garbage, cleaning, and maintenance should be done in this area. There were shaded areas and recreation areas that the participants generally wanted to be improved or added.

Overall, the results show that women feel more unsafe. Totally, the fact that it is generally a central area and there are commercial activities in the surroundings makes them feel safe. It was observed that the participants in Evka-3 and Konak felt unsafe at a close rate. Due to insufficient lighting and few people in Konak and Evka-3, they feel unsafe at night. The crowd was found to be disturbing in Fahrettin Altay.

Metro stations have not only been transportation points in the city but also public spaces that reflect the city's identity. The places encountered when going from the station to the street level can be a street, a square, or a park. These areas define the relationship between the stations and the city. It turns into a meeting place or a place where people can spend time before starting their journey. While these areas function as preparation areas for passengers, they also serve as places where they can spend time for other users. These spatial formations interact at this point where the station interacts with the city and form the public space. This study, which investigates user perceptions in order to increase the usage of these areas and the length of stay in these public spaces, may be useful to improve physical characteristics and urban design elements in the metro station surroundings in Izmir.

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APPENDIX A

SURVEY QUESTIONS

Bu anket çalışması İzmir Yüksek Teknoloji Enstitüsü Şehir ve Bölge Planlama Bölümü Doç. Dr. Fatma Şenol yürütücülüğünde Serenay Aksoy tarafından “İzmir Metro İstasyonları ve Çevrelerine İlişkin Kullanıcı Algıları” Kentsel Tasarım yüksek lisans tezi kapsamında gerçekleştirilmektedir. Bu çalışma, İzmir metro istasyonları çevrelerinin kullanımına ilişkin etkili olan fiziksel ve sosyal faktörleri belirlemek ve metro çevrelerinin tasarımına dair kullanıcı algılarını saptamayı amaçlamaktadır.

Anket sorularına vereceğiniz yanıtlar bilimsel araştırma amacıyla kullanılacak olup kimseyle paylaşılmayacaktır.

Katılımınız için teşekkür ederiz.

Tarih: Saat:
Anket yapılan metro istasyonu:
Varış/Biniş

Bu kısım ulaşım türünüz, amacınız ve tercihlerinize yönelik genel soruları kapsamaktadır.

1. Metroyu genel olarak kullanma amacınız/amaçlarınız nelerdir?
 İş Eğitim Alışveriş Eğlence Sosyal Diğer.....
2. Bu istasyonu şu anda kullanma amacınız nedir?
 İşe gitmek Okula gitmek Eve gitmek Eğlence Sosyal
 Alışveriş Diğer.....
3. Şu an geldiğiniz yer/eviniz bu istasyona kaç dk yürüme mesafesindedir?
 3-5 dk 5-10 dk 10-15 dk 15-20 dk 20-30 dk
 30 dk'dan fazla
4. Metroyu hangi sıklıkta kullanıyorsunuz?
 Her gün Hafta içleri Hafta sonları
 Haftada 1-2 kez Ayda 1-2 kez Diğer.....
5. Metroyu genel olarak günün hangi saatlerinde kullanıyorsunuz?
 Mesai Saatleri Sabahları Akşamları Herhangi bir zaman

6. Metrodan yüzeye çıktığınızda bu alanda kullandığınız yerler var mıdır?

Var Yok

6.1. Varsa bunlar nelerdir?

Ticari faaliyetler Alışveriş Dinlenme, oturma yerleri
 Park/Yeşil alan Diğer.....

6.2. Varsa bu alanda ne kadar süre kalıyorsunuz?.....

0-10 dk 10-20 dk 20-30 dk 30 dk'dan fazla Diğer

6.3. Varsa bu alanı kimlerle kullanıyorsunuz?.....

Tek başıma İş arkadaşlarımla Çocuğumla Eşimle Akrabamla Arkadaşımla

7. Aşağıda bulunan kullanım alanlarını istasyon çevresinde yeterli bulup

bulmadığınıza göre numaralandırınız. (1. Yetersiz – 2. Kısmen – 3.Yeterli)

- Oturma alanı ve banklar
 Temizlik
 Işıklandırma
 Tabelalar ve yönlendirmeler
 Yiyecek ve içecek satın alabileceğiniz yerler
 Park ve benzeri rekreasyon alanları
 Diğer ulaşım türleriyle bağlantısı
 Çevredeki yapısal unsurların estetik açıdan durumu

8. Metro istasyonundan çıktığınızda ne hissediyorsunuz?

.....

9. Burada rahat hissediyor musunuz?

Evet Hayır

9.1. Evetse neler sizi rahat hissettiriyor?

.....

9.2. Hayırsa rahat hissetmemenize neden olan unsurlar nelerdir?

.....

10. Metro istasyonundan çıktığınızda fiziksel çevre hoşunuza gider mi?

Evet Hayır

10.1. Neler hoşunuza gider?.....

10.2. Nelerden hoşlanmıyorsunuz?.....

11. Bu metro istasyonu çevresini çekici kılan en önemli özellikler nelerdir?

.....
.....

12. Bu alanı kullanırken kendinizi güvende hissediyor musunuz?

Evet Hayır

13. Bu alanda sizi güvende hissettiren unsurlar nelerdir? (*Birden fazla kutuyu*

işaretleyebilirsiniz.)

- Kalabalık olması
 Güvenlik kamerası varlığı
 Ticari faaliyetlerin varlığı
 Merkezi olması
 Işıklandırmanın varlığı
 Açık ve görünür bir alan
 Diğer (lütfen yazınız)

14. Bu alanda güvensiz hissetmenize neden olan unsurlar nelerdir? (*Birden fazla kutuyu*

işaretleyebilirsiniz.)

- Çöplerin varlığı/Bakımsız olması
 Kalabalık olması
 Güvenlik kamerası yok
 Az insan bulunması
 Karanlık olması/Yetersiz aydınlatma
 Görünür bir alan olmaması
 Diğer (lütfen yazınız)

15. Metro istasyon çevresinin kullanımınızı artırmak için ne gibi özelliklerin geliştirilmesi ya da eklenmesini isterdiniz?

- | | |
|--|---|
| <input type="checkbox"/> Kültürel tesisler (sinema, sergi alanları) | <input type="checkbox"/> Alışveriş yerleri |
| <input type="checkbox"/> Dinlenme mekanları (oturma grupları/alanları) | <input type="checkbox"/> Otopark alanı |
| <input type="checkbox"/> Bisiklet park yerleri | <input type="checkbox"/> Tabelalar ve yönlendirme |
| <input type="checkbox"/> Gölge alanlar | <input type="checkbox"/> Yeşil alanlar |

Yeme içme alanları (kafe, restoran vb.)

Yiyecek içecek satış yerleri

Diğer.....

Bu kısım sizinle ilgili genel soruları içermektedir.

16. Kaç yaşındasınız?

17. Cinsiyetiniz: Kadın Erkek Diğer.....

18. Aylık ortalama geliriniz hangi aralıktadır?

Asgari ücretin altı

Asgari ücret

Asgari ücret-Asgari ücretin iki katı

Asgari ücretin iki katı-Asgari ücretin üç katı

Asgari ücretin dört katı ve üstü

19. Eğitim durumunuz nedir?

Okuma yazma bilmiyorum İlkokul Ortaokul

Lise Yüksekokul Üniversite Lisansüstü

20. Ücretli bir işte çalışıyor musunuz?

Evet Hayır

20.1. Evet;

İşçi Kamu çalışanı Serbest Meslek Diğer

20.2. Hayır;

Öğrenci Ev hanımı Emekli İşsiz Diğer

21. Arabanız var mı? Evet Hayır

22. Bisikletiniz var mı? Evet Hayır