



**INTEGRATION OF BICYCLE INTO RAIL TRANSPORT SYSTEM: A
CASE STUDY IN ANKARA**



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12/06/2024

INTEGRATION OF BICYCLE INTO RAIL TRANSPORT SYSTEM: A CASE STUDY
IN ANKARA
(M. Sc. Thesis)

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ABSTRACT

Sustainable transportation has expanded into a broad area of study and practical implementation due to the increasingly evident impact of environmental issues and rapid global warming. The bicycle plays a crucial role in sustainable transportation systems due to its energy efficiency and eco-friendly nature. Various tactics and methods have been devised to ensure the integration of bicycles into urban transportation systems. One effective approach highlighted in studies of bicycle transportation is the integration of rail systems and bicycles. This thesis study discusses bicycle transportation projects in a big city, how the integration strategy was adopted, and the implementation status that has adopted this strategy. In recent years, the city of Ankara has garnered interest due to its initiatives and projects related to cycling. Consequently, it was selected as the focus area for this study. A preliminary field investigation was conducted as part of the research, leading to the development of the thesis methodology. Expert interviews were performed using semi-structured interview guides as part of the methodology. Experts were chosen from professionals and representatives closely associated with the subjects explored in the thesis study. The interviews were documented and the experts' remarks were organized under appropriate categories without any alteration. The goal was to gather data and insights regarding plan and strategy development processes, legal compliance, participatory methods, and implementation progress. New issues and challenges emerged during the interviews that were not covered in existing transportation reports. The combined input highlighted the barriers and fundamental shortcomings encountered in bicycle transport initiatives within the city. It is anticipated that addressing these raised issues will offer direction for improving bicycle transport policies and procedures.

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ÖZET

Çevre sorunları ve küresel ısınmanın günümüzde hızla etkilerini göstermesiyle birlikte sürdürülebilir ulaşım da günümüzde geniş bir uygulama ve araştırma alanı haline gelmiştir. Bisiklet enerji verimli ve çevre dostu bir ulaşım aracı olmasıyla sürdürülebilir ulaşım sistemlerinin vazgeçilmez bir parçası olmuştur. Bisikletin kent içi ulaşımında yer sahibi olması için çeşitli strateji ve uygulamalar geliştirilmiştir. Raylı sistem ve bisiklet entegrasyonu bisiklet ulaşım çalışmalarında öne çıkan verimli stratejilerden biridir. Bu tez çalışmasında bu stratejiyi benimsemiş olan bir büyük kentte, bisiklet ulaşımı çalışmaları, entegrasyon stratejisinin nasıl benimsendiği ve uygulanma durumu ele alınmıştır. Son yıllarda bisiklet uygulama ve çalışmaları ile dikkat çeken Ankara kenti çalışma alanı olarak seçilmiştir. Araştırma kapsamında bir ön saha çalışması gerçekleştirilmiş ve çalışma sonucu tezin metodolojisi geliştirilmiştir. Metodoloji olarak yarı yapılandırılmış görüşme formları ile uzman görüşmeleri gerçekleştirilmiştir. Uzmanlar tez araştırmasında ele alınmış çalışmalarla doğrudan ilişkili meslek uzmanları ve temsilcilerden seçilmiştir. Gerçekleştirilen görüşmeler kayıt altına alınarak, uzmanların ifadeleri çarpıtılmadan ilgili başlıklar altında derlenmiştir. Plan ve stratejilerin geliştirilme süreçleri, yasal geçerlilikleri, katılımcı yaklaşımları, uygulanma durumları gibi konular hakkında veri ve bilgiler toplanması hedeflenmiştir. Görüşmeler sırasında araştırmacının ulaşım raporlarından elde edemeyeceği yeni durum ve sorunlar keşfedilmiştir. Derlenen görüşler ile birlikte kentte bisiklet ulaşımı çalışmalarının karşılaştığı engeller ve temel eksiklikler ortaya konulmuştur. Ortaya konulan sorunların bisiklet ulaşımı politikaları ve uygulamaları konusunda yön gösterici olması umulmaktadır.

Bilim Kodu : 80217

Anahtar Kelimeler : Bisiklet, bisiklet raylı sistem entegrasyonu, enerji verimliliği, bisiklet ulaşım planı, Ankara

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SYMBOLS AND ABBREVIATIONS

The symbols and abbreviations used in this study are presented below, along with their explanations.

Symbols	Explanations
----------------	---------------------

km	Kilometer
km/hr	Kilometer per hour

Abbreviations	Explanations
----------------------	---------------------

ABB	Ankara Metropolitan Municipality
ARUP	Arup Group Design Company
EGO	EGO General Directorate
EU	European Union
NGO	Non-governmental Organization
SKUP	Sustainable Urban Mobility Plan
SUMP	Sustainable Urban Mobility Plan
UAP	Ankara Transportation Master Plan
UK	United Kingdom
UKOME	Transportation Coordination Center
US	United States

1. INTRODUCTION

Humanity is undoubtedly the most ungrateful species that betrays the Earth and its natural resources. With every step civilization takes, we pollute and abuse our Earth a little more. Of course, we also have to pay for our excessive consumption. In our age, with rapid urbanization and industrialization, we are facing major problems that threaten human civilization such as the energy crisis and global warming. The energy crisis is caused by increasing demand for energy due to global population and economic development, and limited availability of fossil fuels. The transportation sector plays a crucial role in the global energy crisis, as it accounts for a significant portion of energy consumption. This crisis is further exacerbated by the significant energy consumption of the transportation sector, which remains heavily reliant on oil products. Despite technological advancements, approximately 91% of the energy used in transportation still comes from oil, with only a marginal reduction since the early 1970s (IEA, 2023b). The sector's high energy use contributes to concerns such as environmental degradation, geopolitical tensions over energy resources, and economic volatility due to fluctuating oil prices. This situation underscores the imperative for transitioning to more sustainable energy sources and implementing more efficient transportation modes to mitigate the impact of the energy crisis on both a local and global scale. The need for sustainable transportation has become increasingly urgent in the face of the global energy crisis.

As one of the most popular modes of sustainable transportation, bicycles play a leading role in many research and transportation plans. As it is the most energy-efficient vehicle and provides the movement with the physical energy of the bicycle user, the bicycle is very effective in reducing energy consumption. In addition, unlike fossil fuel-based motor vehicles, the bicycle creates almost no environmental pollution throughout its life cycle. Due to these features, it stands out in sustainable transportation plans. In order for cycling to be widely adopted as a means of transportation in cities designed primarily for motor vehicles, it is necessary to undertake initiatives that encompass physical, social, and political aspects. The city must also ensure the provision of a secure transport infrastructure for both bicycles and cyclists. One of the most effective strategies for the bicycle to play an active role in urban transportation is to integrate the bicycle with the rail transportation system. This strategy encourages a multimodal transport system, where people can use bicycles for short distances and the train for longer commutes, reducing the overall energy consumption of their

journeys. The integration of bicycles with the rail transport system has been widely successful in many cities around the world. Providing facilities like bike racks and bicycle parking lots and allowing bicycles on trains on appointed hours, having a safe bicycle road network connected with train stations can encourage people to use bicycles as a first and last-mile solution in their daily commute. This strategy has been likened to marriage in one study, and if successful, it has been shown to increase both public transportation and cycling (Krizek and Stonebraker, 2010).

In the past few years, Ankara, the capital of Turkey, has been the subject of numerous research and projects focusing on bicycle transportation. There have been two recent bicycle transportation studies in Ankara. Both studies were carried out under Ankara Metropolitan Municipality and are important efforts to improve bicycle transportation in the city. One of the studies was carried out by the General Directorate of EGO and the other by the ARUP firm. According to the completion dates of the studies;

- Within The Framework Of Decarbonization Of Ankara Urban Transportation and Non-Motorized Modes Project, Ankara Priority Bicycle Network Study, Ankara Bicycle Strategy (July 2020)
- Bicycle Strategy, Master Plan, and Pilot Implementation Project for Integrated, Non-Motorized, and Multimodal Transportation in Ankara (March 2021)

The reason why the city of Ankara is considered within the scope of this thesis is that the main concept of both studies is the strategy of the rail transit system and bicycle integration. In this context, both studies will be examined and the beginning of the studies, the planning process and their implementation in the time period to the present day will be discussed. The problems and reasons for implementation will be examined. First of all, the studies will be explained through the study reports directly published and obtained by the researcher, and then the research questions will be clarified by obtaining information from primary sources, namely experts involved in the research, representatives of civil society and professional chambers, and an academician involved in the Ankara Transportation Master Plan. The content of the discussions and interviews will be analyzed under the following headings;

- Bicycle and Rail Transport Integration in Ankara, as a Strategy
- Inter-Institutional Coordination in Bicycle Transportation Plans
- Participation in bicycle transportation Plans

- Place of Bicycle Transportation Plans in Legislation - Implementation Status
- Ankara Transportation Master Plan and Bicycle Plans
- Future For Bicycle Transportation in Ankara

The main problem is that although two important studies have been carried out for the city, the applications targeted by these studies have not been fully realized in the urban space. At this point, our first question is "Why?", and then "What happened to these studies and reports on which so much effort was spent?". The research questions are subtitled.

Research questions

The research aims to examine the rail system and bicycle integration situation with its spatial, social, and governance scope through bicycle transportation plans in Ankara city.

Main research questions

1. What kind of projects have been conducted on the use of bicycles for transportation in Ankara?

Sub-questions;

- 1.1. Which entities conducted the projects?
- 1.2. Were participatory planning methods utilized in the research or projects?
- 1.3. Did the planning process involve civil society and professional associations, and if so, how impactful were their contributions to the projects?
- 1.4. Have UAP reports and data been utilized in the projects?
- 1.5. If UAP data were utilized in projects, what is the authorization status of the UAP?

2. What is the role of the railway system and bicycle integration strategy in these projects?

Sub-questions;

- 2.1. Is the integration strategy between rail and bicycles an effective approach to enhance bicycle transportation in Ankara?
- 2.2. Does the combination of rail system and bicycle integration ensure equitable transportation for Ankara?

3. What is the state of implementation of the projects today?

Sub-questions;

- 3.1. Is there sufficient support from the government and relevant stakeholders to implement and prioritize the integration of bicycles with rail transportation systems in Ankara?
- 3.2. Is the legal framework for the approval and implementation of cycle transport plans adequate?
- 3.3. Are the studies binding on the local authorities or other bodies which are authorized to act?
4. What spatial, social, and governance obstacles do bicycle initiatives encounter in Ankara?
 - Sub-questions;
 - 4.1. Are the efforts aimed at promoting bicycle transportation in Ankara sufficient?
 - 4.2. Could Ankara potentially become a city where cycling emerges as a prominent form of transportation in the future?

Methodological approach

The thesis research examined various bicycle transportation studies conducted in Ankara. These include projects by different teams as well as initiatives spearheaded by the local transportation authority, EGO. EGO's efforts encompassed a user survey, a bus-bicycle integration project, a bicycle strategy and network plan, and the implementation of bicycle parking at subway stations. Additionally, a bicycle master plan and strategy report was developed by the consulting firm ARUP, which also involved a pilot project. Ongoing studies on a shared bicycle system since 2021 are also discussed. Detailed accounts of these projects are provided in the fourth chapter of the thesis. Among these studies, two distinct teams have developed bicycle strategies and bicycle network proposals for the city of Ankara. Upon reviewing the study reports, the bicycle strategy recommended by both teams for implementation in the city is the integration of bicycles and the rail transit system, and they have proposed a bicycle path network designed around this integrated approach. A preliminary field study was carried out to assess the current state of these bicycle transportation initiatives and their progress toward their objectives. The primary aim of the field research was to inform further steps of the thesis study.

Before the field study, existing literature on railway systems and bike integration as well as bicycle transportation studies in Ankara were reviewed. During the field study, an observer

accompanied a volunteer cyclist on a brief trip using the Ankaray rail transport system. The preliminary study focused on infrastructure elements highlighted in existing literature, such as bicycle parking areas, cyclist movements within stations, and navigating with bicycles on the rail system. A detailed discussion of this preliminary study is provided in section 4.1 of the thesis. The preliminary field investigation revealed that the current infrastructure and regulations are inadequate for integrating rail systems and bicycles. However, the research team has decided that further fieldwork and data collection would only reiterate the existing problems. Instead, the focus shifted to understanding why the projects implemented in Ankara failed to achieve their intended goals. The decision was made to concentrate on the bicycle transportation studies conducted by EGO and ARUP and to carry out in-depth expert interviews with individuals knowledgeable about these projects and bicycle transportation in the city. The objective of these interviews was to identify the factors that impede the implementation of the proposed bicycle transportation studies. To address issues identified during this phase, experts' opinions were sought through semi-structured questions aimed at uncovering hidden problems.

The study was conducted within the framework of an in-depth interview method, which is a qualitative data collection technique. The purpose of the in-depth interview is to learn the interviewee's thoughts and perceptions on the subject, to discover unknown factors, and to reveal new information about the subject. It is a data collection technique based on verbal communication between the researcher and the interviewee (Uslu and Demir, 2023).

In the research, interviews were held with professional experts, NGOs, and professional chamber representatives related to the bicycle transportation plans to understand the situations that were not expressed in the plan reports, planning processes, and possible implementation obstacles regarding the bicycle plan studies carried out in Ankara. In addition to the bicycle plans they were related to, the interviewees were also asked for their opinions and suggestions about Ankara and bicycle transportation in general.

Interviews are divided into three groups: structured, semi-structured, and unstructured interviews (Morris, 2015: 21). Semi-structured interview type was preferred in this research. The purpose of choosing this interview type is to categorize the interviewee's information following the research structure, but also to enable the interviewee to convey information

and their own bicycle transportation experiences that are not included in the records and plan reports.

Sampling is a method used by the researcher to select a relatively small number of representative items or individuals within a defined research framework to collect data within the scope of the research objective (Sharma, 2017). Sampling methods are grouped under two main headings: random and non-random methods. Among non-random sampling types, purposeful sampling was preferred. There are subtypes of purposeful sampling such as maximum variation sampling, expert sampling, and typical case sampling. The sampling method that is suitable for the research is the expert sampling method (Bernt, 2020). Expert Sampling requires "experts" who are related to the research to be interview subjects. With this sampling method, the personal opinions of experts directly related to the subject of research can be structured better (Etikan and Bala, 2017).

Within the scope of the sampling method and the purpose of the research, interviews were held with various experts. In order to comprehensively address the bicycle plans, two experts who took part in the process of bicycle plans in Ankara (one person for the ARUP bicycle master plan, one person for the EGO bicycle network study), a professional chamber representative, an NGO representative, and an academican (who took part in the Ankara Transportation Master plan) interviews were held. Thus, it is aimed to address the issue from different perspectives. Experts are generally urban planning graduates and people who work in the field of transportation planning or are interested in the subject. The use of the name is left to the preference of the professional expert.

The researcher created a semi-structured interview form by examining both plans before the interviews. The interviews took place following the approval of the ethics committee at Gazi University Institute of Science and Technology on January 10, 2023. Interviews were held face-to-face or online between November 2023 and December 2023. During the interview, the researcher did not make any comments about his own opinion before the expert's statements were finished. The interviews were recorded digitally (audio or video). Interview times varied between 45 minutes and 2 hours. The collected data were discussed in the sections directly related to the subject within the thesis study.

Limitations

Many public and municipal employees were involved in the projects examined in this thesis. Consequently, it is understandable that some civil servants currently in their positions may have lacked the time or motivation to participate in the study. This constraint affected the selection of experts for the research.

The researchers carefully selected the experts to ensure equal representation based on their involvement in the projects and the stakeholder groups they would represent. This was a limiting factor of the research, as expanding the sample to include more non-governmental organization (NGO) members could have shifted the research focus and resulted in redundant viewpoints. Therefore, the researchers opted to include one representative from each project as well as one from civil society and one from a professional chamber.

Structure of the thesis

This thesis is structured in six main chapters, with the introduction being one of them. The introduction outlines the purpose and significance of the research, providing information about the research questions, methodological approach, and the process of developing the methodology. In the subsequent second part, under the section titled "Energy Crisis and Bicycle," the thesis aims to draw attention to the transportation sector's contribution to the global energy crisis using relevant data. It demonstrates the benefits of the bicycle as an energy-efficient mode of transportation and highlights the bicycle's indispensable role in sustainable transportation systems. The third part of the thesis focuses on the key topic of the bicycle and rail system integration strategy. It outlines the benefits and logical framework of this strategy for promoting bicycle transportation. The potential of the integration strategy is discussed by providing examples from various global cities. Additionally, the thesis compares the implementation of this strategy in Ankara with other cities, highlighting both similarities and differences. The fourth chapter begins by outlining the preliminary field work conducted at the outset of the study and its findings, as detailed in the methodology. It then proceeds to explain the bicycle transportation initiatives undertaken in Ankara, including the objectives, responsible parties, and scope of these endeavors. By chronicling the steps taken towards bicycle infrastructure in the city, the aim is to pique the reader's curiosity as to why these efforts have not been sustained and implemented. Subsequently,

expert interviews were compiled under key themes corresponding to the identified challenges. Each theme encompasses the perspectives of subject matter experts and a concise summary of the resulting discussions. This section presents the critical issues that have hindered the successful implementation of bicycle transportation studies in the city. The concluding chapter of the thesis compiles and discusses the key problems identified through the expert interviews. The chapter highlights the fundamental issues and proposes potential solutions. Additionally, the thesis offers suggestions for future research directions related to the topic.



2. ENERGY CRISIS AND THE BICYCLE

The world is currently experiencing a worldwide energy shortage due to the expanding global population, rising demand for energy, and ongoing reliance on fossil fuels for power generation. This has led to various challenges, including increasing greenhouse gas emissions, environmental degradation, and rising fuel prices. The high cost and limited sources of fossil fuels, coupled with the need to reduce greenhouse gas emissions, have made renewable resources increasingly attractive. As a result, there is a growing focus on advancing renewable energy resources and developing sustainable urban policies (Coyle and Simmons, 2014: 1, 7). Figure 2.1 shows the World's total energy supply and the used sources between 1990-2021. According to the figure, 70% of the world's energy needs are met from unsustainable sources such as oil, coal, and natural gas. Additionally, the demand for these resources is increasing day by day.

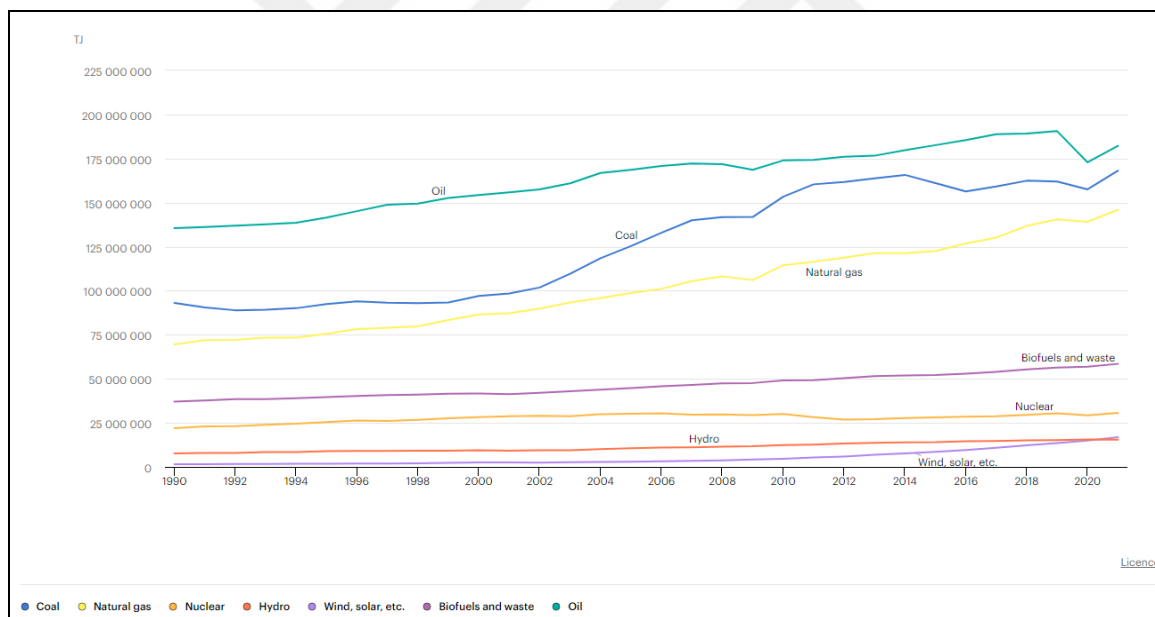


Figure 2.1. Total energy supply by source, World, 1990-2021 (IEA, 2023a)

The energy demand is steadily increasing due to rapid urbanization and industrialization. This demand is fueled by various sectors including transportation, industry, residential, and commercial. The transportation sector is a major consumer of energy, accounting for a significant portion of global energy consumption (Çalışkan, 2017). Figure 2.2 shows the World's total energy consumption by sectors between 1990-2021.

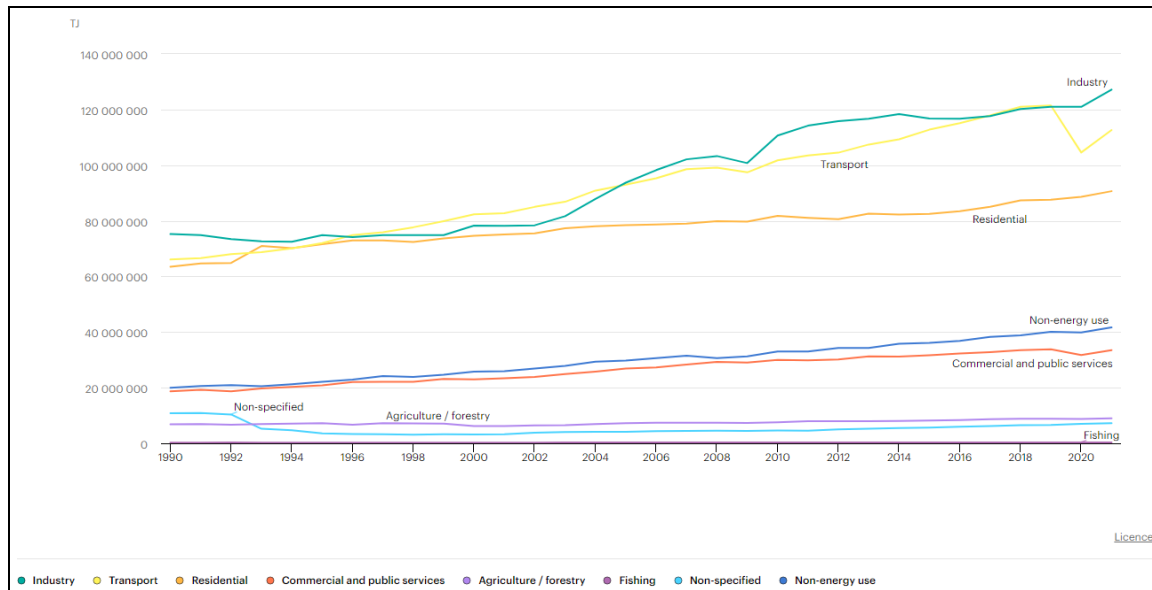


Figure 2.2. Total energy consumption by sectors, World, 1990-2021 (IEA, 2023b)

The transportation sector is one of the largest consumers of energy globally, and it heavily relies on fossil fuels, especially petroleum-based fuels. Transport still heavily depends on oil products for approximately 91% of its final energy, which represents a decrease of only 3.5 percentage points since the early 1970s (IEA, 2023b). Fossil fuels, such as gasoline and diesel, are widely used in cars, buses, trucks, ships, and airplanes. They provide the necessary power to propel vehicles and enable transportation activities. Moreover, the transportation sector is responsible for a significant portion of greenhouse gas emissions, contributing to climate change and air pollution (Coyle and Simmons, 2014). Burning fossil fuels like gasoline and diesel releases carbon dioxide, a greenhouse gas, into the atmosphere. The buildup of carbon dioxide (CO₂) and other greenhouse gases is causing the Earth's atmosphere to warm, resulting in changes to the climate we are already starting to see today (EPA, 2022). Today, emissions resulting from transportation activities constitute approximately 20% of global greenhouse gasses. Among the modes of transportation, roads make up 70% of global emissions, airways 12%, sea lines 11% and railway lines 2% (Çalışkan, 2017).

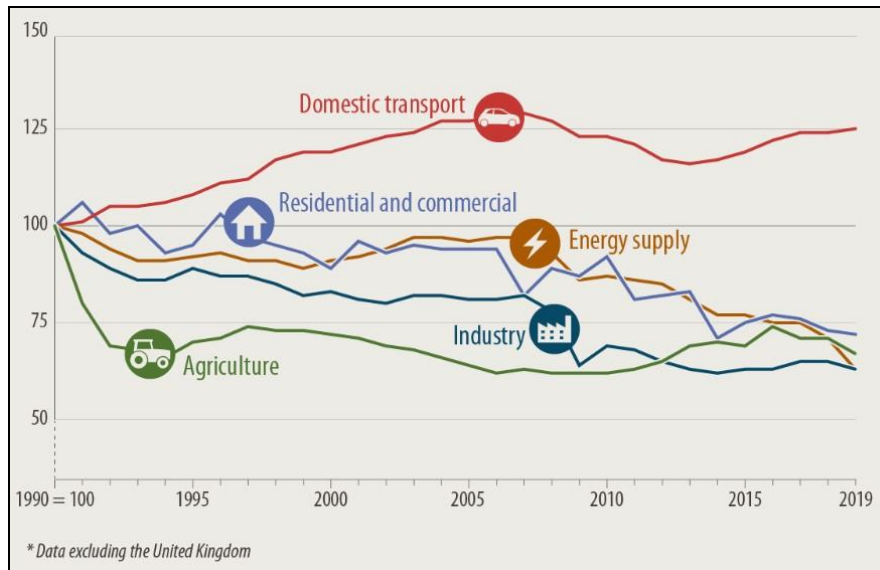


Figure 2.3. Emissions in the EU. Change in emission levels by sector since 1990 (in CO₂ equivalent) (Europarl, 2022).

According to a report from the European Environment Agency, the transport sector is responsible for about a quarter of the EU's total CO₂ emissions in 2019, 71.7% is related to road transportation and motor vehicles. In Figure 1 we see that transport is the only sector where greenhouse gas emissions have increased from 1990-2019, with a 33.5% rate (Europarl, 2022). Also in the US 27% of total greenhouse gas emissions are related to the transportation sector and between 1990 and 2020, GHG emissions in the transportation sector increased more in absolute terms than any other sector (EPA, 2022).

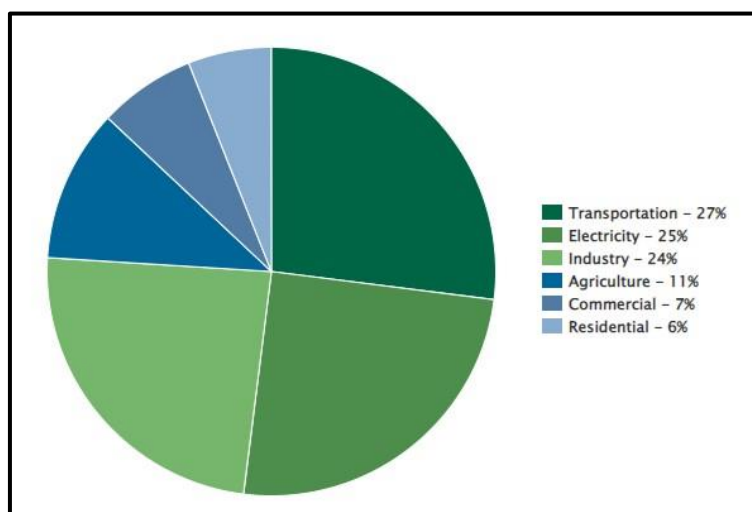


Figure 2.4. U.S. GHG Emissions by sector (EPA, 2022).

This dependency poses severe environmental challenges, including air pollution and the exacerbation of climate change through greenhouse gas emissions. Moreover, the finite nature of fossil fuels and geopolitical tensions in oil-rich regions underscore the vulnerability of this energy reliance, prompting urgent calls for the transition towards more sustainable and resilient energy sources within the transportation sector (Blevis, 2020).

2.1. The Imperative Shift to Sustainable Transportation

The imperative shift to sustainable transportation is driven by the urgent need to address environmental concerns and mitigate the effects of climate change. With the transportation sector being a major contributor to greenhouse gas emissions and energy consumption, transitioning to more eco-friendly modes of transport is essential (Samaras and Vouitsis, 2013: 183, 205).

The role of transport in sustainable development was first recognized at the 1992 United Nations Earth Summit. In the 2012 United Nations Conference on Sustainable Development (Rio +20), world leaders accepted transportation and mobility have an essential role in sustainable development because searches show that sustainable transportation can enhance economic growth and improve accessibility. Except from reducing greenhouse gas emissions, sustainable transportation helps to improve social equality, human health, resilience of cities, and urban-rural linkages. In the 2030 Agenda for Sustainable Development, the sustainable transportation concept takes the role of different SDGs and targets (UN SDG, 2022; World Bank, 2019). Sustainable transportation aims and strategies developed but still we are far behind in reducing greenhouse gas emissions to achieve the 1.5 °C target.

Efforts such as promoting the use of bicycles, enhancing public transit systems, and investing in electric vehicle technologies are crucial steps in reducing reliance on fossil fuels. Additionally, integrating eco-driving training, real-time feedback for drivers, and the adoption of information and communication technologies can improve driving behavior, further minimizing energy consumption and emissions within the sector (Ramadhan and Dinata, 2021; Mebarki , 2020). This evolution towards sustainable transportation not only holds the promise of a cleaner, healthier environment but also supports energy security, economic resilience, and improved quality of life for future generations.

2.2. Promoting Bicycle Use: A Step Towards Sustainability

Cycling is an environmentally, socially, and economically sustainable transport mode. Since bicycle trips are based on biological energy, they do not pollute the air like motor vehicles that consume fossil fuels, for this reason, the bicycle plays a primary role in today's sustainable transportation plans (Pucher and Buehler, 2017). Cyclists are not bound by a timetable and can be flexible about the route, which provides a more free mobility opportunity (Gonzalo-Orden, 2014). The bike is smaller in size than other vehicles, taking up less space in both parking lots and roads. This creates more designable areas for recreation in case of a decrease in parking lots and parking vehicles for the urban space (Bopp, 2018). The infrastructure, vehicle investment, and operating costs of the bicycle are very low. Bicycle vehicle and maintenance costs are cheaper than other vehicles, so it reduces the disparities and imbalances between different income and social groups in society (RTMEUCC, 2021; Forester, 1994; Koçak, 2016). Therefore, promoting cycling as an active mode of transportation is not only beneficial for the environment but also contributes to creating a more inclusive and equitable urban society (Gonzalo-Orden, 2014). Encouraging bicycle use aligns with global sustainability goals by mitigating carbon footprints, promoting economic efficiency through lower transportation costs, and fostering a more inclusive and accessible urban environment (Pucher, 2010).

Rising gasoline prices and the depletion of petroleum-derived resources are another factor that makes cycling important. According to Bloomberg's "Gasoline Prices Around the World" (2020), the average daily income in Turkey in the second quarter of 2020 is \$20.57, and in this case, it takes 16.70% of the daily income to buy one liter of gasoline. Among the 61 countries surveyed, Turkey is the 53. in terms of affordability. The increase in fuel prices continues. According to current data, in the last 1 year in Turkey; gasoline increased by 167 percent, diesel by 221 percent, and LPG by 163 percent (euronews, 2022). The energy crisis combined with the cost of fossil fuels makes bicycle and public transportation appealing remedies.

2.3. Cycling: The Energy Efficiency Perspective

From an energy efficiency perspective, cycling stands out as an extremely effective mode of transportation. Bicycles are, in fact, the most efficient mode of transportation when it comes

to energy utilization (Armstrong, 2022). It transforms the rider's kinetic energy into motion with minimal energy loss compared to motor vehicles, which are less efficient due to their weight and the conversion of stored chemical energy into mechanical work. The energy expended to propel a bicycle is directly related to the cyclist's physical effort, which varies with the terrain and rider skill but is still significantly lower than the fuel consumption of motorized transport. The bicycle stands out as the most energy-efficient mode of transportation when compared to other living things and methods of transport (Tucker, 1975). Cycling is significantly more effective than walking, typically using approximately half the energy of walking to travel 1 kilometer (Armstrong, 2022). In terms of energy efficiency relative to its mass, a bicycle surpasses even birds and fish (Tucker, 1975). Figure 2.5 shows the energy performance of bicycles, diverse animal species, and vehicles. The figure shows that bicycles have the highest energy efficiency among the modes of transportation compared.

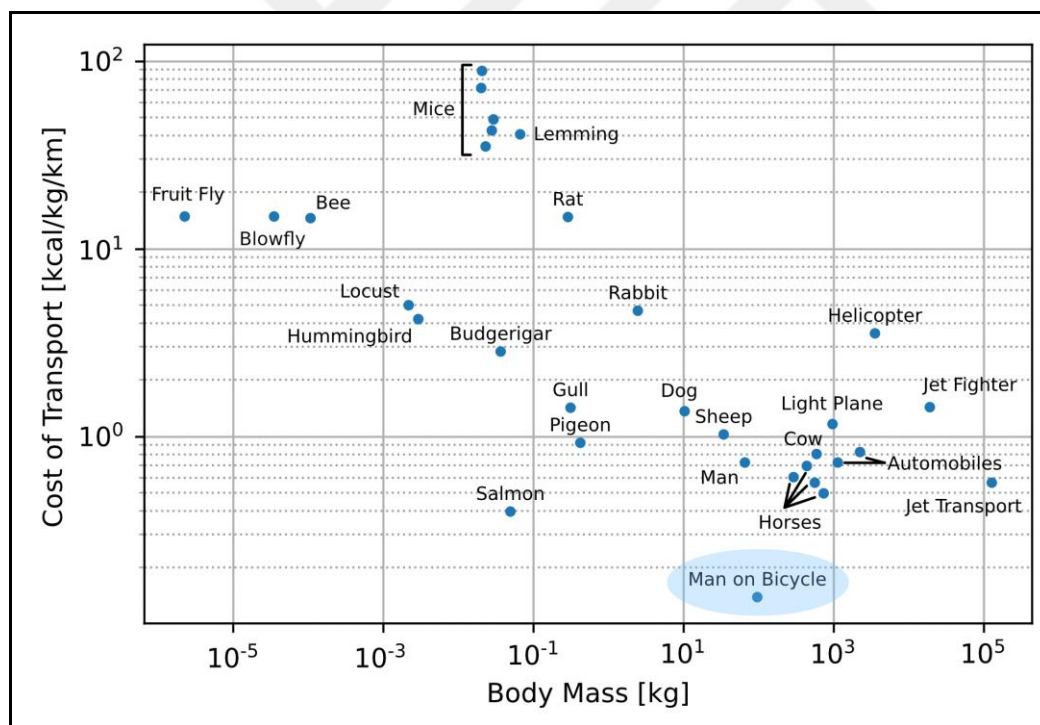


Figure 2.5. The minimum cost of transport for various animal species, vehicles, and cyclists (as the man on bicycle) (Tucker, 1975 in Brake, 2022)

This efficient energy use is coupled with zero emissions—bicycles do not produce the greenhouse gases or pollutants associated with cars and motorcycles. Furthermore, the manufacturing and maintenance of bicycles require considerably less energy and resources

than that of automobiles, contributing to their energy efficiency throughout their lifecycle (Hong, 2018). Figure 2.6 carbon emissions for different modes in their life cycle.

When evaluating the energy efficiency of the bicycle, it is important to consider its economic implications. Furthermore, one should also consider its favorable impact on air and noise pollution. Switching from using cars to riding bicycles or walking can lead to substantial financial savings for both individuals and communities (Environmental Impact U.S. Bicycle Route System Adventure Cycling Association, 2021):

- Energy costs: \$4,5-7,5 per km
- Air pollution costs: \$1,5-18 per km
- Noise pollution costs: \$3-7,5 per km

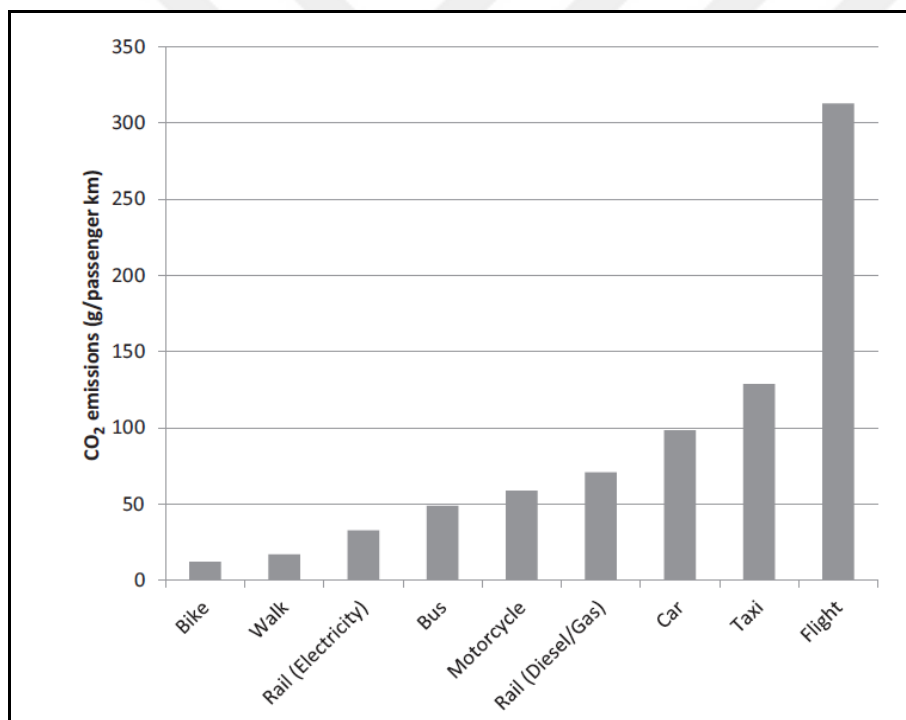


Figure 2.6. Life cycle carbon emissions for various vehicles (Choppin, 2009 in Hong, 2018)

Moreover, bicycles reduce the need for energy-intensive infrastructure, such as large parking spaces and wide roads, while also alleviating congestion, which indirectly reduces energy consumption as less idling in traffic translates to less fuel wastage. The energy expended in cycling is also converted to health benefits for the rider, contrasting sharply with the health costs associated with vehicle pollution and sedentary lifestyles (Hong, 2018). In sum, the

promotion of cycling is not just an exercise in energy efficiency, but a harmonious blend of environmental stewardship, public health enhancement, and sustainable urban planning.

2.4. Concluding Remark

The findings from Section 2 are presented below;

- Global climate change and the scarcity of energy resources are significant challenges for humanity, with the transportation industry playing a major role in contributing to these issues.
- Consequently, the reliance on unsustainable energy types and the resultant environmental pollution have led to serious concerns.
- In recent years, research into sustainable transportation systems has intensified, with bicycles emerging as an attractive option due to their energy efficiency and environmental friendliness.
- The bicycle is notable among sustainable transportation options for its environmental friendliness and high energy efficiency. According to data, cycling is a more energy efficient and environmentally friendly method of transportation than walking. Therefore, it should be given due consideration in the planning of sustainable urban areas.
- Promoting the use of bicycles and integrating them into transportation networks could help mitigate issues such as global warming and energy scarcity.

3. INTEGRATION OF BICYCLE INTO RAIL TRANSPORT SYSTEM

Bicycle-rail integration refers to the seamless connection and coordination between bicycle and rail transport systems (Doolittle and Porter, 1994). This integration aims to facilitate and encourage the use of bicycles as a mode of transportation in urban areas. In the integration scenarios, cyclists could travel the inner city or intercity. Integration research generally addresses the relationship between inner-city bicycle trips and the rail system. Under the integration concept, we can discuss the behavior of the cyclist under two basic headings. Bicycle on car or bicycle off car (Forester, 1994). However, Krizek and Stonebreaker (2011) details this distinction as follows;

1. Bike on transit: In this strategy, the cyclist comes to the transit stop and goes on with his bicycle. The bicycle needs to be aboard the transit vehicle. (In the buses bicycles hang on the racks usually in front of to the buses. In the metro cyclist park his bike inside of car. This strategy is also called bike on board (BoB) (Mil, 2020).)
2. Bike to transit: In this strategy, the cyclist comes to the transit stop and parks his bike in a parking area. This strategy is common in rail transit integrations. The parking area could be inside of station or outside of the station. (This strategy is often called bike-and-ride in the related researches (BaR) (Pucher and Buehler, 2009; Bachand-Marleau, 2011; Mil, 2020)
3. Two bikes: In this strategy cyclist uses two bicycles of himself. cyclist uses one of them to reach the access station and uses the other one from the egress station to the destination. (Not a common behavior for cyclists)
4. Shared bike: In this strategy, cyclists use sharing bicycles at the transit access or egress points.

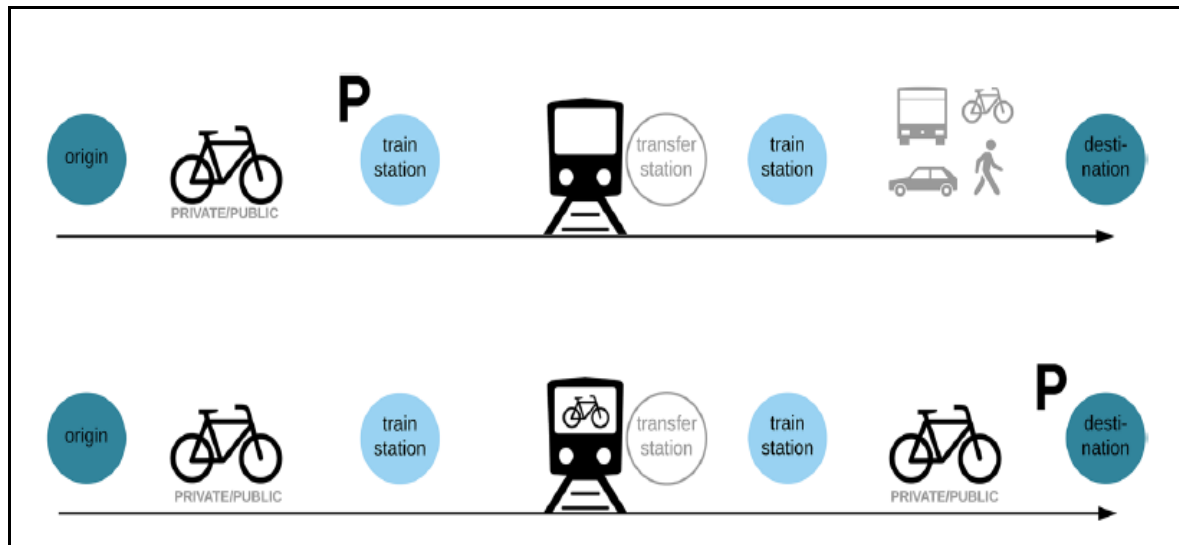


Figure 3.1. Top: BaR (Bike-and-ride) bottom: BoB (Bike on board) (Mil, 2020)

By integrating bicycles and rail transport, cities and communities can create a more sustainable, efficient, and accessible transportation network (Pan, 2010). It is essential to conduct thorough analyses before selecting the integration strategy to ensure its proper functioning and service delivery. (Doolittle and Porter, 1994; Forester, 1994). Bicycle-rail integration involves implementing various measures.

The safe and convenient bicycle network connected with the rail transit system is a necessity for integration (ASSHTO, 2012). It provides safe and efficient routes for cyclists to access rail stations, thereby facilitating the first and last mile of commutes. This encourages more people to combine cycling with rail travel (Geurs, 2016). However, the deficiency of a safe bicycle network affects cyclists' behavior of travel choice behavior and may discourage them from using rail transport as a part of their travel (Doolittle and Porter, 1994). According to Scheltema's (2012) "successful public space for cyclists pyramid of needs", the most important element is the safety of the bicycle routes. The directness of the road, lightning & visibility, and the pavement material are the important factors that affect cyclist behavior. In a research conducted in the Netherlands, it was found that the availability of high-quality bicycle infrastructure significantly increased the likelihood of commuters choosing to integrate cycling with rail transport integration (Krizek and Stonebraker, 2011). In another research conducted in the San Francisco Bay Area Rapid System, it was found that the integrated bicycle network with rail system can increase the catchment area and subsequent

patronage of transit systems, improve overall demand for cycling, and reduce the need for feeder bus services (Cervero, 2013).

The presence of secure and convenient bicycle parking is another fundamental component in the integration of bicycle and rail transit systems (Krizek and Stonebraker, 2010). Without adequate and convenient bicycle parking facilities at train stations, it becomes difficult for cyclists to seamlessly transition between biking and using rail transport. Insufficient availability of bike parking and worries about theft are significant factors contributing to the low utilization of bicycles (Pan, 2010). By establishing ample bike parking at rail stations, transit agencies can significantly enhance the attractiveness of biking as a mode of transport for accessing rail services (AASHTO, 2012). This accommodation plays a vital role in enabling riders to safely store their bicycles before transferring to trains, thus alleviating concerns over theft and vandalism, and providing peace of mind (Mil, 2020; Forester, 1994). Bicycle parking areas in rail stations mostly serve Bike-and-ride strategies (Geurs, 2016). High-quality bike parking facilities, whether in the form of racks or lockers, encourage commuters to consider cycling as a viable option for the first and last mile of their journey, effectively extending the catchment area of transit stations beyond what is accessible by foot alone (Doolittle and Porter, 1994; Cervero, 2013). Research conducted in Montreal, Canada suggests that the most widely accepted scenario involves bringing a bicycle on transit. However, many cyclists prefer to park their bicycles at one end of travel or use a public bicycle as part of an integration strategy (Bachand-Marleau, 2011). The quality and capacity of cycle parking at stations can have a considerable impact on riders' decisions to use their bicycles to access rail services. The quality of bicycle parking is very important, such as a daily cyclist which use rail transit on his journey may prefer secure bike lockers over racks to protect their investment and ensure the safety of their bicycle while they are away. Protection from weather conditions is also important for the longevity and functionality of the bicycle (Sherwin, 2011; Doolittle and Porter, 1994). This issue was highlighted in a study conducted at two intercity stations in Bristol, where it was found that the availability of station cycle parking significantly influenced bike-rail integration practices (Sherwin and Parkhurst, 2010). In brief, the bike parking area needs to be secure, conveniently located, and able to provide protection from weather conditions (such as sun, rain, etc.) for bicycles.

If the chosen integration strategy is BoB, or bike-on-board, where bicycles are allowed to be brought onto trains, it is necessary to ensure that there is sufficient space to accommodate

bikes (Doolittle and Porter, 1994). Additionally, it is important to have clear policies and guidelines in place for bringing bicycles on board, such as designated areas or racks for storing the bikes (AASHTO, 2012). It means that transit agencies should invest in the necessary infrastructure, such as bike racks or hooks on rail cars, and provide clear instructions to passengers on how to safely bring their bikes on board and properly secure them (ASSHTO, 2012). Also while passing the turnstile, first the turnstile should be suitable for cyclists' maneuvers and pass, and cyclists should be educated on the rules and etiquette for bringing bicycles onto trains, such as avoiding blocking aisles or doors and being mindful of other passengers and their belongings.

Cyclists would need to maneuver bicycles through two or three levels down in the stations reach to the transit vehicle, so providing access by elevators, retrofitting a staircase with a bicycle wheel channel, or ramps are necessary as an infrastructure in the BoB system (ASSHTO, 2012; Pucher and Buehler, 2008). Time table is another important point while integrating bicycles into the metro, in peak hours cyclists could not bring their bikes inside trains, because it would cause crowding in trains, So an accurate timetable and availability of trains in high frequency are essential (Sherwin, 2011). BoB is a reliable, fast, and comfortable option in integration strategies however if more than an average number of cyclists start to use this strategy the system won't be feasible anymore (Jonkeren, 2019). Because a bicycle occupies the space of four standing persons in the transit (Forester, 1994). Additionally, the space requirement in stairs-elevators and the platforms won't be sufficient if the number of cyclists is more than the capacity (Jonkeren, 2019).

Cycling infrastructure and spatial configurations by themselves will not be adequate for an effective integration plan. Policies must be established and executed for the advancement of infrastructure development and integration strategy (Cervero, 2013). The development and adoption of coherent policies are pivotal in the successful integration of bicycle and rail transit systems (Pucher and Buehler, 2008). Policy frameworks also govern user behavior, ensuring cyclists adhere to guidelines that promote safety and consideration for other passengers (Krizek and Stonebraker, 2011). Additionally, supportive policies can foster partnerships between transit authorities and local bicycle advocacy groups, further promoting bicycle use (Sherwin and Parkhurst, 2010). By streamlining these regulations and guidelines, authorities can enhance the efficiency of the transportation network, offering a reliable and user-friendly system that encourages the adoption of sustainable modes of travel

and facilitates the expansion of transit catchment areas (Martens, 2007). The lack of awareness among cyclists and the public about the infrastructure projects related to integration, undefined rules, and insufficient support for bicycle transportation by local authorities can present challenges in implementation (Pucher, 2010).

In summary, integration has two sides to success, one is spatial integration which involves the physical infrastructure and spatial configurations to accommodate bicycles within rail transit systems. Another is policy and regulatory integration, which involves the development and implementation of policies and regulations that support the integration of bicycles and rail transit systems.

Developing a more detailed understanding of this strategy market, the priorities of potential users, and the specific benefits of integration is an essential next step (Bachand-Marleu, 2011).

3.1. Benefits of Integrating Bicycles with Rail Transit System

In the reshaping of cities and reinterpretation of transportation, one of the popular sustainable transportation strategies is the combination of bicycle and public transit (Mil, 2020). In order to create a more efficient and sustainable transportation system, the integration of rail transport systems with bicycle networks has gained significant attention in recent years (Oeschger, 2020). This strategy involves the seamless connection between cycling and using rail transit, allowing passengers to easily combine both modes of transportation for their daily journeys. Bicycling-rail integration has the potential to contribute to reducing carbon emissions and car dependence while enhancing transit accessibility and equity (Pan, 2010). This type of travel approach allows commuters to combine different modes of transportation, such as cycling and train travel, to create a more efficient and sustainable journey (Kager, 2016). By providing convenient options for cycling and rail travel, the integration of bicycles and rail transport reduces the need for private car use, which helps alleviate traffic congestion and reduces carbon emissions. Cycling is a sustainable and environmentally friendly mode of transportation that does not produce any emissions. It promotes physical activity and reduces air pollution, improving public health and a cleaner environment (Goel, 2021). Bicycle journeys are typically the lowest cost journeys among vehicle journeys. Integrating

bicycles and rail transport systems allows commuters to save money by avoiding the expenses associated with owning and operating a car, such as fuel costs (Mil, 2020).

Integrating railway transport systems with bicycle networks has the potential to enhance accessibility and connectivity, offering one of its key advantages (Geurs, 2016). The combination of bicycle and rail systems provides better access to attraction points, jobs, schools, etc (Oeschger, 2020). While railways provide efficient, high-capacity, and long-distance connectivity; bicycles offer flexibility, accessibility to short distances, and the ability to cover the "last mile" of a journey, Kager and Harms describe the integration of these two modes of transportation as a "symbiotic relationship" (Kager and Harms, 2016). The fact that the city has a rail system and bicycle integration system encourages both public transport users and cyclists and positively affects the number of both mode users (Pucher and Buehler, 2009). A cyclist has a 15-18 km/hr speed but a pedestrian has a 5-6 km/hr speed. In this way, the passenger can access more areas at the same time. The integration of these modes creates a harmonious, multi-modal transportation network that caters to diverse travel needs (Geurs, 2016). Figure shows the increased catchment area (Kager and Harms, 2016).

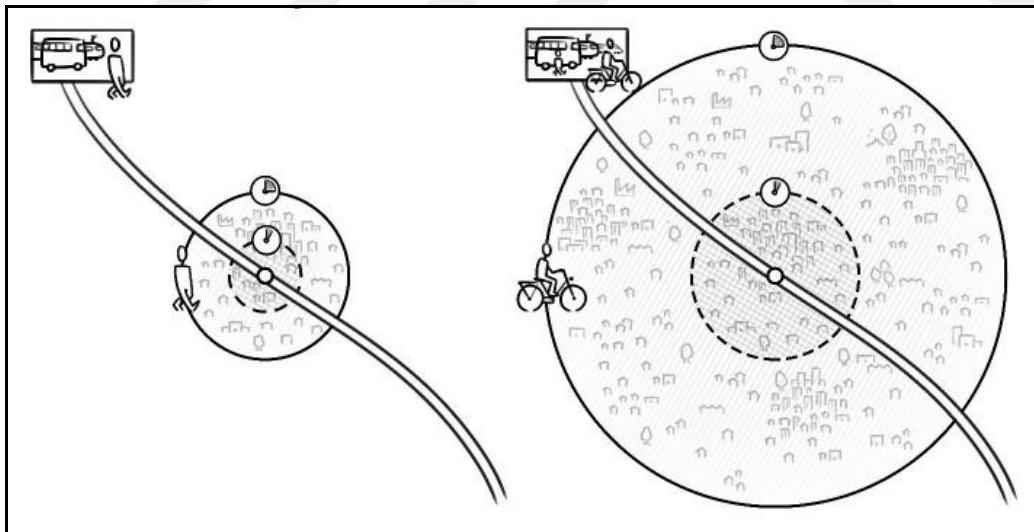


Figure 3.2. Increased catchment area (Kager and Harms, 2017).

Cyclists mostly make journeys between 0-5 km on their bicycles (Bachand-Marleau, 2011; Pucher and Buehler., 2008). However, if multi-modal transportation is provided, a distance of 20 km or more is accepted for travel. Regarding bicycle and rail system integration, the accepted time and distance that an average cyclist will cover in 15 minutes is 1.5 km - 3.5 km (Geurs, 2016). Ideally, the cyclist arrives at the nearest rail station within the accepted

average time and distance. But not every cyclist is "average". Depending on bicycle type and cyclist's demography could change their travel time and distance.

3.2. Bicycle Users and Travel Purposes

When considering the issue of bicycle transportation, two of the most important factors are the characteristics of bicycle users and the purposes of their journey by bicycle. The bicycle as a vehicle has different sizes and features. Different types of users choose among various bicycle models for different purposes. For this reason, bicycle infrastructure should be designed taking into account various vehicles and drivers (NACTO, 2016). Figure 3.3 shows some sample bicycle types and sizes.

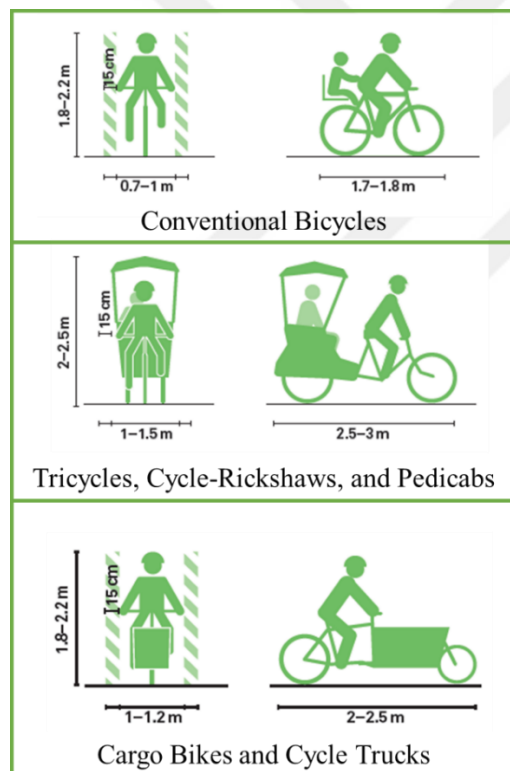


Figure 3.3. Bicycle types and sizes (NACTO, 2016)

Apart from the types of bicycles, another important issue is the diversity of users riding the bicycle. It would be wrong to carry out bicycle projects by uniformly treating bicycle users. There are bicycle users of different age groups and physical strength. Depending on this diversity, cycling speeds and distances they can cover will also vary. The commuter and recreational cyclists have different operating and design needs. Defining strategic

approaches for each group is essential for a bicycle network (City of London Planning Division, 2005). Figure 3.4 shows different users and their average speeds.

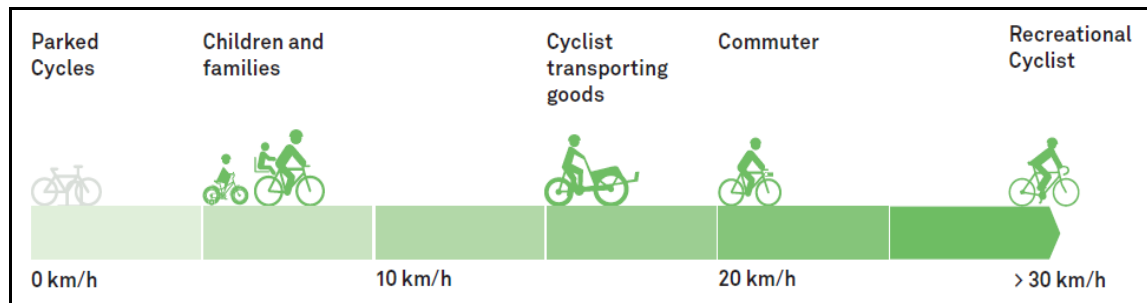


Figure 3.4. Different bicycle users and their average speed (NACTO, 2016)

Since the infrastructure and cycling needs of these cyclists are different, naturally their demands on cycling may also vary. Another important factor that distinguishes cyclists from each other is their current or potential cycling behavior. Geller discusses four types of cyclists in his article published in 2006 (Geller, 2006 in Dill and McNeil, 2013). This distinction remains valid today and is used in cyclist research (Dill and McNeil, 2016). According to this grouping, bicycle user behaviors are divided into four groups:

- **Strong and the Fearless:** Bicycle equipment is in good condition. People who cycle on high-speed roads even if there is no cycling infrastructure.
 - **Enthusied and Confident:** The group that can cycle with motor vehicles, but they prefer to have bicycle infrastructure
 - **Interested but Concerned:** A group that is enthusiastic and curious about cycling. However, due to the lack of bicycle infrastructure, they do not want to cycle on the same road as motor vehicles.
 - **No Way No How:** The group that does not want to cycle, regardless of whether there is a bicycle infrastructure or not.
- (Dill and McNeil, 2016).

According to the cyclist behavior survey conducted by Geller in Portland in 2006, the cyclist distribution rate is as shown in figure 3.5.

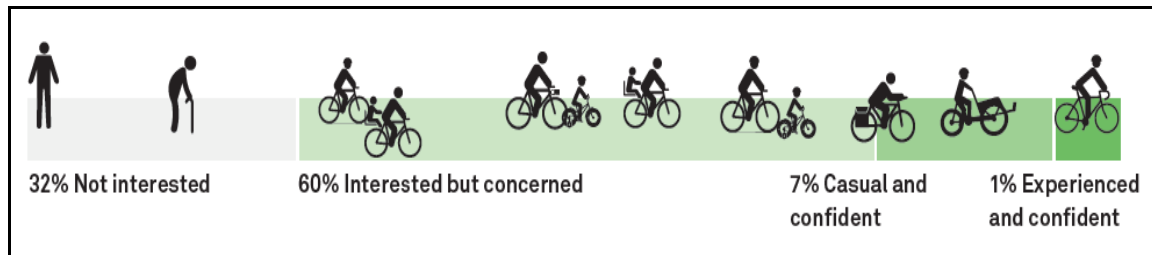


Figure 3.5. Distribution of cyclists in Portland according to Geller grouping (NACTO, 2016)

As can be seen in the figure, potential bicycle users have the highest rate among all bicycle users. Even though experienced cyclists have higher endurance in traffic, they are a very small minority. Therefore, it would not be the right approach to consider only experienced cyclists with high riding capacity when creating bicycle infrastructures. It is also necessary to consider children who are just learning to ride a bicycle, elderly cyclists, cyclists carrying loads, or employees who have long journey times and distances (NACTO, 2016).

According to research, bicycle incentive policies target the interested but anxious group. By revealing that this group does not like driving (traffic or economic reasons), it was supported that they should be prioritized over other groups. This group rides bicycles for recreational purposes at least as much as other groups, but they do not prefer to use bicycles for transportation purposes due to lack of infrastructure. The most important reason for not using bicycles in transportation is safety. This group, which prefers bicycles if they have their bicycle path, does not want to cycle on shared or vehicular roads (Dill and McNeil, 2016).

Travel purpose

When we look at Geller's types of cyclists, one of the important points is that Geller deals with cyclists in a transportation-oriented manner in general. There is no distinction here for recreation or other travel purposes. In the grouping considered, the behavioral patterns of cyclists were not evaluated depending on their trip type. Geller's typology is based mostly on users' emotions (such as fear, trust, courage, etc.) (Dill and McNeil, 2013).

In this respect, considering travel purposes in bicycle transportation studies can be useful in understanding the travel behavior of cyclists. Napper emphasized in his study that the purposes of bicycle travel are not included enough in the literature. He states that he does not find the transportation or recreational generalization particularly accurate. Travel

purposes have been discussed in various ways in the literature, Napper compiled this diversity and proposed a new bicycle trip purpose grouping. This grouping is shown in Table 3.1 (Napper, 2023).

Table 3.1. Napper's synthesis of the journey types (Napper, 2023)

Journey types from literature	Proposed Aggregate Journey Type
Social, recreation	Recreation
Exercise Dining out Journey to work School/Education	Commute
Utilitarian or transportation Carrying cargo Shopping Personal business Dining out	Tasks & errands
Carrying passengers	Passenger
Carrying cargo	Work
Competitive sport	Sport

In his research, the author also points out that these travel types are not separate from each other, on the contrary, there may be transitions and switches between types. The point that needs to be understood here is that, for example, a user who rides a bike as a sports activity may not ride his bike for transportation purposes in heavy traffic. In this regard, Interviewee 5 states that he rides a bicycle for transportation purposes in Ankara, but he only allows his son to ride a bicycle for recreational purposes, or he does not use a bicycle for transportation purposes with his son as a passenger. Even when his son grows up in the future, he thinks that he won't approve of his son riding a bicycle for transportation purposes in Ankara. Similarly, Napper states in his article that his fear increases while cycling with a child passenger. Therefore, both the cyclist's demographic structure and the purpose of the trip are factors that directly affect cyclist behavior (Dill and McNeil, 2013).

It is not enough to rely solely on promoting walking and cycling to make a transportation system sustainable. Because there are different user and travel types, especially walking and cycling distances may vary depending on the weather and topography conditions. Therefore, a multi-modal transportation system needs to be designed in which walking and cycling modes are integrated with public transportation (Friman, 2018).

The reason for providing detailed information about cyclist groups and their journeys in this part of the research is based on the researcher's prediction on a subject discussed in the expert opinions section. The prediction is this: "Civil society representatives are in the "strong and fearless" group of cyclists expressed in the literature. However, projects are often aims the "interested but concerned" cyclist group. We can expect a conflict between Interviewee 2's opinions and the other expert's opinions about the sufficiency of the bicycle plans.

3.3. Good Practices of Successful Rail-Bicycle Integration

Making cycling an active mode of transportation is often a decision taken by governments and local authorities. Cities across the globe have been making significant strides in integrating bicycling with rail transit to create more efficient and sustainable transport systems.

Amsterdam and Copenhagen are leading examples of cities where bicycle-rail integration has been exceptionally well-realized. Amsterdam and Copenhagen are leading examples of cities where bicycle-rail integration has been exceptionally well-realized (Cervero, 2013).

In Amsterdam, bicycle-rail integration plays a crucial role in the urban mobility system. The city showcases a symbiotic relationship between cycling and rail transport, manifesting in features like the OV-fiets bike-sharing program tailored for rail commuters, which has seen consistent growth and high demand (Kager and Harms, 2016; Villwock-Witte and Grol, 2015). Train stations are equipped with extensive bicycle parking facilities, reflecting both in quantity and quality, with investments ensuring seamless and efficient bike-to-train transitions. The efforts to integrate these two modes of transport are aimed not only at increasing the attractiveness of public transit but also at supporting the city's sustainability goals, reducing traffic congestion, and promoting a healthy lifestyle among residents (Pucher and Buehler, 2008; Pucher, 2010; Charreire, 2021). The success of Amsterdam's approach is evident in the high usage rates of both cycling and public transit, serving as a model for effective cycling-transit synergies (Kager and Harms, 2016).



Figure 3.6. Left: Bicycle tire slot Right: OV-fiets bike (Villwock-Witte and Grol, 2015)

Similar to Amsterdam, Copenhagen is one of the leading cities in terms of bicycle infrastructure and rail system bicycle integration. With a deeply ingrained cycling culture, Copenhagen has strategically incorporated cycling into its public transportation network. Copenhagen's advanced urban structure centered on public transportation (known as the Finger Plan) has facilitated the integration of the bicycle into this system (Knowles, 2012). The city's infrastructure includes dedicated bike lanes that lead directly to train stations, enabling smooth transitions for those combining bike and train travel (Aun, 2010). Commuters benefit from a comprehensive bike-sharing system and an abundance of bike racks at train stations (Cannon, 2024). This commitment to integration extends beyond rider convenience, also serving to advance Copenhagen's environmental objectives, diminish urban traffic, and promote active, eco-friendly lifestyles among its citizens (Knowles, 2012).

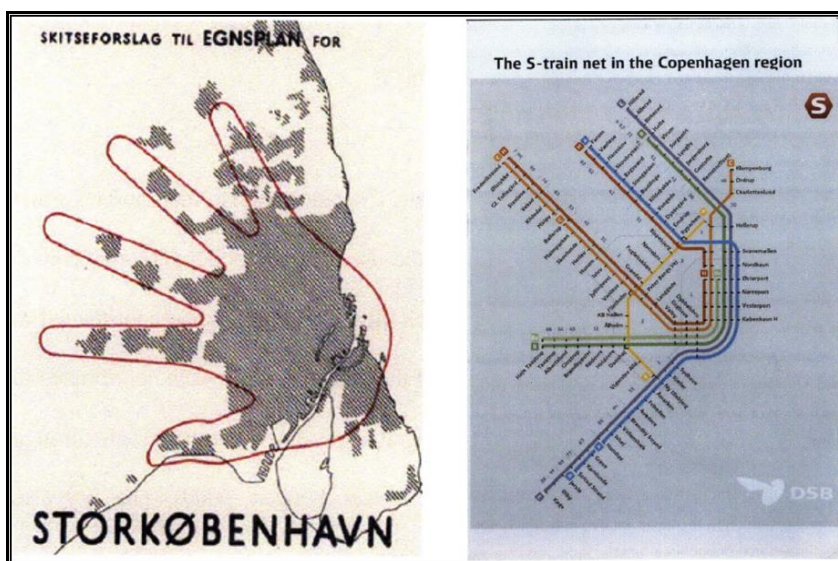


Figure 3.7. Left: The Finger Plan Right: S-train network (Aun, 2010)

Japan's urban transportation network is known for being efficient, accessible and public transportation-oriented (Guo, 2018). The biggest advantage of Tokyo in terms of integration is that it has a comprehensive rail system line similar to Copenhagen. The city has achieved rail system-centered growth during its development process. However, they encourage a transportation system that prioritizes walking, cycling or other forms of public transportation instead of cars when accessing rail system stations (Calimente, 2012). The city's expansive public transportation network is complemented by extensive bicycle infrastructure, including ample bike parking at train stations and the availability of bike rental services, accommodating those who choose to cycle to and from rail services (Pucher and Buehler, 2009). Bicycles play a significant role in Japan, with a modal share of about 25% in Osaka and 14% in Tokyo. Japan is one of the biggest bicycle countries, with one bicycle per 1.5 people. The main purpose of cycling in Japan is shopping in neighborhoods, commuting, and accessing railway stations (Suzuki and Nakamura, 2017).

In the United States, Portland, Oregon, and San Francisco, California, are recognized for their initiatives in merging cycling with rail transportation. Portland exemplifies bike-and-ride integration, with TriMet's public transit system allowing bikes on light rail trains without additional fees or permits, and all buses being equipped with bike racks (Lasky, 2005). The city has also established bike routes that are thoughtfully coordinated with the public transport network, enhancing access to transit stops (Krizek & Stonebreaker, 2011; Singleton and Clifton, 2014). Meanwhile, San Francisco's Bay Area Rapid Transit system faces challenges with bike capacity during peak hours but provides accommodations at other times, promoting multi-modal commutes (Pucher and Buehler, 2009; Curtis, 2012). Both cities have worked towards improving bike parking infrastructure at transit stops, striving to encourage cycling as a part of daily commutes, decrease road congestion, and support sustainable urban living.

3.4. What about Ankara ?

Following its establishment as the capital of the Republic of Türkiye on October 13, 1923, the city of Ankara underwent a period of rapid growth and development, solidifying its position as the core of the new republic. Presently, Ankara is, after Istanbul, Türkiye's second most populous city, with a metropolitan area exceeding 5 million inhabitants. Similar to other major urban centers in the contemporary era, Ankara's transportation network is

heavily reliant on private automobile usage. In the 1960s, the national government's emphasis on highway infrastructure investment also shaped transportation developments in Ankara, leading to the construction of multi-level intersections and the expansion of intercity connections (Tekeli, 2010). During the 1970s, the city of Ankara faced escalating transportation challenges. Although the EGO provided public buses in 1969, the inability to continue expanding the vehicle fleet in subsequent years and the private sector's failure to invest in transportation infrastructure resulted in unmet travel demand. Moreover, as public institutions relocated away from the city center, increasing personnel shuttle vehicles contributed to the growing congestion. The proliferation of domestic automobile production in the 1970s also led to a surge in private vehicle ownership and usage, which outpaced public transportation capacity by 1975 (Çubuk and Türkmen, 2003).

In response to these transportation challenges, Ankara has implemented various policies and strategies to improve the efficiency and reliability of its public transit system. The development of Ankara's rail system commenced in the 1980s. The city's rail system, in particular, has seen substantial growth, with the introduction of light rail and metro lines to address the increasing demand for efficient public transportation (Babalık-Sutcliffe, 2016). The Ankaray metro line was inaugurated in 1996, providing a connection at the Kızılay station with the Ankaray line. The metro line was planned to operate along the Kızılay-Yenimahalle-Ostim-Batıkent route and was subsequently launched in 1997. Currently, these two rail lines constitute critical components of Ankara's public transportation infrastructure, continuing to serve the city's residents (Öncü, 2017).

The current transportation landscape in Ankara reflects a mix of modes, with the bus system playing a crucial role in supplementing the rail network. While the public transit system has improved connectivity, the city still grapples with challenges related to traffic congestion and the need to prioritize pedestrian and cyclist infrastructure (Vitoşoğlu, 2014). Ankara has the highest rate of motor vehicle ownership per capita among Turkish cities, with 32.2 vehicles per 100 residents. In contrast, the national average for Türkiye is significantly lower at 17.8 vehicles per 100 people. (TUIK, 2024). The data indicates that private cars are the preferred mode of transportation for longer trips in Ankara. While automobiles accounted for 15% of transportation preferences in the 1930s, they now make up 21.69% of the total modal share. In contrast, bus journeys constitute 24.67% of transportation demand. Analysis of non-motorized transportation preferences reveals that walking is the choice for 27.91%

of trips, while only 0.08% of travelers utilize bicycles (Akin, 2021). Efforts are underway to enhance the walkability and bike-friendliness of Ankara, as the city recognizes the importance of promoting sustainable mobility options for its growing population.

According to the 2038 Ankara Transportation Master Plan data, the bicycle transportation rate in Ankara is %0.08 (Ulvi, 2019). *“ In daily conversations, we say there is a one in a thousand chance for impossible things. This is what it's like to be a cyclist in Ankara. ” (from the interview with Interviewee4, he said this sentence).* According to the thesis research conducted by Akin (2021), which deals with bicycle users and their behavior in Ankara;

- In the city of Ankara, bicycles are generally used for recreational purposes, but only 21.3% of cyclists use bicycles for transportation on weekdays.
- The vehicle-oriented development of the city and the lack of bicycle infrastructure are obstacles to bicycle use.
- Current cyclists generally ride on the carriageway. It is dangerous.
- Bicycle infrastructure demands are mostly concentrated in the sub-centers of the city.
- Recreational cyclists typically favor safe, gently sloping roads and enjoy covering long distances (exceeding 5 kilometers). On the other hand, in commuting travels by bicycle, cyclists prefer the shortest route and minimal travel time. This preference may potentially differ in Ankara.

There are cities globally that have effectively integrated rail systems and bicycles, and continue to advance in this area. Referring to successful examples will be instrumental in developing a new application. However, it's important to note that the aforementioned cities and Ankara differ from each other in several aspects. The table oo shows data on population, surface area, and population density for these cities. According to the data, Ankara is a very densely populated city compared to other cities. In terms of surface area (surface areas are urban areas that express the jurisdiction of city municipalities), Ankara city has a considerably larger area than other cities in terms of both municipal authority boundaries and irregular urbanization. When assessing the state of bicycle infrastructure in Ankara compared to other cities, it is crucial to consider the specific contextual factors and data unique to Ankara. Policies or physical designs that have proven effective in other urban environments may not be directly transferable or appropriate for Ankara due to its distinct characteristics and conditions.

Table 3.2. Example cities and Ankara's data of population, area, and population density (data from: luminocity3d.org; citypopulation.de)

Name of City	Population	Area	Population Density (pp/ km ²)
Amsterdam	≈1,2 m	193.3 km ²	7.0 k
Copenhagen	≈1,3 m	292.5 km ²	8.6 k
Tokyo	≈34,1 m	2,194 km ²	10.2 k
San Francisco	≈0.8 m	600.59 km ²	7.2 k
Portland	≈1.8 m	346 km ²	2.7 k
Ankara	≈5 m	24,521 km ²	21.6 k

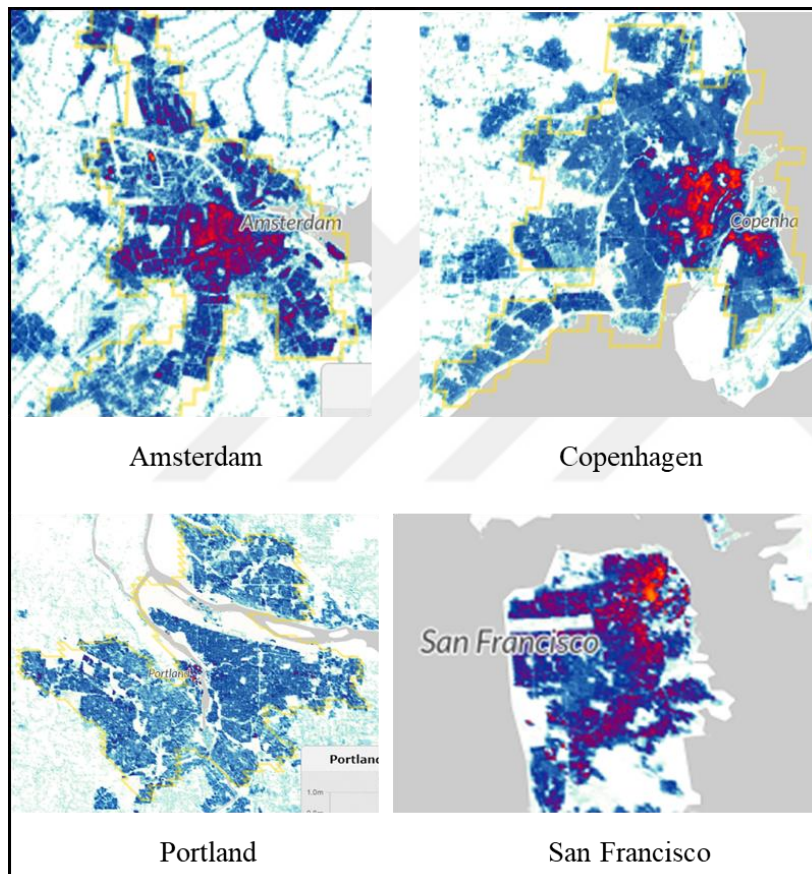


Figure 3.8. Population density maps of Amsterdam, Copenhagen, Portland and San Francisco (luminocity3d.org)

Regarding this issue, Interviewee 5 says the following:

‘I use my bicycle in Lowen (a city in Belgium with a population of approximately 100 thousand people), where bicycles have all kinds of priority in traffic. I would like to show the practice here to the authorities in our country, but we should not make this mistake: Lowen and Ankara are different cities in terms of scale. Lowen is a much smaller city, a city of 100 thousand people, so it is very easy to implement policy. For example, questions such

as why Ankara is not Amsterdam are asked regarding bicycle transportation. We cannot be Amsterdam, we cannot be Delft, so it is not possible anyway. We have a population of 6 million to cope with in Ankara. Even the population of Brussels is not 2 million. For example, the entire population of Belgium is the same as the population of Istanbul. That's why it would be unfair to compare European cities with Turkish cities. ''

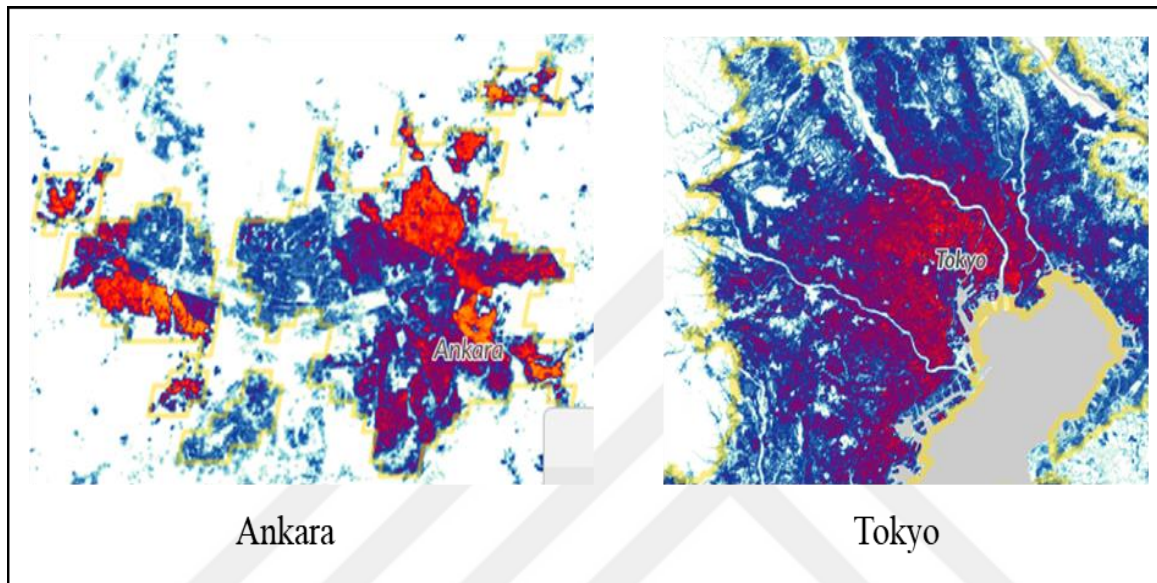


Figure 3.9. Population density maps of Ankara and Tokyo (luminocity3d.org)

Cities where bicycles play an active role in transportation today have also gone through a long process of struggle, implementation, and policy development. Developing a cycling culture plays a crucial role in making bicycles an active mode of transportation in cities. Amsterdam is a great example of this process.

Amsterdam, the "bicycle capital" of the world, has a network of cycle paths and lanes that cater to the needs of cyclists. The city's bicycle culture has evolved over many decades to become a cornerstone of the city's transportation system and urban identity. The network of cycling paths in the Netherlands has its origins in the 1890s. It has been described as the world's leading cycling nation since the 1900s (Reid, 2017). However, the city of Amsterdam faced threats from the growing number of cars in the 1950s and 60s, leading to the rise of "Stop de Kindermoord" (Stop the Child Murder), an action group that protested against traffic fatalities and child deaths (Bruno, 2021). Because related to the increase in car ownership, between the 1950s and 1970s, the number of children and cyclist fatalities from car accidents in Amsterdam doubled (Bruno, 2021). During the 1970s, Stop de Kindermoord

received financial support from the Dutch government and formulated strategies for enhancing urban safety. This initiative ultimately resulted in the introduction of *woonerf*, which encompasses streets designed to prioritize pedestrian well-being through features such as speed bumps and meandering pathways. (van der Zee, 2015; Hockenos, 2013). Dutch politicians became aware of the advantages of cycling and began introducing measures to make their streets more cycle-friendly in the 1980s (Reid, 2017). The cities of The Hague and Tilburg tested out dedicated cycling routes, but they found that a single route did not result in a significant overall rise in cycling. In contrast, Delft implemented an extensive network of cycle paths, leading to an increase in the number of people choosing to cycle. (van der Zee, 2015; Bruno, 2021). Today, the Netherlands has approximately 35.500 km of cycle paths, with 25% of all trips made by bicycle. All major cities in the Netherlands have appointed "bicycle coordinators" to upkeep and enhance the cycling infrastructure. The increasing popularity of cycling is attributed in part to advancements in electric bike technology (van der Zee, 2015; Reid, 2017). It is important to note that the Netherlands did not "suddenly" become a cycling country in the 1950s (Reid, 2017). This is the result of a process and is achieved by different partners and actors. It is important to note that the Netherlands did not "suddenly" become a cycling country in the 1950s. This is the result of a process and achieved by different partners. It is very important that the local government acts in line with the collective demands of the cyclists and the rest of society. The Dutch cycling culture has been built over almost 100 years. So the Netherlands is not a cycling country just because it is a "flat plain".

It is evident from the case of Amsterdam that the development of a successful bicycle culture is not only the demands of society but also the will and the action of decision-makers and management units. This situation highlights the importance of long-term planning and the involvement of the various stakeholders in shaping a city's transportation system. When we look at the number of bicycle users (0.08%) in Ankara, we can say that a bicycle culture has not yet formed. However, the city has a Bicycle Council led by Interviewee 2 operating under the City Council and many different cycling NGOs and university cycling clubs. Examining their roles and contributions to the recent bicycle project in Ankara could help to understand the current "bicycle culture" in the city. The extent to which current bicycle users and civil society are involved in bicycle transportation efforts in Ankara will be discussed by Interviewee 2's statements in the later parts of the thesis.

3.5. Concluding Remark

The findings from Section 2 are presented below;

- The integration of rail systems and bicycles is a crucial strategy in promoting the use of bicycles as an efficient urban transportation option. However, successful implementation depends on meeting the requirements for this strategy.
- For the strategy system to be comprehensive, it needs to consider a range of bicycles and types of cyclists. This is because various factors such as trip purpose, bicycle type, and cyclist characteristics contribute to the diversity of bicycle journeys.
- NGOs dedicated to cycling in the city of Ankara consist of experienced and confident individuals who are typically considered to make up 1% of the overall cyclist community. Members from this group are often included in the collaborative planning process. This could lead to conflicts in bicycle planning, as studies on bicycle transportation typically focus on the potential but non-participating audience, which comprises about 60% of the population. Initiatives and policies aimed at encouraging this majority to cycle may face resistance or criticism from non-governmental organizations currently cycling in hazardous and congested traffic conditions. This likely explains why there is often disagreement between Interviewer 2 and professional experts in the expert opinions section.
- Bicycles are widely used for urban transportation in many cities globally. However, before comparing a large city like Ankara with others, it is important to consider factors such as population density, built environment, traffic patterns, geographic size, and climate. This approach ensures a fair comparison that acknowledges the unique characteristics of Ankara and supports the efforts of experts working to enhance bicycle transportation in the city.
- Improving the efficiency of bicycle transportation within an urban area necessitates dedication and a substantial amount of time.

The elements necessary for integrating bicycle and rail systems can be seen as a cycle with three fundamental components that support and enhance each other rather than occurring in distinct stages. The proposed cycle is shown in Figure 3.10.

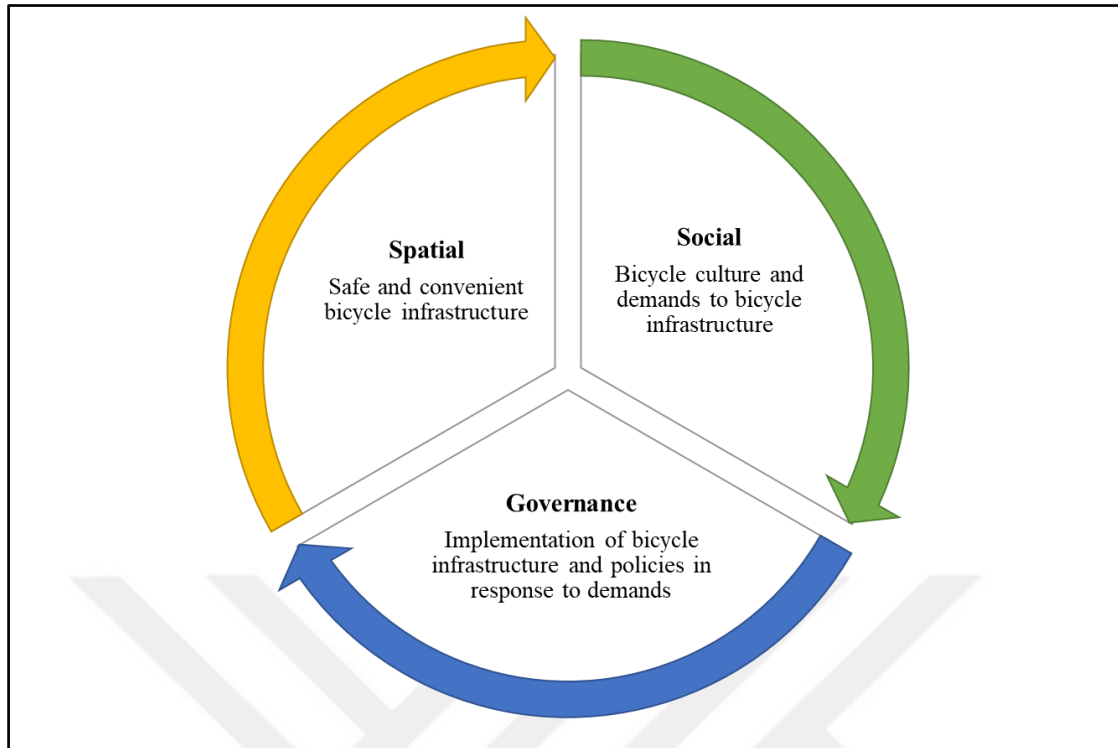


Figure 3.10. Cycle of bicycle transportation development components (Produced by the author)

To elaborate on the concept, having a bicycle infrastructure leads to more cyclists, which in turn fosters a cycling culture and community. As this cycling community grows, there arises a demand for better bicycle facilities from city authorities and policymakers. When local governments recognize the significance of cycling, they invest in enhancing the cycling infrastructure, consequently prompting higher participation in bicycling. This symbiotic relationship between bicycling and infrastructure development perpetuates itself. However, the crucial aspect is initiating this cycle from a specific point.

4. CASE STUDY: BICYCLE TRANSPORTATION PLANS IN ANKARA

Several recent research projects have been conducted in Ankara on sustainable transportation. This thesis specifically centers on two significant studies related to bicycle transportation, which were conducted between 2019 and 2020. These studies aim to develop a cohesive bicycle strategy for the city and suggest potential bicycle networks. The chronological order of these two studies is as follows:

1. Within The Framework Of Decarbonization Of Ankara Urban Transportation And Non-Motorized Modes Project, Ankara Priority Bicycle Network Study, Ankara Bicycle Strategy (EGO's NS.,)
2. Bicycle Strategy, Master Plan, and Pilot Implementation Project for Integrated, Non-Motorized, and Multimodal Transportation in Ankara (ARUP's plan)

The shared characteristic of these proposals and the rationale for their inclusion in the thesis is their focus on devising a transportation network plan for the city based on integrating bicycle and rail systems. Both plans advocate using Ankara's rail system as a central axis and designing bicycle paths to connect with this axis. It is noteworthy that both studies endorse this approach, indicating consensus between two separate specialized transportation teams, one local and one foreign.

4.1. Preliminary Field Study

As noted under the methodological approach title in the thesis introduction part, a preliminary on-site investigation was conducted to gain a deeper comprehension of the topic and pinpoint challenges encountered during the formulation of the methodology. Several studies on bicycle transportation in Ankara have been conducted, which will be discussed in detail in the subsequent sections. These studies share a common approach to the integration of the rail system and bicycles. However, in the period following the completion of these studies, many of the proposed initiatives were not implemented, and those that were implemented exhibited various shortcomings. The preliminary field research serves as a modest indication that the planned projects have not been fully realized. The decision to focus the thesis on investigating the underlying reasons for the lack of implementation, rather

than simply documenting the "what" regarding rail-bicycle integration, is the rationale behind the chosen research approach. Informed by the preliminary field research, the researcher determined to conduct in-depth interviews with subject matter experts to explore the reasons behind the lack of project implementation. The field observations also informed the development of the semi-structured interview form.

During the field study, the rail system bicycle integrated journey of a volunteer cyclist with his bicycle was observed. The search began at the Ankaray Dikimevi station (on Saturday, around 2:40 pm, the researcher selected the weekend for their investigation, as they had found this time to be more conducive to safe travel via bicycle and public transportation based on their personal experiences) and concluded at the Kızılay metro exit. The researcher consciously chose Dikimevi and Kızılay stations because the bicycle rail and bicycle parking facilities at Dikimevi station had been previously studied, and Kızılay serves as the central intersection point in Ankara. The study involves a brief trip and the observation of a volunteer cyclist's journey solely to contribute to the development of the methodology. To ensure the observation is appropriate for its intended use, a review of relevant literature was conducted, with specific focus on the elements outlined in figure 4.1.

Bicycle Parking	
	• Inside of the stations • Outside of the stations
Access to Station	
	• Stairs • Turnstiles • Elevators • Escalators
During trip in the metro	
	• Immobilize the bike in the cart • Possible seats for cyclist

Figure 4.1. Factors related to infrastructure that were considered during the observation

The results obtained as a result of the research are as follows:

Bicycle Parking

- Inside of the station: A limited bicycle parking facility is available at the Dikimevi stop, however, the bike racks are not firmly secured, allowing for only one wheel to be attached. The Kızılay metro station serves as a spacious and important hub where both the metro and Ankaray lines intersect, yet it does not provide any designated bicycle parking area.
- Outside of the station: Bicycle parking is not available at any of the exits of the Dikimevi or Kızılay station that was observed.

Photos captured at the parking area of Dikimevi station are depicted in figure 4.2. As there are no secure and appropriate bicycle parking facilities at Kızılay station, there is no corresponding visual representation.

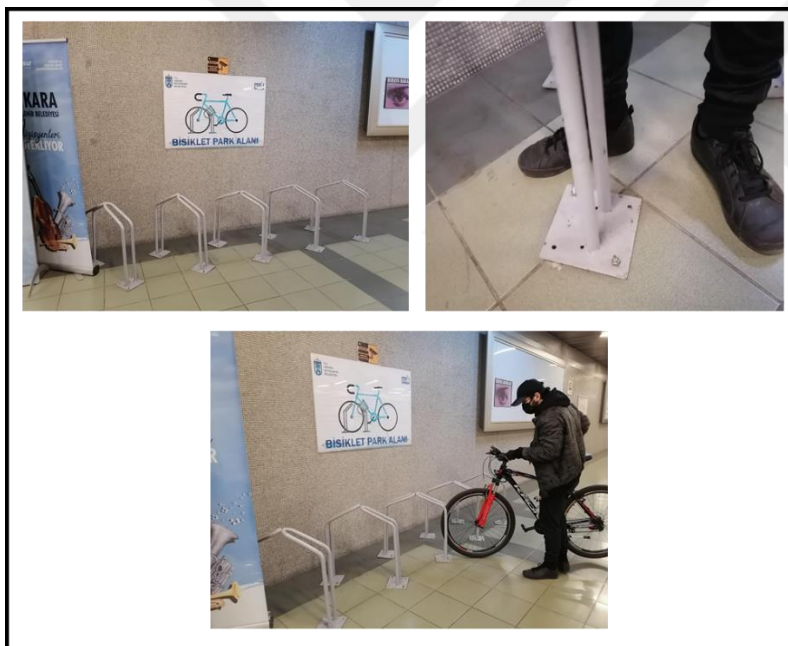


Figure 4.2. Photos taken at Dikimevi station

Access to Station

- Stairs: Many station stairs do not have bicycle rails, which means that cyclists, whether they prefer BoB (bike on board) or BaR (bike and ride), must carry their bicycles while descending to the station. Furthermore, it has been noted that other passengers striking the cyclist's bike or obstructing the cyclist can be hazardous and significantly impact the cyclist's journey. Although there has been an increase in bicycle rails at stations since

this observation was made, there is no available data on which stations and stairs have these facilities.

- **Turnstiles:** Turnstiles present a significant issue. Cyclists must go through the gate intended for disabled individuals when entering and exiting. It observed that cyclist pays first and then proceeds through the gate designated for disabled passengers. The exits reserved for disabled persons are often locked because of misuse by other users, necessitating interaction with security personnel to unlock them. Adjusting turnstiles for cyclists' use and potentially implementing preferential treatment in payment could have positive implications for urban bicycle transportation.

Figure 4.3 shows the photos of the stair and turnstile taken by the researcher during the observation.

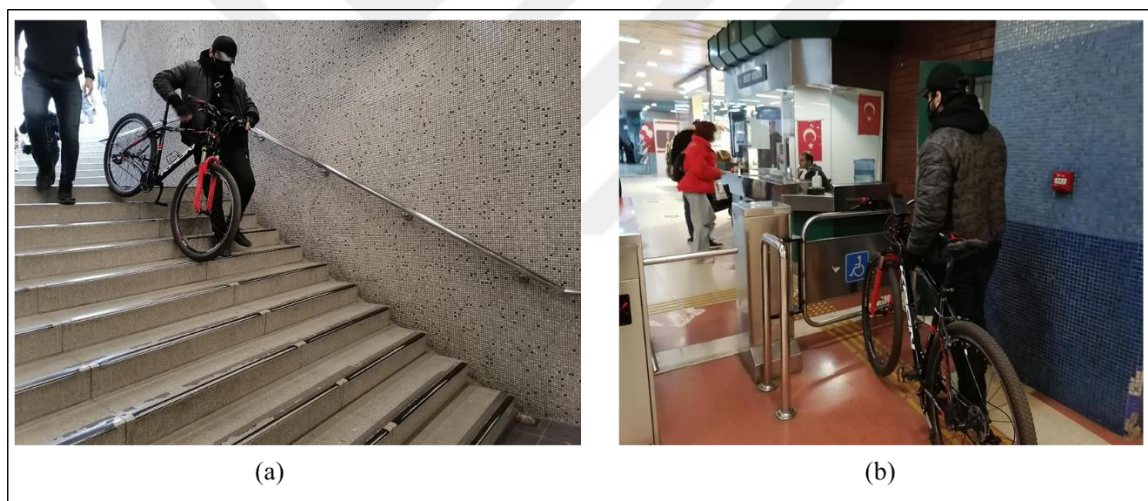


Figure 4.3. (a) The cyclist descending the stairs carrying his bicycle (b) The cyclist passing through the turnstile gate reserved for disabled individuals

- **Elevators:** Elevators provide a suitable alternative to stairs for cyclists in certain situations. At the Kızılay stop, the elevator is primarily intended for use by elderly and disabled individuals, so cyclists should yield to priority users. The elevator can accommodate a cyclist along with two other people, but it has not been assessed whether two bicycles can fit inside simultaneously as this was only tested with a single bike.
- **Escalators:** Using escalators poses a significant risk, as the bicycle could skid if not handled attentively and potentially cause harm to other commuters. Additionally, individuals on foot may be unable to move past a cyclist positioned on the escalator.

Consequently, utilizing elevators or stairs equipped with bike-friendly facilities should be the preferred method for ascending and descending in stations.

Figure 4.4 shows the photos of the elevator and escalator taken by the researcher during the observation.

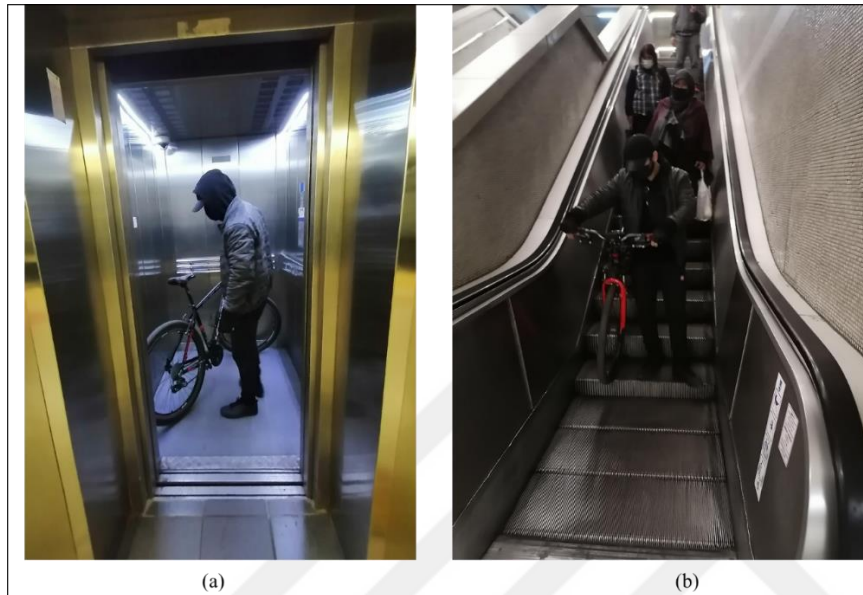


Figure 4.4. (a) The cyclist in an elevator with his bike (b) The scenario in which the cyclist utilizes the escalators to descend to the station

During the trip in the metro

The volunteer cyclist mentioned that he usually doesn't use the metro with his bicycle as part of his regular commute. However, he consented to bring his bicycle to the metro cart for this study. The primary reasons for avoiding using the subway with his bike include a lack of clear regulations, safety concerns (for himself and other passengers), crowded peak hours, insufficient facilities for parking bicycles, and insufficiency of other necessary infrastructures. At this point in the study, his choice was to board the initial car of the train that arrived at Dikimevi metro station. His rationale for this preference was the available physical space both in front and behind those carts. The count of individuals in the carriage during the trip was documented as follows:

- Dikimevi Station: 9
- Kurtuluş Station: 14
- Kolej Station: 13

The observation concluded at the Kızılay station where the cyclist and the researcher disembarked, while approximately 165 passengers were observed waiting for the next train. As these passengers boarded the incoming train to Kızılay station, there was a significant reduction in available space inside the train; however, it remains possible to travel by bicycle if boarding again. Figure 4.4 depicts a basic illustration of a metro cart for boarding.

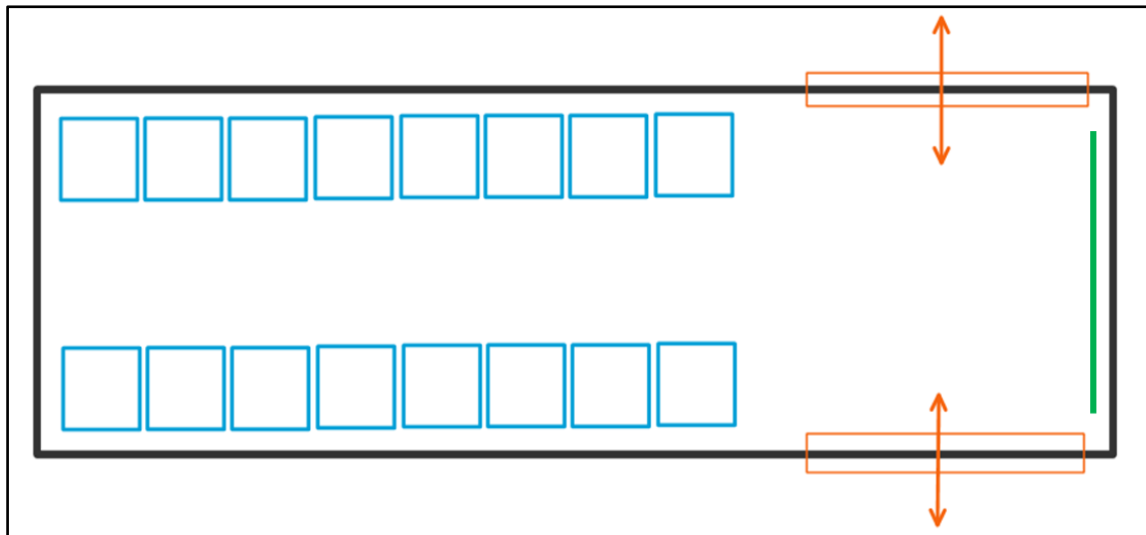


Figure 4.5. Diagram of the boarded metro cart, blue boxes – seats orange rectangle – gates green line - holder for disabled users

- Immobilize the bike in the cart: The platform access is at ground level, allowing cyclists to board the train easily. Nevertheless, there are no specific provisions inside the carriage to secure bicycles in place. One option is to fasten a bicycle to the support arm for disabled passengers located in the first cart. Other than this, cyclists may find it challenging to maintain the stability of their bicycles while the train is in motion.
- Possible seats for cyclists: The bicycle should be positioned at a right angle to the doors to allow other passengers to access the train. If the cyclist positions their bike parallel to the doors to sit nearest, it hinders access for other passengers and prevents them from sitting during the journey. During the journey, the cyclist is unable to be seated.

The visuals in Figure 4.5 depict the scenarios faced by the cyclist while following the BoB strategy. Visual (a) illustrates the ease with which the cyclist boards the subway from the platform. Following this, visual (b) depicts him securing his bike by fastening it to a designated area for disabled individuals after boarding the subway. Image (c) portrays him

standing at a right angle to the doors with his bicycle, while image (d) demonstrates him positioned parallel to the doors alongside his bike.



Figure 4.6. Some scenarios experienced by the cyclist while implementing the BoB strategy during his travel

Following the initial field investigation and review of scholarly literature, it has been recognized that while there has been a growing emphasis on bicycle transportation studies in Ankara (these will be extensively examined in subsequent sections of this thesis), these endeavors have yet to achieve their intended objectives. The preliminary field research findings suggest that while a bicycle parking facility has been installed at Dikimevi station, there is a lack of complementary infrastructure and policies to support it. This raises concerns that the previous studies may have been conducted perfunctorily, without a genuine commitment to implementation. Additionally, although bicycle transportation strategies and a network of bicycle paths have been developed by separate teams for the city, there is no evidence of any tangible improvements or advancements in bicycle usage. Consequently, this thesis investigation aims to explore the reasons behind the non-realization of these prior studies and the incomplete execution of the proposed projects. The results from the field

investigation contributed to formulating the approach for the thesis study and creating a set of semi-structured questions based on expert opinions.

4.2. EGO's Bicycle Transportation Works

Various studies have been carried out by the EGO General Directorate of Ankara Metropolitan Municipality, especially in recent years, to activate bicycle transportation in the city. These are;

- Research on Determining the Factors Affecting Ankara People's Bicycle Awareness Level and Bicycle Use Tendency, a survey study (2019)
- Ankara Priority Bicycle Network Study And Bicycle Strategy (2020)
- EGO's Autobus and Bicycle Integration Project
- EGO's Bicycle Parking Areas in Metro Station
- Smart Ankara - E-bike system (2021- ongoing)

Works carried out will be discussed as listed.

4.2.1. EGO's bicycle survey

There is a survey research made by ABB EGO General Directorate in 2019, "Research on the Determination of the Factors Affecting the Bicycle Awareness Level and Bicycle Usage Tendency of the People of Ankara". The survey was conducted with a total of 9163 people using the participation technique in the study face-to-face and on the Internet. As a result of the study, the current situation of bicycle use in Ankara and the issues that need improvement are seen. According to survey results, only 12.4% of cyclists use bikes every day. The sum of daily and weekly cycling rates is 49.4%. Almost half of all cyclists use bikes at least once a week. But most cyclists use the bike mostly to make use of their spare time and sports. The rate of using bicycles to go to school or work is 30%. Using bicycles as a means of transportation is not common for the people of Ankara. In Ankara, people mostly use the bus (51.9%) or subway and train lines to go to school and work. Only 14.9% of people use their bicycle to access their jobs/schools. As a result of the survey study, it is understood why the use of bicycles cannot leave the position of just a leisure activity. Why do people not -cannot- use the bicycle as a transportation mode?

“Question: What are the reasons that prevent you from using the bicycle or using it more often?

- Lack of bicycle infrastructure (53.5%)
- Safety and danger of harassment (27.3%)
- Negative attitudes towards cyclists (46.4%)
- Insufficient bicycle parking areas (39.5%)
- Concern about the bike being stolen (23.1%)
- Inability to use bicycles with public transport (33.2%)
- Weather conditions (21.0%)”

“Question: What changes encourage you to cycle?

- Expanding the bike path network and separating it from the motor vehicle road,
- Ensuring the use of public transport by bicycle,
- Improving the rules to protect cyclists,
- Increasing secure bicycle parking spaces,
- Increasing the incentives for cycling, “ (EGO,2019).

The inability to use a bicycle with public transportation is a %33.2 rate. Cycling with public transportation has different problems, such as access to used transportation modes, the ability to load the bicycle in the transport vehicle, if the cyclist only brought their bike to the public transport stop, where they lock it, etc. Another survey question is; “would you like to use a bicycle and public transportation together in your daily travels?”, within the scope of the survey, 90.4% of the users answered “yes” to this question (EGO, 2019). It is clear that public transportation systems should be made suitable for cyclists and that public transportation lines and bicycle paths should work in an integrated manner.

Although it was not one of the questions of the research, Interviewee 4 shared his ideas about the survey questions and the results obtained from the surveys. According to Interviewee 4, these surveys do not mean anything, the questions asked in the survey are superficial, so he stated that healthy answers cannot be obtained from the participants. Interviewee4 says:

“ This is so nonsense. Go to any town in Turkey and ask, "If there was a metro, would you ride ?", people will answer yes. I think the questions are asked incorrectly and incompletely here. The question should be like this; "We will build the metro here, but your buses will come less frequently and you will have to walk more to reach the metro. Your road repair will be less frequent, your asphalt will be damaged, and your child's class will be 60 people

instead of 20 people, do you want the metro despite all this?". If it is asked like that then people will really think.

For bicycles, the questions need to be re-examined and their limitations must be taken into consideration. It is necessary to ask this way: First, we need to learn the trip behavior of the person, for example, where he goes to the market, and ask whether he would prefer to ride a bicycle if a bicycle path is built. That is to ask the question based on people's daily movements. They ask people imaginary questions and people answer them without thinking. Parameters such as distance, location, and duration must be included in the question. Otherwise, these questions are not even questions. For example, it is necessary to ask people whether they can ride a bicycle in -10-degree weather and on a snowy road. Do you ride when it rains or snows? Do you ride in winter? How far could you ride? Do you want to ride in heavy and high-speed traffic? So it is necessary to ask questions that include real factors. ''

Based on Interviewee 4's opinion, it can be said that collecting information about the citizens' perspective on cycling by surveying bicycle transportation is a positive step. However, because the questions are superficial, participants' answers may be too optimistic for an assessment. For example, the 90.4% rate given to the question "Would you like to use a bicycle and public transportation together in your daily travels ?" may not reflect the truth. Based on the question examples given by Interviewee 4, the question about using the rail system and bicycles together could perhaps be asked as follows.

''We will integrate the bicycle and rail system, but you may not be able to get on the train at peak hours (because there is no regulation on how cyclists can get on the wagon during peak hours), you will pay the same fee as other citizens (because there is currently no fare discount for cyclists), you may need to carry your bike when going down to the station (there are no bike stairways at every station), there may not be a safe bike park at the station where you can park your bike (very few stations have bike parking spaces and they do not comply with standards), would you still travel using the rail system together with your bike?''

Considering Interviewee 4's statements, it may be suggested to reconsider the survey questions and conduct the survey again. If a reorganized survey is conducted, the results can be compared with the old surveys to reveal whether Interviewee 4 is right or wrong on this issue. However, such a survey was not conducted because it was not one of the problems addressed in this research. This is an issue that can be addressed in future studies.

4.2.2. EGO's Ankara priority bicycle network study, bicycle strategy

According to the EGO's bicycle network report, this study aims to determine bicycle strategies suitable for the city and create a priority bicycle infrastructure to make bicycles an active means of transportation in Ankara. According to Interviewee 4's statements, this report is an "emergency" study. Mr. Mansur Yavaş became the Mayor of Ankara Metropolitan Municipality with the local elections held on March 31, 2019. One of Mr Yavaş's election statements was to build a bicycle path for the city of Ankara (Uyar, 2019). A Stakeholder Participation Meeting on this issue was held on 22 October 2019. It was stated that universities, ministries, municipalities, professional chambers, and NGOs were invited and participated as stakeholders. At the meeting, information was mainly given about the EGO bicycle path and smart bicycle facilities. It was stated that meetings were held between 7-10 February 2020 with representatives of stakeholder NGOs (Turkish Women's Union, Ankara Cycling and Nature Sports Association, Women's Bicycle Initiative, Ankara Gazi Neighborhood Bicycle Community, Ankara Thursday Evening Cyclists) and academicians (Hacettepe University) (ARUP, 2020). The effectiveness of the participatory process will be discussed in the interviews section.

Table 4.1. Basic information about the EGO's project

Project Name	Contractor Institutions Organizations	Delivery Date	Fund	Access
Within The Framework Of Decarbonization Of Ankara Urban Transportation And Non-Motorized Modes Project, Ankara Priority Bicycle Network Study, Ankara Bicycle Strategy	ABB EGO General Directorate - OnTasarim	July 2020	the EU	Open Access

However, according to Interviewee 4, the current EGO project is different from the first study in terms of routes, as the bicycle paths presented in the election declaration were not found to be safe. Interviewee 4 reported that the election declaration displayed bicycle routes encompassing roads with high-speed vehicle traffic, such as the Eskişehir road. According to Interviewee 4, these routes are included at the request of NGOs and are not planned by technical or expert personnel. The election declaration was expected to pose a threat to the safety of cyclists, prompting experts to take charge of organizing these routes. As a result,

Interviewer 4 characterized EGO's efforts as urgent and essential. The report, in which Interviewee 4 took part as a consultant, recommends safe bicycle routes centering on the rail system and bicycle integration. The report started working in 2020, just before the pandemic and was delivered in July 2020. It is a report collaborated by EGO and ON Tasarım.

In the project, cities are grouped as crawling, walking, and running cities according to bicycle use rate and bicycle infrastructure characteristics. Figure 4.1 shows the grouping of cities based on bicycle trip rates and bicycle transportation conditions. According to household survey data of the Ankara Transportation Master Plan, which was completed in 2013 but has no official validity, the rate of bicycle usage in transportation is 0.08%. Looking at this usage rate (not even %1), Ankara is a city that is crawling with bicycle transportation and it is stated that strategies should be determined according to this situation.

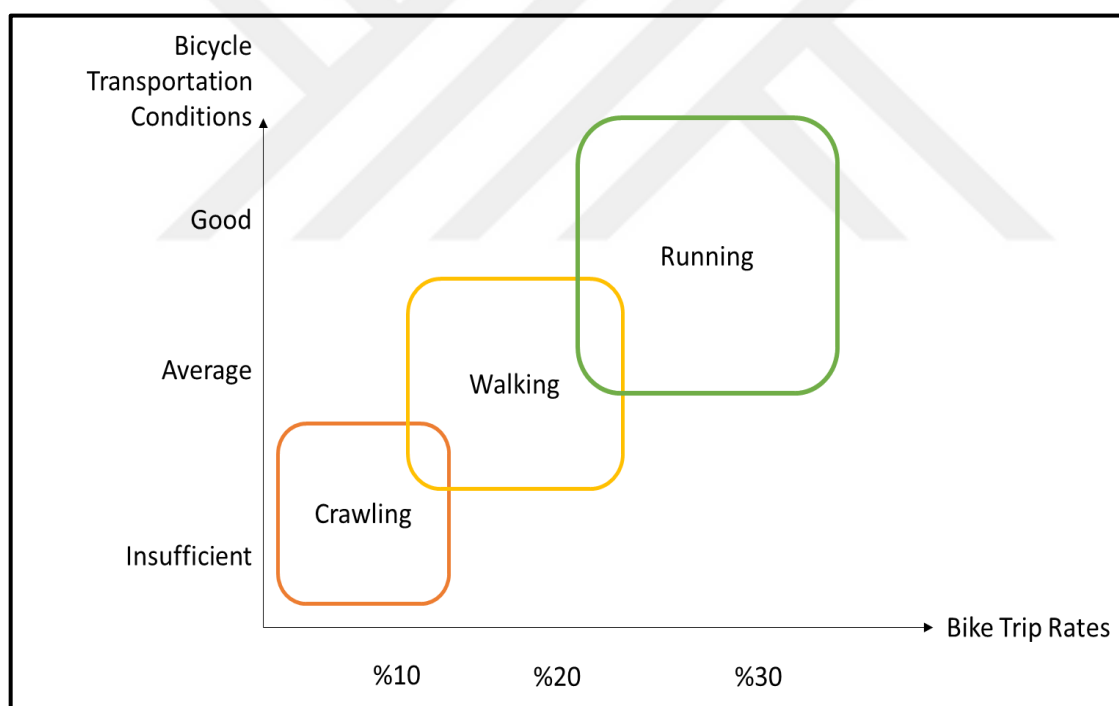


Figure 4.7. Grouping of cities according to bicycle usage and infrastructure features, image re-edited by the researcher from the report

During the planning phase, cyclists were considered separately according to their different experiences and usage habits. The distinction between cyclists and bicyclists is one of the sections discussed and written by interviewee 4 in the report. In Turkish, there is a distinction between "bisikletçi" and "bisikletli". The group of bicycle users described here as "bisikletçi" (cyclist) is a group that is accustomed to using bicycles as a means of

transportation in all conditions, is brave and has bicycle equipment. The group considered "bisikletli" (bicycle users) is the group that has limited experience with cycling and would not prefer to use a bicycle in adverse conditions. Groups that make up the bicycle infrastructure target group are indicated in figure 4.2. These groups are ranked according to their proportions in the population. According to this graph, cyclists are in the least number. According to the Geller category mentioned in the previous sections, the equivalent of the "bisikletçi" group mentioned in the report is the Strong and Fearless group, and the equivalent of the "bisikletli" group is the Interested but Concerned group.

Cyclists, the first group, are considered as an experienced and brave but minority group. The second group is the group that has reservations about using bicycles in transportation and uses bicycles mostly for recreational purposes, and the third group is the group that does not use bicycles under current conditions but is considered as a potential user because they have positive thoughts about bicycle transportation. The report draws attention to the importance of the target group and emphasizes that the strategy should be chosen according to the transportation habits and tendencies of this target group.

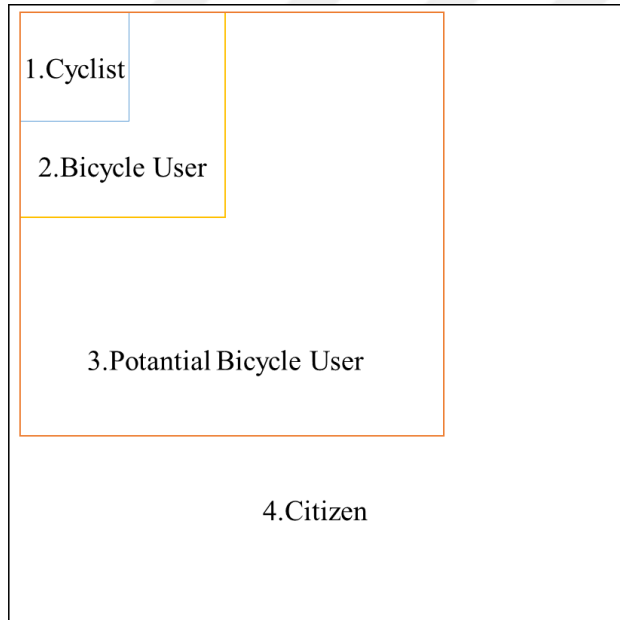


Figure 4.8. Different groups that make up the target audience of bicycle infrastructure, (image re-edited by the author from report)

Although this project aimed to create a bicycle network that would include different users, it was decided to determine a strategy, especially for the 2nd and 3rd groups of cyclists. The

aim here is to encourage the group who do not use bicycles for transportation to become permanent bicycle users.

Another important issue emphasized in the report is that bicycle path widths are the lowest standard in the current bicycle legislation. The report states that these measurements should not be preferred unless necessary. The width of the bicycle path specified in the legislation does not allow overtaking and is insufficient. In addition, on a road of these dimensions, bicycles cannot be used to carry loads or passengers (such as parents traveling with their children). In the figure 4.3., the current legislation bicycle infrastructure dimensions and recommended measurements are indicated.

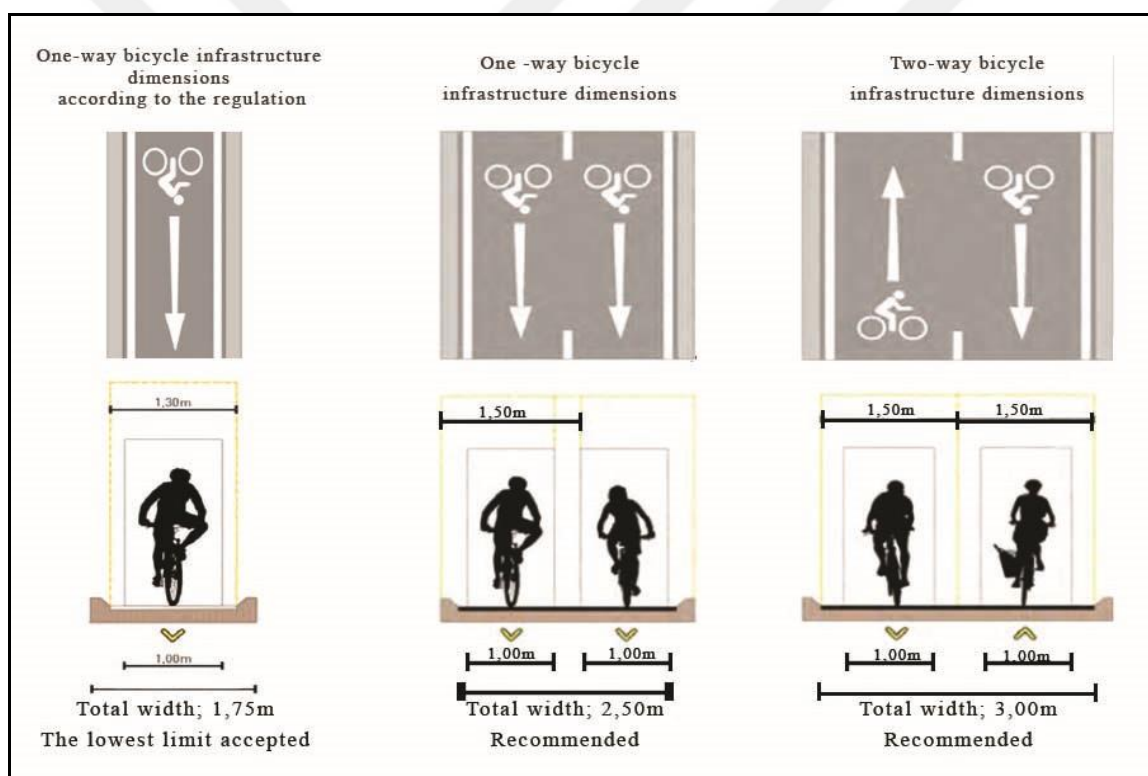


Figure 4.9. The dimensions specified in the legislation in bicycle infrastructure design and the proposed measurements in the report, (figure re-edited by the author from the report)

Suggestions for situations such as the fact that the bicycle paths are one direction/two directions, the relationship with public transport stops, and the levels of protection from vehicle traffic are included in the report. However, this part of the report does not have a spatial or strategic suggestion on how to connect bicycle paths to rail system stations.

The report also focuses on standards and recommendations related to bicycle parking spaces. The need to increase the safe bicycle parking areas is expressed. The report recommends implementing cycle parking unit designs known as the 'Sheffield Design' and the 'Harrogate Design'. These two designs are similar in shape. They both resemble the letter "U" upside down, only differing in size. The Sheffield design is shown in figure 4.10.



Figure 4.10. The Sheffield Design (cyclehoop, 2024)

Details such as how bicycle stairways should be placed on the stairs are also included in the report, as the bicycle is required to use stairs in a rail system or a different place. The report shows sample application images for bicycle rails application.



Figure 4.11. Ramp recommendation visuals included in the report (EGO, 2020)

Bicycle Network Infrastructure and Strategies

As stated before, group 2 and 3 cyclists are the primary target audience, but the bicycle network is expected to serve group 1 cyclists as well. Strategies and principles were determined considering this target cyclist group. Subsequently, the route and project standards were selected.

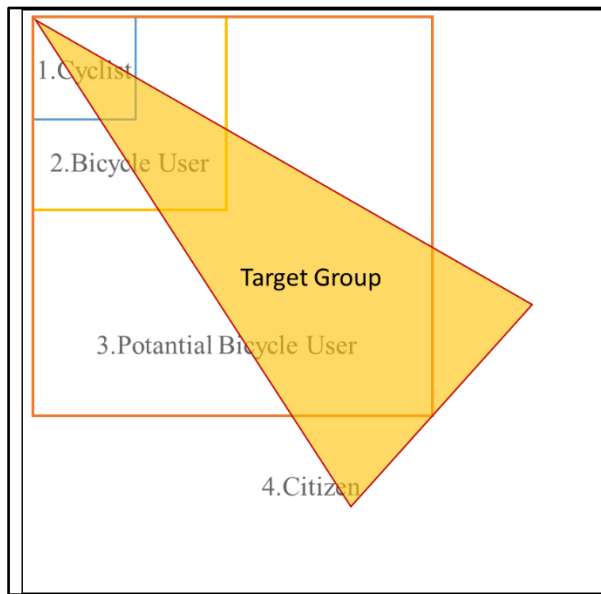


Figure 4.12. Defining the target bicycle user group in Ankara, (the figure re-edited by the author from the report)

The principles decided for the target group are as follows;

- Travel time must be a maximum of 30 minutes,
- The bicycle network does not pass through high-speed vehicle traffic or multi-storey intersections,
- In the first stage, choosing low-cost locations,
- Preferring comfortable and safe lines for new bicycle users,
- Using rail systems and bicycles together to provide connecting travel,

The main strategy of the project is stated as the integration of rail systems with bicycles. The report highlights the benefits of this strategy, such as expanding the reach area, reducing travel times, and providing direct access to sub-centers. The reason for choosing this strategy in the city of Ankara is that periodic trips (home-school/home-school) in the city exceed the agreed maximum 30-minute cycling distance. It is thought that this strategy should be the

first stage for Ankara, which is a crawling city in bicycle transportation. With the implementation of the strategy, it is envisaged that cyclist groups who are reluctant to use bicycles will be able to use bicycles as a means of transportation, thanks to the transfer opportunity provided by rail systems. Additionally, the city's bicycle access area will be inclusive.

The report includes a priority list for the implementation phase. Because it would not be a realistic approach to consider the city of Ankara as a whole and create a network covering all rail systems and all stations. For this reason, areas with low slopes and whose application would not require much cost were chosen. It is aimed to expand the bicycle network as the process progresses. The report also includes different measures regarding bicycle transportation. The actions and timeline to improve bicycle transportation are shown in Figure 4.13.

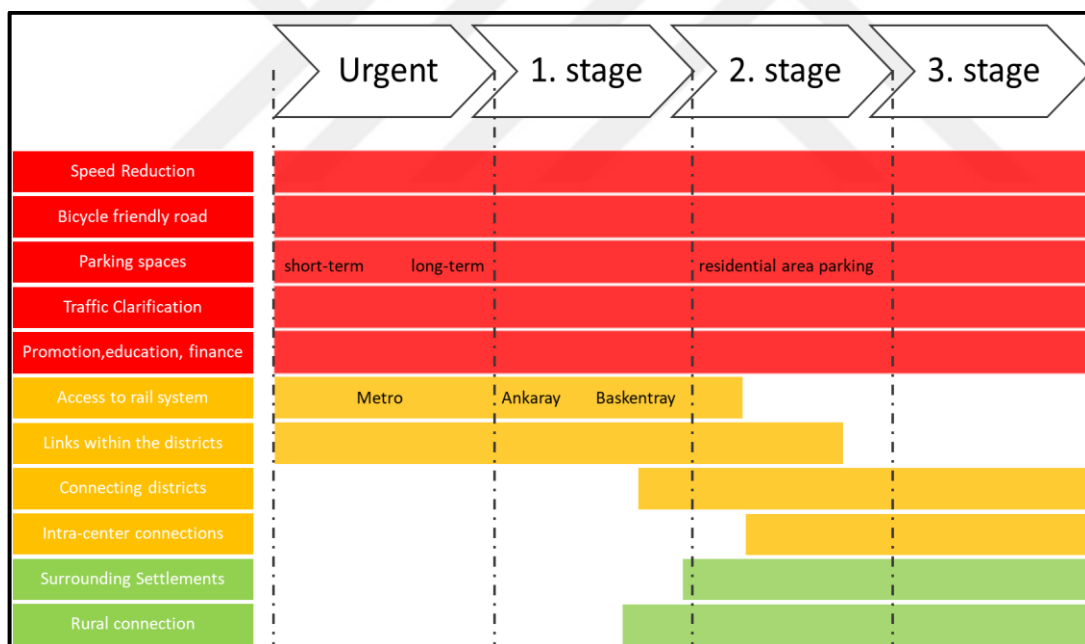


Figure 4.13. Phased prioritization of Cycling Transport Improvement Applications, (figure re-edited by the researcher from the report)

Rail system and bicycle integration is an implementation step that is considered a priority in the first phase. The following practices are recommended for this strategy;

- Safe bicycle paths providing access to the station,
- Safe bicycle parking areas in and around stations,
- Bicycle paths and parking areas to cover destinations within the district,

In the following stages, it is aimed to connect the networks implemented in the first stage and to meet the need for bicycle parking spaces in the station and surrounding residential areas.

Bicycle network plans

The project has determined corridors within the city for the implementation phase. It was stated that in determining the corridors, factors such as urban morphology, integration with Ankara's existing public transportation system, demographic cycling potential, and international bicycle transportation regulations were taken into consideration. Figure 4.14. shows the transportation infrastructure and slope analysis. When we look at it, five regions (Eryaman, Etimesgut, Batıkent, Cebeci, Cayyolu/ University area) will provide meaningful integrity in the application of bicycle paths instead of the entire city. As a result of the slope and transportation analysis, it was found more suitable for the targeted audience in these regions to cycle compared to other areas.

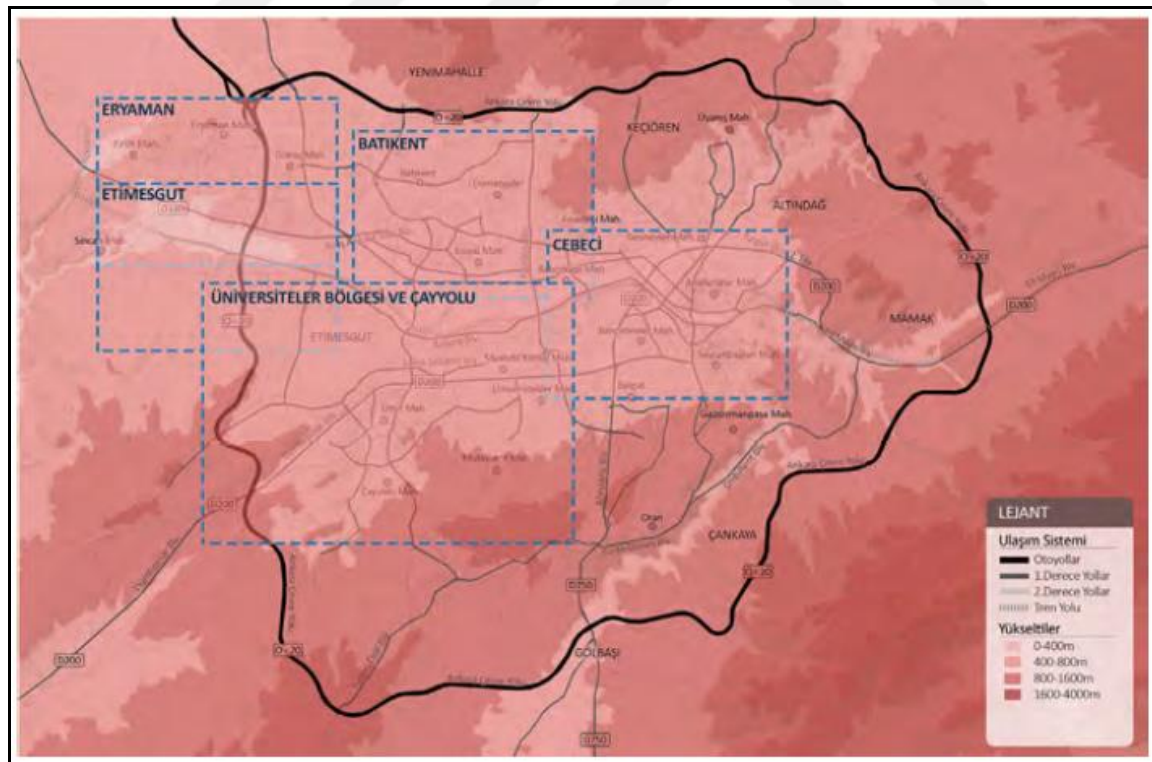


Figure 4.14. Transportation Infrastructure and Slope Analysis for Corridor Selection

The target group of the project is defined as a group that has limited experience with cycling and is enthusiastic about bicycle transportation but abstains. After analyzing the transportation structure of Ankara city; first of all, the strategy of creating an integrated bicycle road network with Metro and Ankaray stops has been adopted. It is stated in the report that with this strategy, cyclists can access a large part of residential areas by transferring from station stops. Figure 4.15. shows the bicycle access area and the transportation system map of Ankara, based on the centers of the districts.

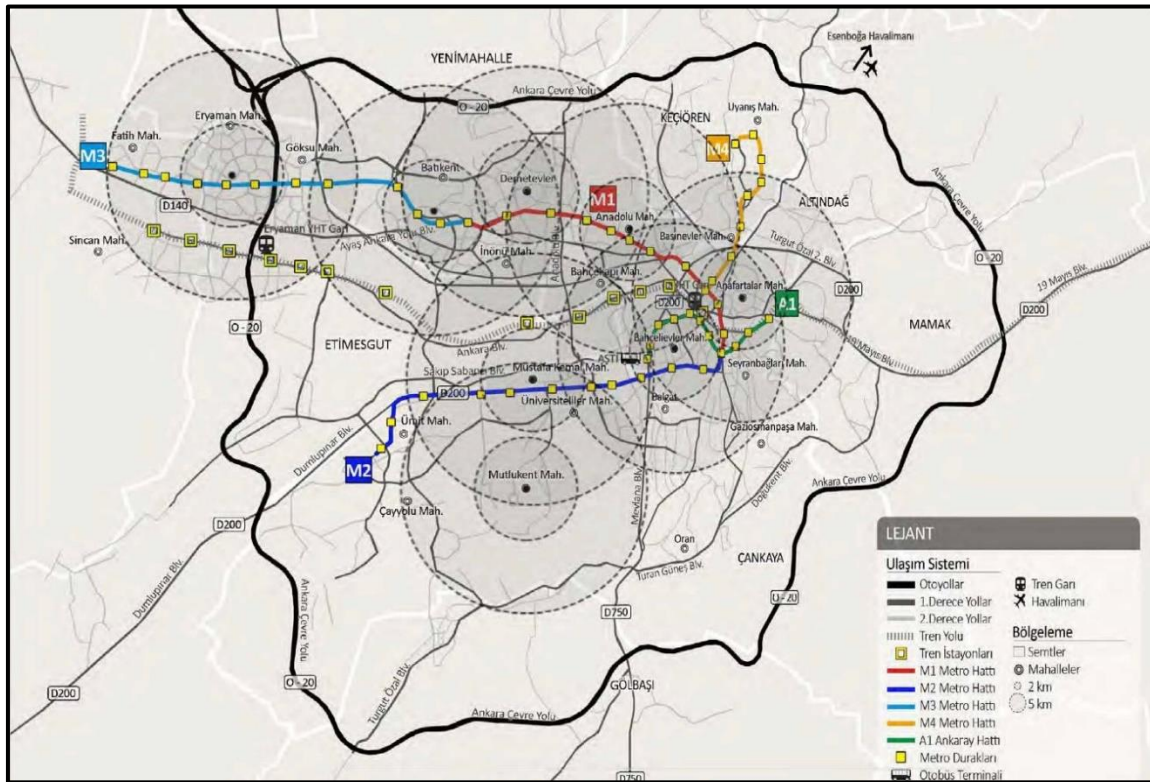


Figure 4.15. Ankara transportation system and bicycle access zones

In the decision phase of the first routes, integration with the rail system, providing access to different areas for all stations, and areas with low slopes were taken into consideration. Although the city consists of regional routes in the first stage, the bicycle network is planned with an integrative approach.

Bicycle networks directly connected to rail system stations have been created within the regions seen in the transportation and slope analysis. The total length of all planned roads is 54.9 km. This line was planned as nine sub-routes in the first stage, but these routes are not connected with continuous bicycle paths. Instead, it creates integrity in the rail system. As

stated before in the report, the aim is to connect these lines with continuous bicycle paths in the future. Considering the current bicycle usage rate in Ankara, it is stated that continuous bicycle paths in the city will not be realistic yet. The report states that there are not enough authorized personnel and budget in this regard. That's why the process stages are divided, in summary, the primary goal is to transform Ankara from a crawling city into a walking city. Figure 4.16. shows the priority bicycle network of Ankara city.

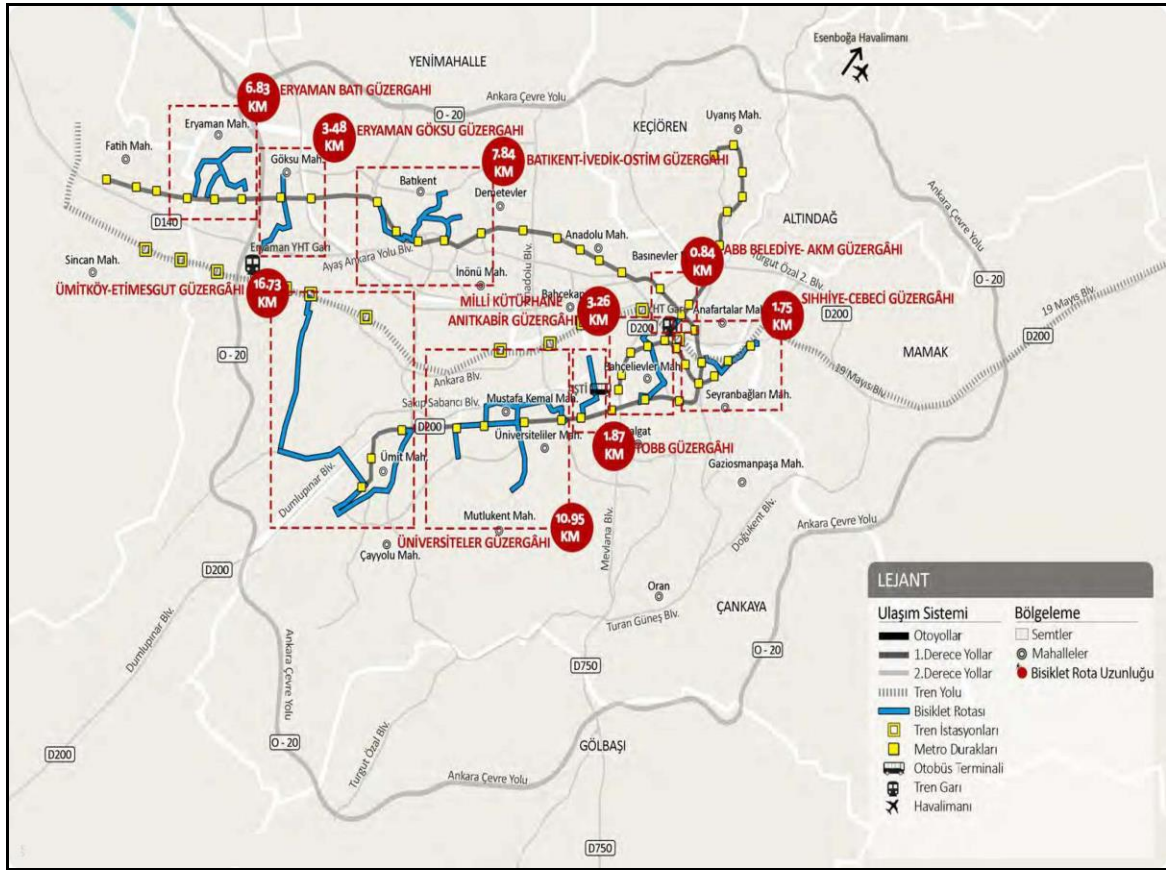


Figure 4.16. Ankara Priority Cycling Network Groups (54.9-09 km)

Implementation Status of the Project

The EGO Priority Bicycle Network Study and Bicycle Strategy project was completed in July 2020 and published on EGO's bike.ego.gov.tr website. Anyone interested in bicycle transportation and the studies carried out on this subject can access the full text of the report in the relevant tab of the website. On the same site, there are also other studies of EGO regarding bicycle transportation, such as shared e-bicycle systems.

In the last part of the report, detailed engineering solutions are proposed for the "National Library-Anıtkabir-Beşevler" route and the "Universities" route. It has been stated that these two routes need additional solutions in addition to general suggestions. Although it has nothing to do with this situation, the only route whose implementation has been completed to date (year 2024) is the "Milli Kutuphane-Anıtkabir-Beşevler" route. The Eryaman route, which started as the 2nd stage, has not been completed yet.

In this project, a total of 54.9 km of bicycle paths were planned for the city of Ankara, without specifying any target year. If we accept July 2020 as the starting date and January 2024 as the current date, approximately 42 months (3.5 years) have passed since the end of the plan, which would require the implementation of approximately 1.2 km of bicycle paths to achieve the goal. However, today this goal has not been achieved.

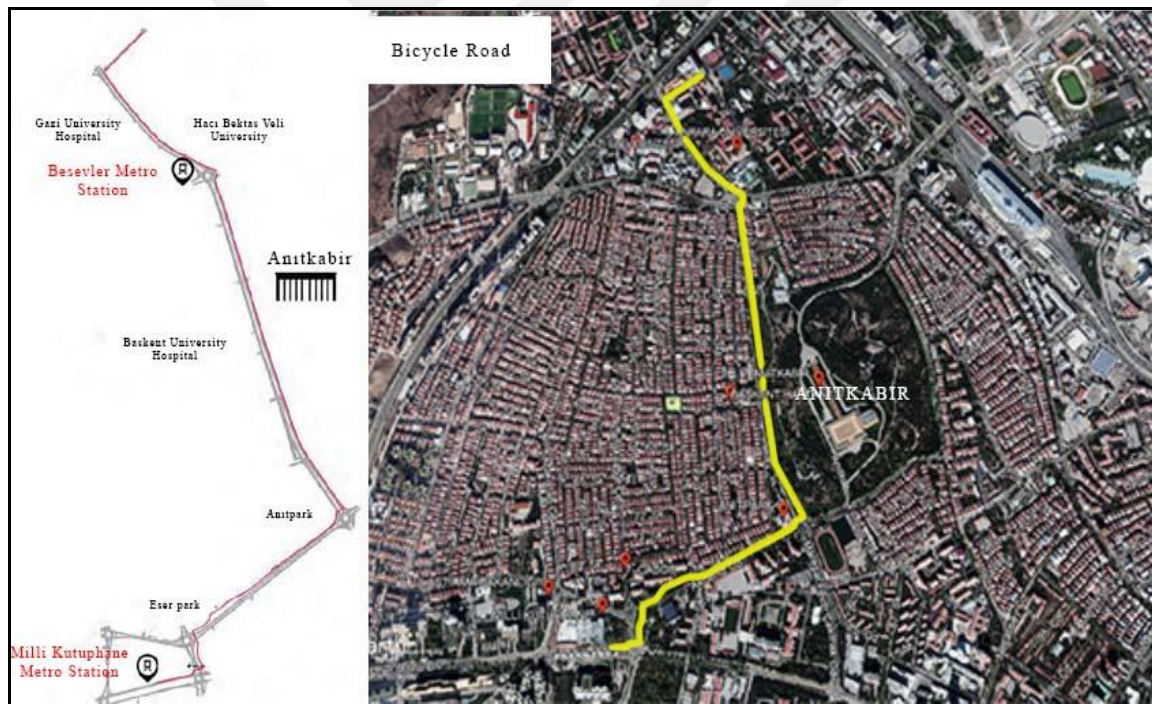


Figure 4.17. Completed "Milli Kutuphane-Anıtkabir-Beşevler" cycling route (EGO, 2021)

Figure 4.17. shows the diagram of the completed "Milli Kutuphane-Anıtkabir-Beşevler" route and its location on the satellite map. 2.5 km of the route has been completed. There are two university hospitals, Anıtkabir, Beşevler, and Milli Kutuphane metro stations, city parks, and dense residential areas on the route. During the application, since Anıtkabir is a protected area, the pavement section was not touched, therefore the bicycle path is at asphalt level. This route is named after cyclist Umut Gündüz, who died in a traffic accident in 2019.

Eryaman route is considered as the 6th stage according to the plan, but it has been brought forward as an application. Eryaman western region is currently a dense residential area and vehicle dependency is high because it is very difficult to go from one point to another in this region if you do not have a personal car. For this reason, bicycles have an important transportation potential. There are three metro stations (Wonderland, Devlet Mahallesi-Eryaman-5) and parks with serious open spaces on the route. Due to its spatial opportunities, the Eryaman West stage has been considered as a region with high cycling potential. The planned bicycle path length for this route is 6.28 km. The last update regarding the Eryaman stage on the ‘bisiklet. ego’ website was made for the date range 29 November - 8 December 2021. According to this update, although it has not been completed yet, approximately 5 km of bicycle path has been completed and it is stated that the work is continuing (EGO, 2021). Figure 4.10. shows the diagram of the Eryaman West route and its location on the satellite map.



Figure 4.18. 2nd stage Eryaman West Bicycle route (EGO, 2021)

Apart from the 9-stage project planned by EGO, bicycle path works have also been carried out for universities. The universities and the bicycle paths built are as follows;

- 4,4 km in Başkent University Bağlıca campus,
 - 2,6 in from Gazi University campus,
 - 1,2 km in the Turkish Aeronautical Association University campus,
 - 2,6 km in Anatolian Organized Industrial Zone,
- (Gemici, 2021)

4.2.3. EGO's autobus and bicycle integration project

After completing the cycling plan, EGO has carried out various projects on public transportation and bicycle integration. Installing bicycle racks on EGO buses is one of these projects (EGO, 2023).



Figure 4.19. MAN CNG model EGO buses with bicycle racks (EGO, 2023)

According to EGO's news dated 18.04.2023, 480 bicycle racks have been installed on suitable buses, and two bicycles can be carried in one device. Bus drivers were trained on how to use installed bicycle racks. QR codes are placed on the front of the buses so that citizens can learn how to use the racks (EGO, 2023).

However, Interviewee 2 drew attention to some problems by giving an example of this practice while answering another question. He finds it positive to install bicycle racks on buses, but due to Ankara's sloping topography, the racks rub against the ground on the slopes. Drivers are concerned that the bicycle will be damaged in a possible accident, so they usually either do not take the bicycle on the bus at all or accept it inside the bus. Because drivers have not been given a clear assurance that the damage will be covered in an accident. In addition, since not all buses have bicycle racks, it depends on your luck whether the bus you are waiting for has a bike rack or not, because the information on which lines and buses have bike racks is not communicated to the citizens. The full statement of Interviewee 2 is found in chapter 4.3.1 of the thesis.

4.2.4. EGO's bicycle parking areas in metro station

EGO also has some work on the rail system and bicycle integration. In the post on EGO's official Twitter account in 2021, it was stated that a bicycle parking area was placed at Dikimevi station. The bicycle parking area is for 5 bicycles and is monitored by security cameras 24/7.



Figure 4.20. Post made by EGO official account on Twitter on October 22, 2021 (EGO, 2021)

To examine the condition of the park area today, the researcher made on-site observations and took photographs of different years and days. Photos and dates are listed in the table below.

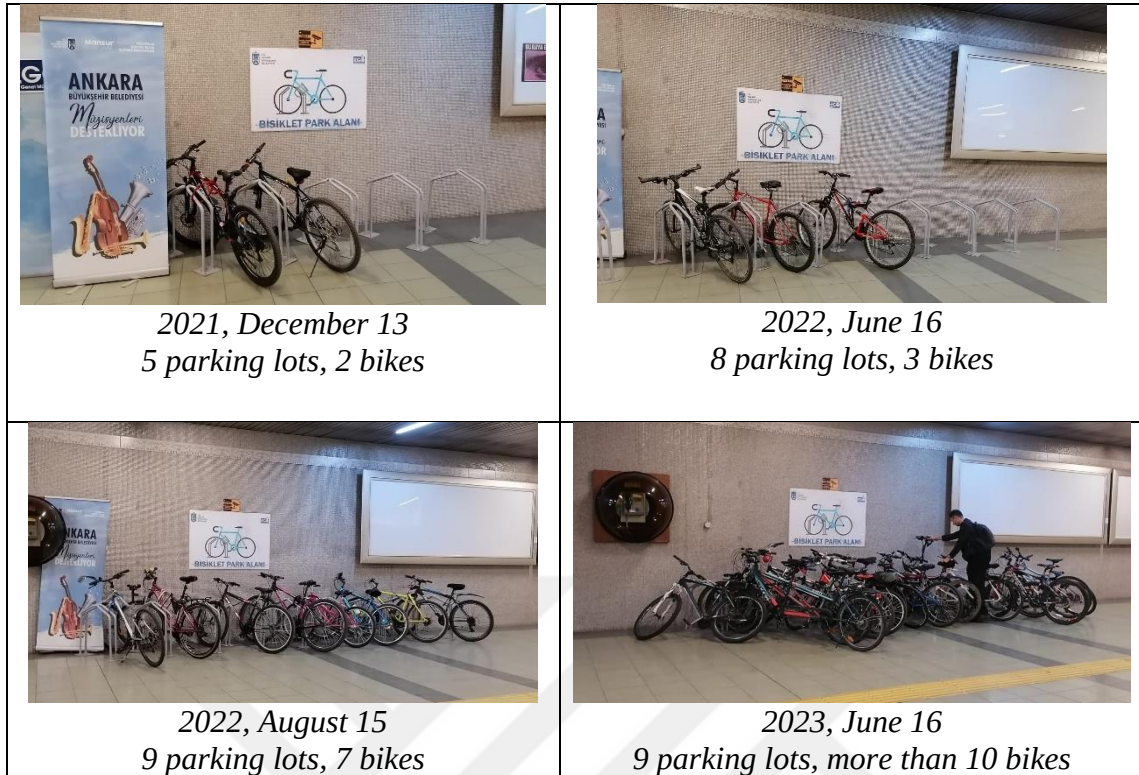


Figure 4.21. Bicycle park photographs taken by the researcher on different dates and locations

Especially when two photographs taken on the same day (June 16, 2022-2023) are compared, it can be said that the bicycle parking area has begun to be used over time and even is no longer sufficient. Except for Dikimevi Ankaray Station, the researcher also took photographs of bicycle parking areas from different train stations and locations in Ankara. The parking areas are shown in figure 4.21.



Figure 4.22. Bicycle park photographs taken by the researcher on different dates and locations

Some of these bicycle parking areas are not built by EGO. The reason for showing these parking areas is that in four different locations, there are four different types of bicycle parking lots in the mean of parking units. When you look at figure 4.22, it is seen that these parking areas do not comply with the standards (security, protection from weather conditions, etc.). The bicycle parking units placed at Dikimevi station also do not match the designs suggested in the report. Bicycle parking areas are very important for bicycles to be an active means of transportation in the city. For this reason, bicycle parking area models that comply with the standards should be preferred and implemented within the city of Ankara. Since this is not a problem that this Research aims to reveal, this issue will not be discussed further. However, it is thought that this issue can also be addressed in future studies.

Apart from bicycle parking areas, bicycle stairways have also been laid at rail system stations. However, not every station has stairways at all exits, even if they are located on a staircase of the station. As with bicycle parking areas, no detailed field studies have been

conducted on this issue, but it is an issue that can be addressed in future studies. The photographs taken by the researcher regarding the bicycle rail are shown in Figure 4.23.



Figure 4.23. Photos of bicycle stairways taken by the researcher in Ankara

According to the 25th article of the Rail System Road Transport Directive published by the EGO General Directorate; " It is forbidden to use bicycles, skateboards, roller skates and similar vehicles at the stations and inside the vehicle, except for baby carriages. Otherwise, 50 full ticket amounts will be applied against penalty receipt". However, in the news published by EGO (Nov, 26); within the scope of the bicycle network and strategy project, bicycle stairways were installed on the stairs of the Metro stations, and bicycle transport apparatuses were installed inside the wagons and on the EGO buses. When we look at this

situation, it can be seen that even if spatial arrangements regarding integration are made, there are deficiencies in the rules and regulations.

While the expert interview was being held with Interviewee 2, Ms. M, who was in the same room with the researcher and Interviewee 2, wanted to talk about a situation she had experienced related to this issue. Ms. M, who works in the public sector, in middle age and uses a bicycle for transportation, is one of the management members of the Ankara Bicycle Council (No questions were asked to Ms. M, she participated as an instant volunteer to help with the research.). Ms. M says:

“ I wanted to ride Ankaray at Kızılay station after returning from training with my folding bike. The security there said to me, "Ma'am, you cannot ride the subway with a bicycle at this hour." It was only 15:30, so it was not a rush hour for the metro. There is no such hour regulation anyway. That's why I asked the officer if there was a written rule, and he said, "No, we just have such an order." I folded my bike and said that it was no different from a stroller or wheelchair. You can complain about me if you want, but I said I would still take the subway. The officer did not say anything to me after I said these, and I was not reported about it because there is no regulation anyway. If it was at a very busy hour or there was a time regulation, I would comply. I already get into the front or rear wagon. Because there is no vehicle to stabilize bicycles in the train. They still haven't been able to clarify this issue in general.”

4.2.5. EGO's shared e-bike system

Another bicycle transportation project carried out by EGO is shared e-bike systems within the scope of Smart Ankara. According to the news of the EGO bicycle site dated 2021, the electric bicycle sharing system has been implemented with the European Union EIT grant project. Bicycle charging stations have been placed in dense areas of the city, in line with Ankara's topography and to ensure integration with the metro network. The bikes have been tested for use only by professional cyclists. As a result of the tests to be carried out, it has been stated that it is aimed to have 480 electric bicycles available to all city residents by the end of 2022 (EGO, 2021). However, we know today that this goal has not been achieved.



Figure 4.24. EGO's electric bikes and charging station (EGO, 2021)

In the news dated August 15, 2022, on the EGO official website, it is stated that shared bicycle studies are continuing. In the news, it was stated by Bülent Özkan, Head of the Transportation Technologies Department of EGO General Directorate, that the process for 408 electric bicycles and 34 charging stations has been completed, but that the procurement process will be concluded in the first quarter of 2023 and will be put into service in early 2023. According to the news of the same website dated September 11, 2023, 243 more electric bicycles were purchased within the scope of the project, providing a total of 651 bicycles.



Figure 4.25. EGO's new electric bikes and charging station (EGO, 2023)

However, while new bicycles are being provided, the previous bicycles are still not available for use by the citizens. It is stated that the project is still in the software and testing phase. In the news dated November 22, 2023, it is stated that the stations will be established as soon as possible and the locations of the stations are stated, but no date is given as to when they will be opened for use.

Approximately 2 years have passed since the beginning of this project. Today, there is no shared electric bicycle system available to the citizens of Ankara yet. When we look at the news published about the studies, similar stages, and similar information are repeated. Since the scope of this thesis is mostly bicycle transportation planning studies that have been completed, questions were not asked of the experts about the shared bicycle system. Therefore, this research will not address why electric bicycles and charging stations have not been put into service for 2 years.

Shared bicycle systems are outside the research scope of this thesis. It is not discussed under a subheading in the interviews and discussions section. However, in the interview, Interviewee 4 said the following, although no questions were asked on the subject:

‘For the ongoing bicycle sharing systems, it was planned that students would climb up from the Hacettepe stop with electric bicycles. It was a problem how the bicycles that went up would come back down, vehicles were purchased for this, but there is no feasibility study for this sharing system. For example, the feasibility study of the bicycle-sharing system in London took 2 and a half years. Even though I was interested in this project, I did not see a feasibility report. Feasibility is not just about cost or reducing air pollution. All factors such as repair and maintenance of this system, advertising, symbolization, identification, control, and training of personnel need to be prepared and implemented like a battle plan. In many big cities around the world, these systems were divided into two and three and given to different operators, allowing these operators to compete. They competed for their productivity, businesses that met the productivity criteria also guaranteed the contract for the next period. Our report was quite amateur. A study was commissioned by Sabancı University. They had people who have nothing to do with transportation and who do not know Ankara transportation prepare a report, and they are currently trying to do business according to that report. How many years have passed and I still haven't seen anyone riding an electric bike? We hear from the news that 300 bikes have been delivered, and 100 more are likely to arrive, but 400 bikes are already too few for Ankara. It should have been much

higher in quantity. There are no measures of the efficiency of this system. Normally, in shared bicycle systems, a bicycle must be used by at least 6-7 people a day. For bicycle sharing systems to be efficient, if you make multi-purpose trips, that is, only with those who go to work or school, the sharing system will not be efficient. For example, let's say you installed this system at METU. Will that bike stay there for 6 hours when the students go to class? You have to bring it back to the station, and since it is costly to bring it back, someone else has to pick it up and use it to bring it to another station. Therefore, electric shared bikes are more suitable in city centers, not in metro stations. Because the number of users and journeys will be high, bicycles will be used by different users in the city center and will provide circulation. But right now, they are focusing on campuses with higher slopes, with the mentality that young people will ride bicycles. They construct this system with a narrow perspective, such as Beytepe and METU, Hacettepe. This work is already quite late. It is not supported by campaigns. There is no physical infrastructure either. That's why I think it will fade away in a short time after it starts serving. Additionally, these vehicles are fragile. In Izmir, we saw how electric bicycles were broken by foreigners and they tried to dismantle them, and similar things may happen in Ankara. That's why bike stations need to be in very visible places, and they need to be protected and safe. But in general, this project was very delayed, and the enthusiasm for cycling after the pandemic has dissipated.''

4.3. ARUP's Bicycle Strategy, Master Plan, and Pilot Implementation Project

The Bicycle Master Plan of Ankara is one of the supported project of the UK Government's Global Future Cities Prosperity Fund Programme. The program supports cities and projects that plan to achieve international climate change goals such as reducing poverty and increasing social inclusion and mobility. In the scope of this program, the bicycle master plan was prepared in cooperation with ARUP and Ankara Metropolitan Municipality.

Table 4.2. Basic information about the ARUP's project

Project Name	Contractor Institutions Organizations	Delivery Date	Fund	Access
Bicycle Strategy, Master Plan, and Pilot Implementation Project for Integrated, Non-Motorized, and Multimodal Transportation in Ankara	ABB –ARUP	March 2021	the UK	Closed Access

The plan aims to increase the social and economic resilience and livability level of the city by making bicycles an active means of transportation in the city. The main vision of the project is *"to ensure that bicycles are adopted as a form of urban transportation for everyone in Ankara and integrated into the public transportation system."* Under this vision, three basic principles have been defined.

- i. Increasing bicycle awareness for everyone
- ii. Streets suitable for cycling for everyone
- iii. Access to bicycles for everyone

A strategy framework has been formed based on the principles. This framework is shown in Figure 4.26. In the plan, the benefits of bicycle use for the city were emphasized and the regulations required to increase bicycle use were prioritized under basic headings.

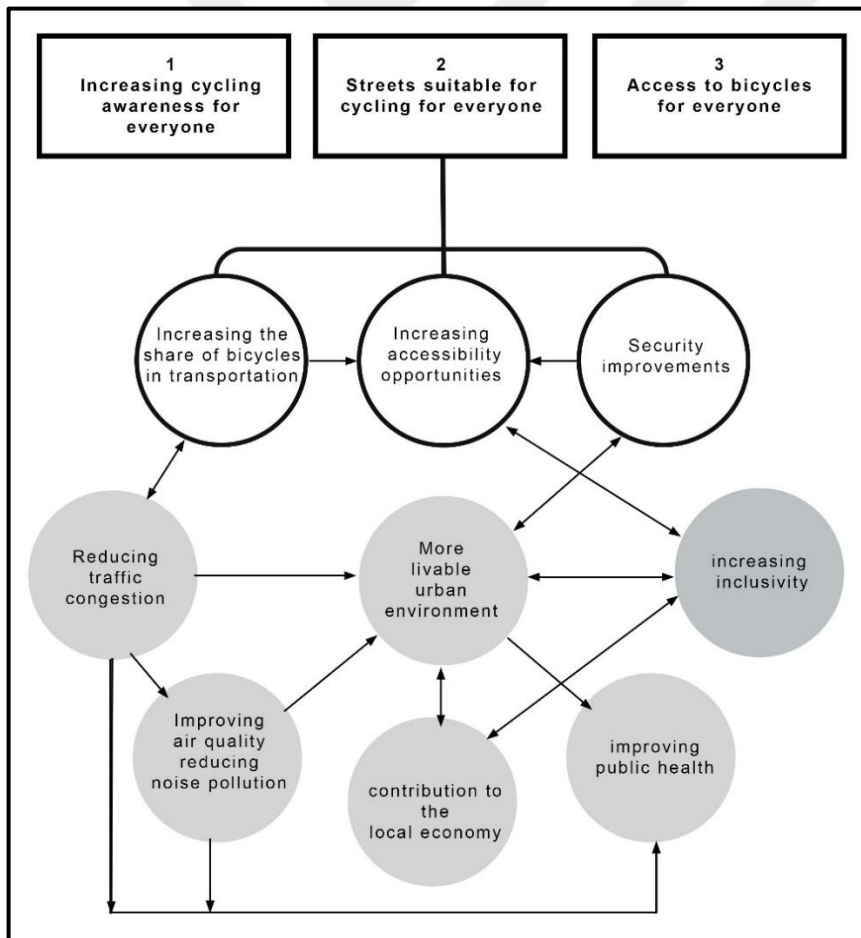


Figure 4.26. Main guiding principles of the master plan, Figure re-edited by the researcher from the report

The first of these priorities is to increase security. It is stated in the plan that cycling on the existing road network of Ankara is not safe and that there is prejudice against cycling among the public. If the plan is implemented, there will be a road network for cyclists in the city as a result of this implementation an increase in bicycle use is expected. There will be more individuals on the roads as a result of the increase of cycling so also an increase of social security is expected. In addition, it is expected that as bicycles become more visible in traffic, motor vehicle drivers will be more sensitive to cyclists and, as a result, road safety for cyclists will increase.

Another important topic is to give the bicycle a priority position in the urban transportation system. In the plan, it is stated that Ankara is a city dominated by motor vehicle traffic and that pedestrian and bicycle roads are quite limited in the urban area compared to motor vehicle roads. It has been stated that reducing the number of parked vehicles on roads and public areas will contribute to bicycle transportation and increase the social areas of the city. It is expected that giving priority to bicycles in the transportation system will reduce travel demands and, as a result, will have a positive impact on the urban form.

It is mentioned in the plan that the physical activity rates of urban residents are quite low. As the bicycle becomes an active mode of transportation and the rate of bicycle use increases in the city, it is expected to reduce chronic diseases in urban health, improve productivity, improve mental and physical health, and have a positive impact on public health in general.

Facilitating multimodal journeys is another important heading that is directly related to this thesis. The plan emphasizes that the joint use of the rail system and bicycles will be beneficial for these two modes of transportation. The need to have a systematic connection network for bicycles to public transportation stops, to have parking spaces for bicycles at stations, or to make appropriate arrangements for carrying bicycles in public vehicles is mentioned in the plan. These regulations are expected to increase the use of bicycles and public transport. As a result, due to the decrease in automobile use; It is expected that traffic volume will decrease and the reliability of the general transportation network will increase. This phase of the plan will be discussed in detail in the study.

The plan also emphasized the environmental contributions of bicycle transportation to the city of Ankara. The plan predicts that if bicycle use increases, there will be a decrease in air

and noise pollution, fuel savings, and positive effects on urban health. In addition, it is expected that the decrease in motor vehicle traffic will reduce the need for new infrastructure construction.

The plan stated that making bicycles a part of the transportation system in the city could play a role in increasing urban resilience. It has been stated that the reliability of some modes of transportation has decreased, especially after the COVID-19 pandemic. The importance of the bicycle's features such as not requiring fuel supply or third parties and providing door-to-door transportation was emphasized. With these aspects, it has been stated that bicycles can be an alternative to cars or public transportation in crises such as pandemics in the city.

Social inclusion is one of the frequently mentioned and important headings of the plan. Mentioning that the automobile is a class vehicle, it is stated that the bicycle is a vehicle that can appeal to the entire society, on the contrary. In this respect, the fact that bicycles are a common mode of transportation in the city is expected to reduce social inequality within the city. In addition, it is expected that minority groups grouped on the city periphery will have access to new employment opportunities and opportunities with easier bicycle transportation. In addition, it is expected that the social and spatial disadvantages of children, women, and the elderly will decrease by using bicycles in the city.

Planning process

Although the master plan was planned to be a multi-stakeholder study across the city, as well as ABB and EGO staff, it was stated that there was limited coordination due to the COVID-19 pandemic. However, according to the draft report dated April 2020, participation meetings and cooperation with NGOs were included. It was mentioned that the Communication Strategy was developed as a result of these meetings (ARUP, 2020).

The planning process includes an analysis of Ankara's current transportation system. The data used in the analysis were obtained from sources such as ABB, the Turkish Statistical Institute (TUIK), websites of ministries, Open Street Map, and the draft Ankara Transportation Master Plan. The UAP is not yet an approved plan, but it is stated that the analysis and collected data of this study were used in the bicycle master plan.

Due to the COVID-19 pandemic, Google and Yandex online maps were widely used in field research. After the computer analysis, field trips were organized to the determined routes, and the regions where information was insufficient were re-evaluated.

Bicycle routes were determined by analyzing the collected data. The planning process carried out using the ArcGIS program has two main purposes. The first aim is to identify bicycle routes by revealing Ankara's current transportation situation. The second aim is to determine to what extent the bicycle network can be expanded by considering the coverage areas of rail transportation systems.

Bicycle network plans

At many points in the plan, explanations about the benefits of integrating bicycles with public transportation and the necessity of this strategy are included. One of the aims of the plan is to integrate Ankara's bicycle system into the urban transportation system.

"Bicycle should be seen as one of the layers of Ankara's urban transportation system, and therefore, the full integration of the transportation network such as rail system and bus is very important. This should be reflected in amenities such as uninterrupted network connections and quality bicycle parking at metro stations and other transport hubs." (ABB, ARUP, 2021)

Table 4.3. Objectives of the Integration into the Urban Transportation System (ABB, ARUP, 2021)

Objectives	Definition
Integration	Integrating the bicycle system into the public transportation network.
Parking spaces in rail stations	Providing quality (correctly located, safe, and well-lit) parking spaces for bicycles in all existing and new metro stations.
Parking and use of bicycle	Exploring opportunities to integrate bicycle transportation into the vehicle network.
Local connections	Improving the distribution of local connections in the suburbs with transfer points at metro stations.

In the plan, a study focused on the rail system was carried out within the public transportation systems. There are two main reasons for focusing on the rail system in the report:

- Rail systems offer higher capacity and reliability than buses.
- Rail stations are more spatially larger than bus stops, allowing the addition of high-quality bicycle parking spaces.

The plan has an approach that centers on the city's active rail transportation systems and the bicycle access areas of these systems. The report stated that an approach that would cover the entire city of Ankara would not be realistic, and focused on sub-centers and the work to be carried out in these centers. First of all, the preliminary study showing the analysis and mapping of the rail systems and access areas in the city is shown in figure 4.27.

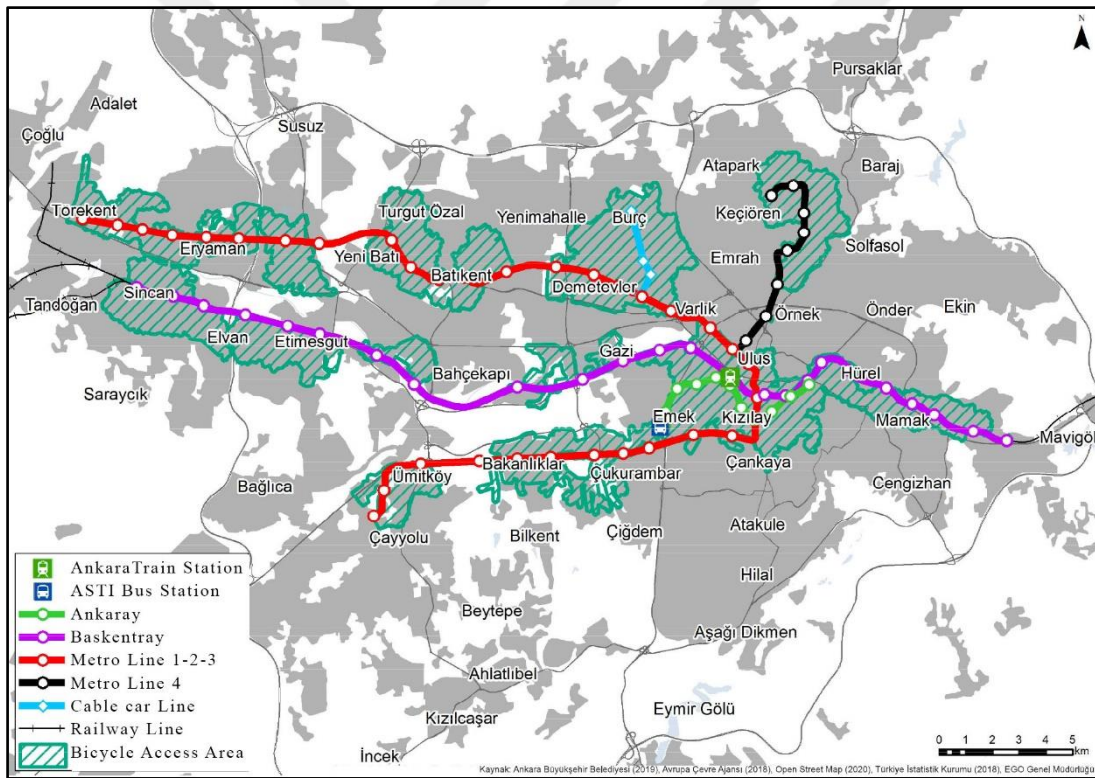


Figure 4.27. Existing bicycle service areas of train stations

Creating service areas forms a basis for designing routes. These service areas include rail stations, road connections, and residential areas. Service areas only include streets and low-grade roads currently suitable for bicycle use. Looking at the analysis, main roads and rail lines pose an obstacle to bicycle access. There is a significant difference in impact area

between metro lines and Başkentray. Many stations have minimal bicycle service areas, which limits access between public transport and attractions (ABB, ARUP, 2021).

The methodology followed in the design of the bicycle network is indicated in Figure 4.28. This figure contains the criteria that affect the design process and the outline of the design.

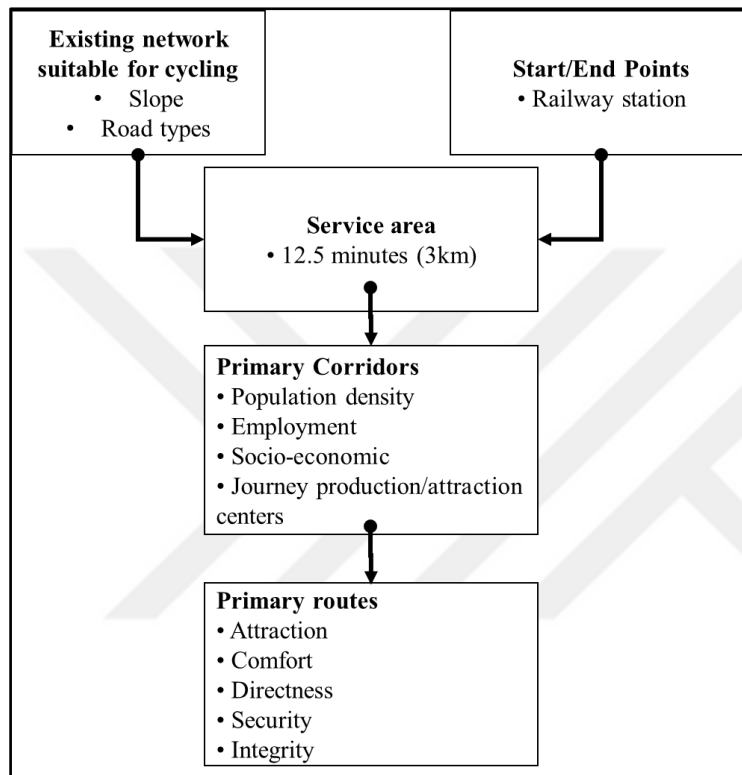


Figure 4.28. Overview of methodology (ABB, ARUP, 2021)

In this context, the following analyses were carried out separately for the city, and the maps of these analyses are included in the report;

- Road Slope
- Population density
- Socio-economic status
- Places of employment

The report mentions the importance of analyzing demographic characteristics, employment (trip production and attraction centers), and bicycle service areas together. This analysis was used as a reference in determining the most suitable routes for the proposed bicycle network. The analysis is shown in Figure 4.29.

According to the analysis, important employment centers such as Ostim, İvedik (Yenimahalle), and Sıteler (Altındağ) and some regions with high population density remain outside the bicycle service area accessed by the rail system network. While there are areas with high slopes, such as Mamak, that are outside the reach, some other areas, such as the surrounding regions of Sincan, have suitable topography for cycling infrastructure (ABB, ARUP, 2021).

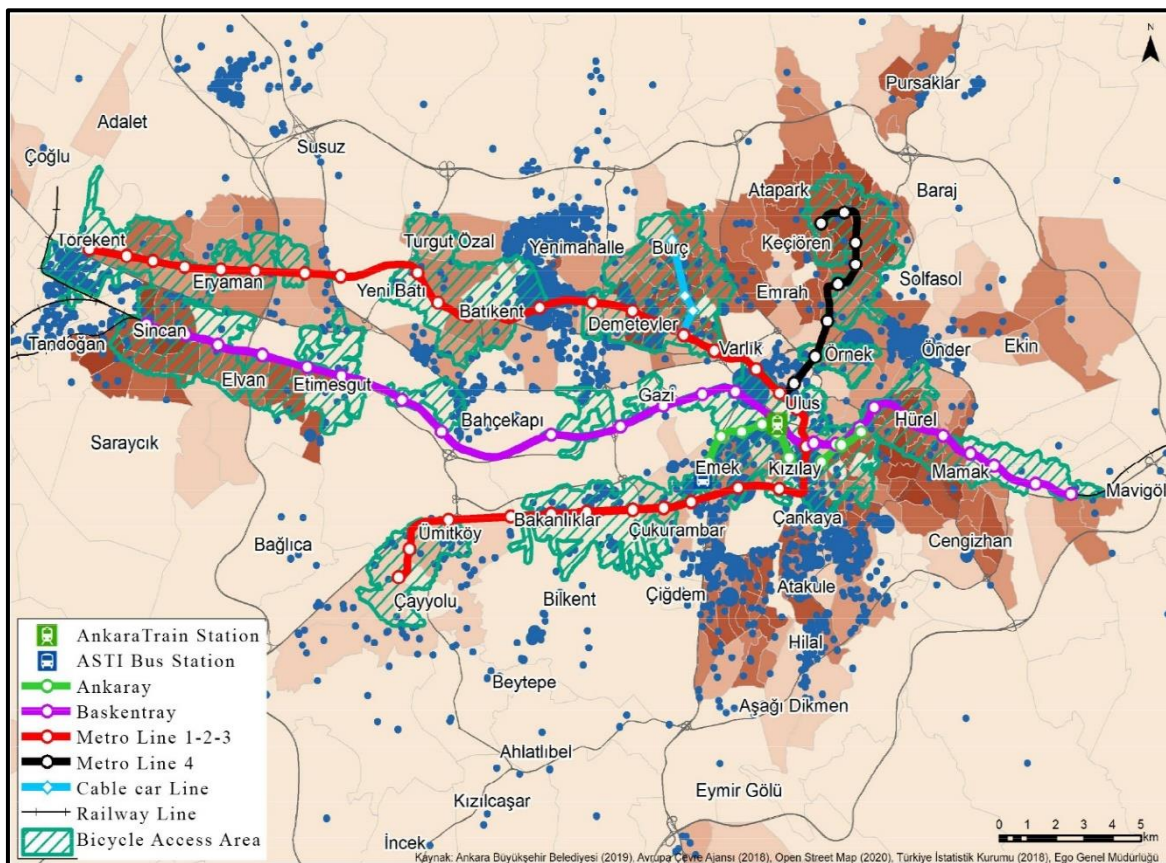


Figure 4.29. Employment locations compared to stations' existing bicycle service areas (ABB, ARUP, 2021)

As mentioned before, it has been stated that it is unrealistic to design a bicycle network covering the entire city of Ankara. Therefore, as a result of the analysis, 5 focus areas were selected in the city, and bicycle networks were designed to provide the best service to these areas. Focus areas are shown in Figure 4.30. Before the design of bicycle networks, desire lines were determined within these focus areas. While creating desire lines, demographic characteristics, travel habits, and centers of attraction were analyzed and determined in more detail (ABB, ARUP, 2021).

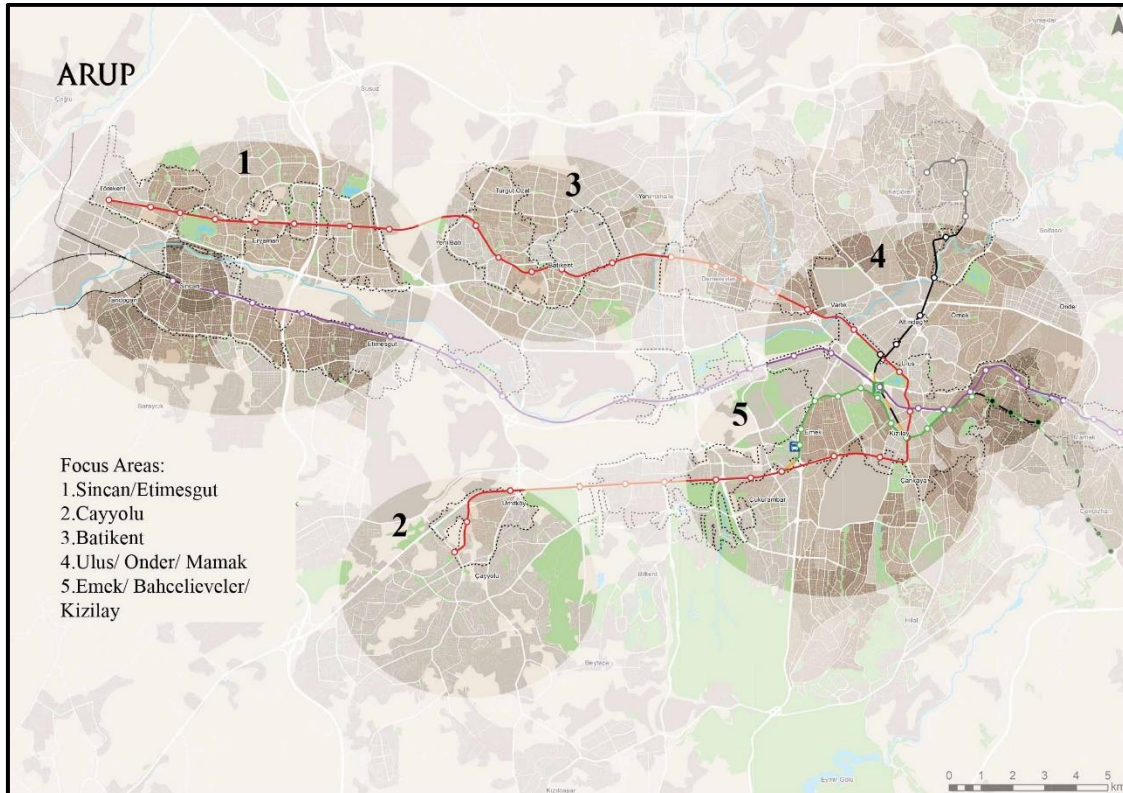


Figure 4.30. Focus areas (ABB, ARUP, 2021)

Focus areas and selection criteria are shown in Figure 4.31.

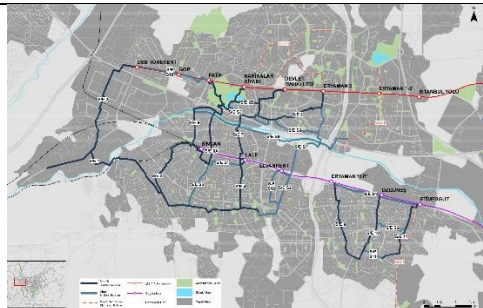
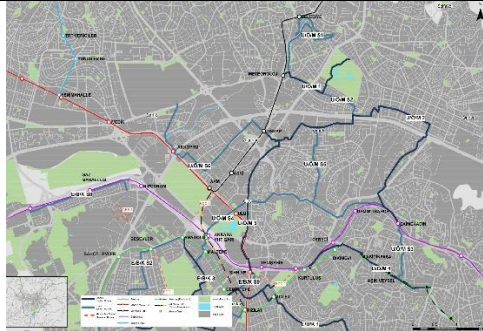
	Focus Areas and Bicycle Network	Site Selection Reasons
1. Sincan/Etimesgut		• Metro and suburban services are available • Topography suitable for cycling • Population density is a relatively dense area • Household income is lower than the city average • The majority of the residents of the region work in ASO and OSTİM and travel by private vehicle.
2. Çayyolu		• Metro service is available • Topography relatively suitable for cycling • Located within accessible distance of residential areas and metro stations
3. Batıkent		• Relatively flat topography • Metro service is available • High population density in the western parts and employment opportunities in OSTİM • The proportion of women over the age of 25 who do not have a university degree is relatively high
4. Ulus/Önder/Mamak		• Region with medium density of rail system stations • High rate of unrepresented groups • Employment is relatively high • Commercial attractions such as AnkaMall and Altınpark
5. Emek/Bahçelievler/ Kızılay		• The region where rail system stations are quite dense • High student and university ratio • The city is an important employment center and has a large number of attraction centers.

Figure 4.31. Bicycle Master Plan Focus Areas and Site Selection Reasons

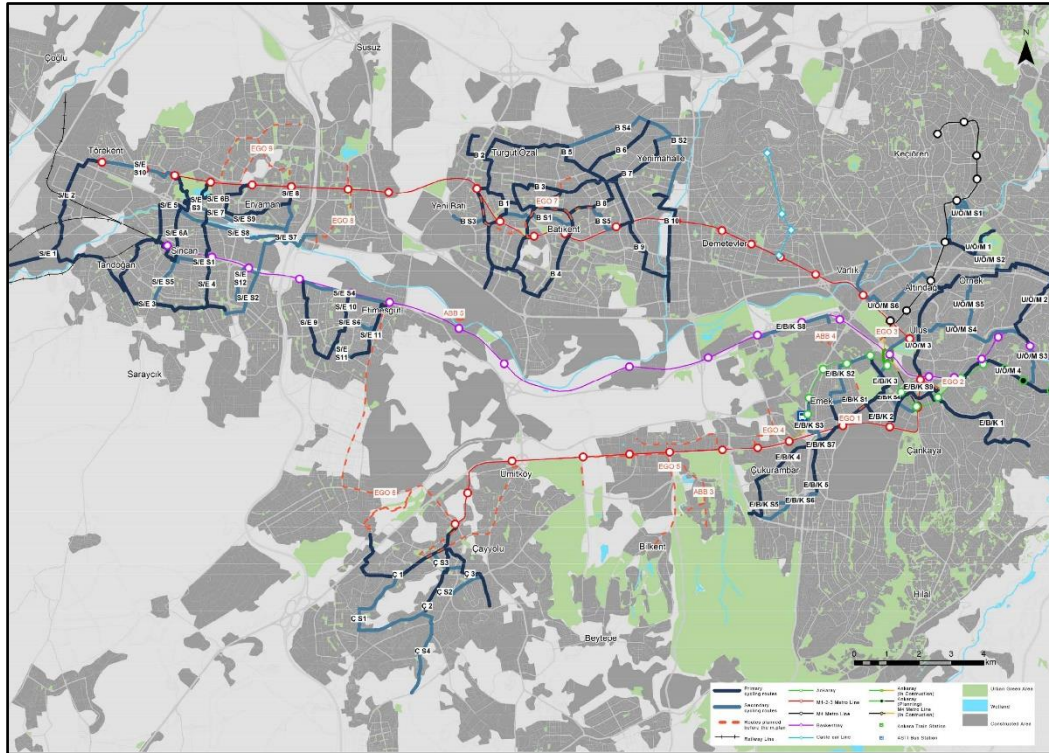


Figure 4.32. Proposed Cycling Network Map

The Bicycle Network consists of graded bicycle paths, primary (dark blue lines) and secondary (light blue lines). Secondary routes connect primary routes or serve areas with less potential. The outputs of EGO's bicycle survey study, which was completed in July 2020, are also included in the ARUP bicycle network (orange dashed lines). The created bicycle network is directly related to rail systems, as stated in the strategy. When looking at the whole study, five regions selected as focus areas can be identified (ABB, ARUP, 2021).

Implementation status of the project

The Bicycle Master Plan prepared by ARUP is the first bicycle master plan prepared within ABB. For this reason, it is stated in the report that there is no application to be taken as a reference for the approval process. For this reason, the stages of UAP were an example of the approval process. The report explains the approval process through UAP as follows:

The completed work is submitted to UKOME for approval. The decision (positive or negative) issued by UKOME is binding for institutions and organizations. The approved plan is forwarded to sub-institutions such as zoning and implementation. Once the plan is

approved, it is included in ABB's investment plans, and its budget is determined and included in the implementation program.

However, there is a problem here. As discussed in detail in the relevant section of the thesis, UAP becomes an official document if approved, since it has a provision in the legislation. Unfortunately, since there is no legislation regarding bicycle master plans, the plan cannot become an official document even if it is approved by UKOME. The Bicycle Master Plan has been approved by UKOME, but today there is no obligation to implement the plan.

For this reason, in the period since the approval of UKOME, the construction of a 5 km bicycle path in the Batıkent area, which is expressed only as a pilot project of the plan, has been completed. Figure 4.33. shows the Yenimahalle-Batıkent Bicycle Network in the plan.

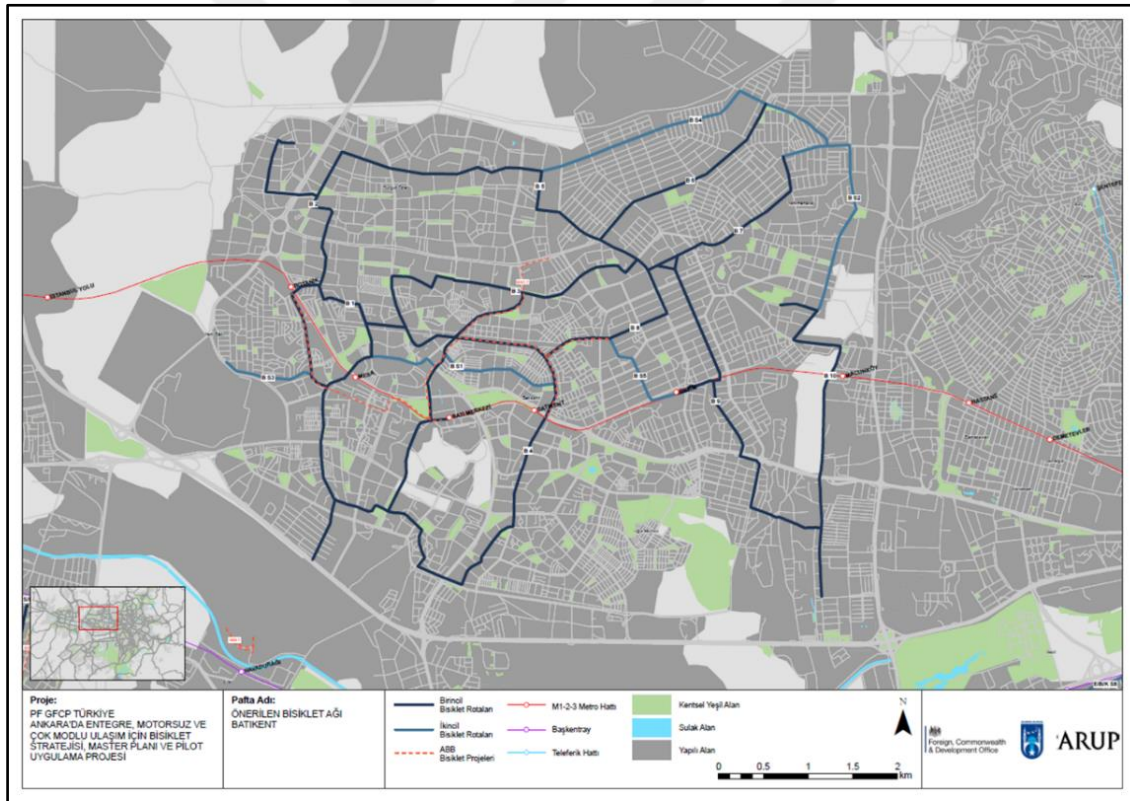


Figure 4.33. Yenimahalle-Batıkent Bicycle Network (ABB,ARUP, 2021)

According to the Bicycle Master Plan, approximately 44 km of gradual bicycle paths are planned in the Batıkent region. Bicycle paths are integrated into the M1-2-3 Metro line and are planned to avoid heavy vehicle traffic. However, today, only the 5 km part of this line

decided in the pilot project has been completed. Figure 4.34 shows the pilot project and the completed bicycle paths.

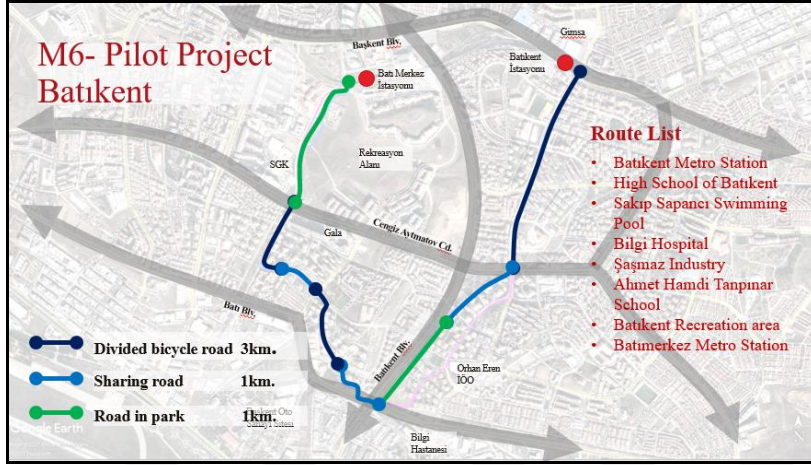


Figure 4.34. Batıkent Pilot Project Routes (ABB Transport Department's bicycle path presentation, 2021)

According to Interviewee 5, the reasons for choosing Batıkent for the pilot project are that there are two metro stations in the area and that it includes different levels of bicycle paths. There are also various attraction points in the region as indicated in Figure 4.22. According to the presentation (closed access) there are approximately 6800 students and 5600 employees in the region. The population of the region is approximately 36,500. In this respect, it was seen as a potential study area in the first phase of the plan. For now, it is the first and only implemented part of the plan. The satellite image of the study is also shown in Figure 4.35.



Figure 4.35. Batıkent Pilot Project (ABB Transport Department's presentation, 2021)

4.4. Interviews and Discussions

This section of the thesis presents the findings from in-depth expert interviews, which serve as the primary research method. The interviews, conducted over approximately one month using a semi-structured interview form, were guided by the insights gained from the preliminary field research and the studies undertaken in Ankara. The interview data was then organized under relevant thematic headings to address the overarching research question, which investigates the reasons behind the failure to implement the projects proposed by EGO and ARUP.

Table 4.4. Interviewee codes and their status, general information about the professional experts interviewed

Interviewee (Expert) Codes	Relationship With The Bicycle Projects	Profession	Period of Service	The Interview Was Conducted As,
1	Representative of the Chamber of City Planners	Urban Planner	10 year	Online
2	President of the Ankara Bicycle Board	Urban Planner	8 year	Face-to- face
3	Expert and the Responsible Person for the UAP Ankara Transportation Plan	Academician	25 year	Face-to- face
4	Expert in the EGO Bicycle Project	Transport Planner	+50 year	Face-to- face
5	Expert in the ARUP Bicycle Project	Urban Planner, Academician	13 year	Online

Table 4.4 presents the relation of experts with bicycle projects, their professional backgrounds, their period of service, and the methods used to conduct interviews with them. In this part of the research, the topics discussed within the framework of the survey questions will be compiled under headings.

- *Bicycle and Rail Transport Integration in Ankara, as a Strategy*

Since the main strategy of both bicycle studies discussed within the scope of the research is rail system and bicycle integration, the opinions of experts about this strategy were discussed.

- *Inter-Institutional Coordination in Bicycle Transportation Plans*

Since two different teams within ABB, EGO, and ARUP, have recently carried out a bicycle transportation study, information was received from experts about the communication and coordination status between these two teams.

- *Participation in bicycle transportation Plans*

In both study reports, the importance of participatory planning was mentioned and it was stated that a participatory process was carried out. Information was received from the interlocutors on how the participatory process was carried out, or more precisely, whether it was carried out or not.

- *Place of Bicycle Transportation Plans in Legislation - Implementation Status*

As will be stated in the relevant section, the initial purpose of the researcher in this article is to obtain information about the approval processes of the projects. However, according to experts, the main problem is that these completed studies, especially the Bicycle Master Plan, cannot become an official document. Information was obtained about the status of the studies in the regulation and the lack of legal infrastructure encountered during the implementation process.

- *Ankara Transportation Master Plan and Bicycle Plans*

In both study reports, reference is made to the data of the Ankara Transportation Master Plan, and it is mentioned that some data of the UAP are used in the Bicycle Master Plan. It was also stated that the UAP was taken as a reference during the approval process of the Bicycle Master Plan. However, when referring to the UAP, words such as not yet approved plan or draft plan are used about the plan. Today, there is no official approval of the Ankara Transportation Master Plan. The details of this issue and the opinions of experts about the use of data are discussed.

- *Future for Bicycle Transportation in Ankara*

After all the discussion topics, experts' opinions about the future of bicycle transportation in Ankara were discussed.

4.4.1. Bicycle and rail transport integration in Ankara, as a strategy

Regarding this issue, the question "Do you think it is right that the bicycle and rail system integration strategy is seen as the primary strategy for bicycle transportation in Ankara?" was asked of the experts. Experts 1, 4, and 5 think that the strategy is right for the city. Interviewee 2 does not fully agree with the issue. Interviewee 3 finds the strategy positive but does not comment in detail. In the comparison here, whether the experts are cyclists in their own lives or not is considered important in interpreting their opinions. Their relationship with the bicycle is shown in Table 4.5.

Table 4.5. Interviewees' cycling ability and purpose of using the bicycle

Code	Knowing how to ride a bike	Purpose of using the bicycle
1	Yes	leisure time activity
2	Yes	leisure time activity (in the past as a means of transportation)
3	Yes	leisure time activity
4	Yes	leisure time activity
5	yes	as a mean of transportation

Interviewee 1 says:

“I can say that it is a positive strategy for Ankara. But it may not be for other cities. I think it is essential for Ankara to accept the metro as an axis. Because Ankara's topography is not very suitable for bicycles, bicycles and the metro must be used together. For example, let's say I want to go from the Kızılay to my home with my bike, there are serious hills. If I am not a very professional cyclist, I may not be able to climb that hill or I would tire myself out a lot, and I think this would never be sustainable. That's why I should choose to get off at a higher stop and go down from there.”

Interviewee 4 says:

“As a norm, a cyclist travels between 12 and 15 km per hour. For example, the distance between Çayyolu and the city center is 20-25 km, and a cyclist needs 2-2 and a half hours to cover this distance. During this time, they arrive at their jobs in a sweat, passing through very dangerous roads and intersections. They will go like this for 2 days at most, and return to their cars on the third day. The access distance for cyclists is 5 km and 1,5 hours, which

is ideal. These limits should not be exceeded when planning bicycle transportation. There is already a widespread metro system in Ankara, so I think the bicycle system in Ankara should be arranged to transfer to the metro. If we consider the metro as the trunk of a tree, bicycle paths should be planned as branches of this tree.’’

Interviewee 5 stated the following regarding the question within the scope of the ARUP plan:

‘‘ For better or worse, Ankara has an expanding rail system network. It makes sense to have a bicycle plan to integrate into the rail network. Whoever you ask will tell you that Ankara is a very inclined and vehicle-dependent city. The strategy plan states the following; We first need to increase bicycle access, this could be bike sharing or ownership. Then we need to create a bicycle network. We also need to fight against vehicle addiction with policies.’’

Also, interviewee 5 stated that he agrees with the opinion of interviewee 4:

‘‘ 4 had a logical plan here, and he explained it to us in the presentations. The idea was, when we look at the literature on crawling cities, walking cities, and running cities, Ankara was a crawling city in terms of bicycle transportation. He said that it would be much more logical to build bicycle paths piece by piece in crawling cities and connect the networks after experiencing them. When we looked at it, he said that it was unreasonable to build a parallel bicycle path on top of the metro line while it was running underneath. I think he is right.’’

The only person who disagrees with the other experts is Interviewee 2. Interviewee 2 says:

‘‘If you conduct a survey of any individual who uses bicycles and show them these projects; If you ask, "50 km bicycle network plan has been worked, what do you think about this project?", the answer you will get is this; Why are these always connected to the metro?. Is the cyclist's only problem being that he cannot reach the metro? Will we solve the problem of bicycle transportation in Ankara when we connect the bicycle networks to the metro? This is the proposition of the 2040 bicycle master plan, let's connect bicycles to public transport.’’

Interviewee 2 expresses the problems related to the subject as follows:

‘‘The problem is, how healthy is Ankara's metro transportation? We are talking about an Ankara metro that was planned incorrectly and cannot use its full capacity. How many correct places does it go through? A metro whose service network was not planned correctly. Plans suggest adding bicycle networks to such a metro system. Let's say a cyclist comes to

the Kızılay transfer center and has trouble getting on to Ankaray because there is no bicycle parking lot in the station. So how was the bicycle integrated into the rail system in this case? There is so much lack of infrastructure.’’

Although it is not related to the rail system, what expert interviewee 2 said about bus and bicycle integration reveals infrastructure deficiencies and problems with integration practices. Interviewee 2 says:

‘‘ Approximately 300 bicycle hangers were purchased and installed on buses. It's nice when you look at it, but now these devices can only be installed on old MAN buses. These buses also scrape their bicycle racks on the ground when getting off and on from places like Ankara's Şentepe, Küçükesat, and Keklikpınarı. Because when you bring the hangers used in the plains in the Netherlands and attach them to the bus systems in Ankara, they cannot be used.

Another problem, even though we reported it to EGO, you cannot see which bus has a hanging device or not. For example, while waiting at the bus stop, you cannot know whether the incoming bus has a hanging device or not. Normally, this is not a very difficult thing, by adding another tab to the EGO mobile application, they can show buses with bicycle racks. They are even late in implementing this. Because these projects are suggested by people who do not use bicycles, and because they are suggested, they are not supported. Naturally, the process does not progress since civil society is not included in the process. As a result, the feedback is that no one uses the hanging devices.

...These need to be clearly stated, the scope of the rules, assurances must be given to the driver, and there must be a way of compensation for this.’’

According to interviewee 2, although it is a different mode, there are serious implementation deficiencies in the bus-bicycle integration system which will negatively affect the strategy. It is foreseeable that such implementation deficiencies will occur in bicycle-rail system integration projects.

Here, following the purpose of the research, another discussion situation was discovered, completely independent of the questions asked. That is Eskişehir road and bicycle use.

Experts differ similarly. While explaining the subject here, first the opinion of interviewee 2 and then the similar opinions of interviewees 1-4 and 5 will be conveyed.

To examine the issue better, the researcher asked the following question: "Do you think this strategy is negative due to the lack of infrastructure and the inadequacy of the rail system here, or do you find this strategy unsuitable for the city?"

Interviewee 2 says:

‘‘It’s not a bad strategy, but I think just integrating into the rail system is not a good strategy either. Cyclists do not take the bus or subway unless necessary.

..., connecting bicycle paths to the metro will not solve the bicycle transportation problem in Ankara.

... But if they built a main bicycle path instead, they would provide a better service. For example, when you pass a bicycle path through Eskişehir Road or Istanbul Road, the main arteries of Ankara, you create a bicycle path.’’

Interviewee 4 has an opposing view here, especially regarding the Eskişehir road and interchanges:

‘‘ In Mansur Yavaş’s election propaganda, A3-sized bicycle path works were shown with the title "Our bicycle plan is ready". In this study, bicycle paths were proposed, almost all of which passed through main roads like Eskişehir-Istanbul Roads. In this study, the idea of weekend cyclists is seen.

...We tried to explain to them that bicycles are a means of transportation and the work should be for transportation purposes. It should combine people’s destinations, and route selection criteria should be such as keeping people’s lives as safe as possible, staying away from high-speed routes, and avoiding multi-storey interchanges.

...Because every intersection is a killing machine for cyclists. ...intersections are deadly dangerous for cyclists without proper regulation. Therefore, the studies shown in the election manifesto were not safe for cyclists. First, there was a big reaction at the meeting because we were proposing the opposite of the work presented in the election declaration. The one they thought about most was the Eskişehir road.

... We said that no matter where you turn from the wrong, it is profitable. If you don’t, you will be the cause of death.’’

In this point, we can clearly state that there is a serious difference of opinion between the NGO representative and the expert who personally took part in the EGO project, especially regarding the Eskişehir road. There is also a situation reported by interviewee 5 on the subject:

“M. Y.(another NGO representative and cyclist) or Interviewee2 can drive maybe 16 km. Interviewee4 criticizes them a lot about this. Maybe you have heard that Interviewee4 says this; ‘They wear their helmets and tracking jerseys on special days, and people who see this become alienated from cycling. When the citizen sees that equipment, he feels the lack of bicycle equipment and thinks that he cannot ride a bicycle (interviewee 5 here himself conveys an opinion of interviewee 4).’”

Interviewee 1's comment on this issue is as follows;

“Eskişehir road is perilous for cyclists and poses a risk of death. How many cyclists died on that road in Ankara? There, it is necessary to separate the bicycle path with barriers, but this would be a very absurd solution. I think the number of lanes on the Eskişehir road should also be reduced.

...I don't understand why they don't make things harder for cars, but they make things harder for pedestrians and cyclists. If the Eskişehir road's ring road nature is reduced, then maybe cyclists can also use that road. But in the current situation, I think cyclists should use the metro instead of Eskişehir road.’”

What makes Interviewee 1's comment particularly important here is that it is found in the target user base of ARUP and EGO plans (the difference between “bisikletli” and “bisikletçi”). Although not today, Interviewee 2 was a member of the strong and fearless cyclist group in Geller's category during his university student years and Interviewee 5 is still a cyclist belonging to this group. In this respect, we cannot establish a direct relationship between the disagreement on strategy and the use of bicycles. However, interviewee 5 is also more knowledgeable about the scope and implementation of the strategy, as both an academic and someone who took part in the ARUP project. One of the most important reasons why the plans propose rail-bicycle integrated systems for the city of Ankara is to make bicycle transportation in the city safer and to encourage users like Interviewee 1 to use bicycles thanks to this integration strategy. However, the city's well-equipped cyclists, who currently use bicycles in transportation, find this strategy insufficient in general and

argue that improvements in bicycle transportation will be achieved by finding a place for bicycles as vehicles on high-speed and dangerous roads such as the Eskişehir road.

4.4.2. Inter-institutional coordination in bicycle transportation plans

In this section, the coordination process between institutions for bicycle transportation projects is discussed. Interviewee 1 (representative of the Chamber of Urban Planners), interviewee 2 (President of the Ankara Bicycle Board), and interviewee 5 agree on this issue; coordination between institutions in bicycle work is weak and negatively affects these plans and projects. In fact, interviewee 5 stated that this situation is the biggest problem in bicycle transportation projects. Interviewee 4 approaches this issue differently and considers the large number of studies on bicycle transportation as a positive situation and states that the EGO study was already concluded before ARUP's study. The following question was asked to the interviewees regarding this issue: *"Two different units in Ankara worked on bicycle transportation. Is there coordination in these projects carried out on similar dates? Can you share your information on the subject?"*

Interviewee 1 says:

"Two separate teams, EGO and ARUP, are working on bicycle transportation. There is no conflict between institutions when you look at them, they are both affiliated with ABB. ... Look, this is not between institutions, you need to be aware of this. There is polarization within the same institution affiliated with the metropolitan city, it is important to draw attention to this. ABB's corporate structure is so dependent on politics and political conflicts that departments within the same institution do two different jobs. You can make a transportation plan in Ankara, and you can do everything else, but if even the department that will implement it and manage this work has a difference of opinion within its institution, it is a shame for Ankara. It seems like they divided the bicycle-related plan work into two."

Interviewee 5 says:

"One of the biggest problems regarding bicycle transportation is the lack of coordination between these institutions. We have turned the bicycle issue into a big problem area in Ankara, which has great potential. Two plans were running side by side, both sides blame each other for lack of coordination, but I do not find either side guilty. I attended meetings to coordinate and reach an agreement. But obviously, no consensus could be reached."

... Ankara had such a potential, both could go hand in hand. But they chose not to see each other. Ankara had two brilliant bicycle plans, which were completed on similar dates.

EGO had an advantage, they were getting the project approved directly, and they had a plan in their hands, but since it was EGO, they wanted to complete the entire network in 2 years, but it did not work, only one network could be built in two years. They built the bicycle path passing through the Bahçelievler metro and around Anıtkabir. It was Ankara's first bicycle path for transportation purposes, but that path also ends somewhere. No line starts other than that because EGO already has a lot of work to do on different subjects. For example, the unit manager at EGO told us that he was dealing with lawsuits on the sidewalks while building the bicycle path.

In our pilot project, parking areas were also a problem. I can say that the biggest problem in Ankara is the coordination between these institutions, that is, the decisions of the institutions on this issue.”

We can see from interviewee 5's statements that there are different problems related to the subject. In their studies on bicycles, institutions are trying to find solutions to additional problems in our country's current transportation system. They also deal with other transportation-related problems that are the responsibility of their units. Due to these situations, their targeted bicycle transportation projects remain unfinished.

The same question was directed to Interviewee 2. Interviewee 2's statements contain expressions similar to the problems mentioned by Interviewee 5. Interviewee 2 says:

“Lack of coordination is a huge problem. One of the recommendations we have taken as the bicycle council regarding this issue is the establishment of a bicycle-related Branch Directorate. We suggested that this directorate should personally deal with both road construction and maintenance works and the project part. In other words, the only business of the branch should be bicycles. Because otherwise, it starts to look like additional work of other institutions and becomes difficult to follow.

For example, when you give this task to EGO, they cannot care because they have too much work to do already. But if a Bicycle Branch Directorate is opened, this will be the only job of the directorate. Processes will also proceed faster and more accurately. Coordination will also be easier because you will have authorized someone regarding this matter.

Let me tell you something weirder, for example, the bicycle path has now been drawn and projected, do you know who will do this project? Directorate of Technical Works. Where is

technical work in the subject, nowhere?. So there is a huge coordination problem. Naturally, even the little work done never brings a solution. Bicycle transportation has been studied. At this rate, maybe we will reach a point in 50 years.’’

Interviewees 1, 2 and 5 agree on inter-institutional coordination. In the words of interviewee 2 and 5, a new problem was discovered in line with the purpose of the research, which is that institutions cannot allocate enough time and personnel for bicycle transportation studies. In addition, institutions encounter additional problems during the implementation phases of the projects, which makes the process difficult and the projects cannot be completed. The statement of interviewee 4, who approached the issue from a different perspective, is as follows:

‘‘The EGO bicycle study was delivered in July 2020. The work started before the pandemic and was delivered during the pandemic. This is not a plan, there is no target year, and this was an emergency study. It’s like an arrangement against the work shown in the election campaign.

There is no contradiction between the two studies anyway. It is always a good thing for studies to be diverse and numerous, but these studies should not remain on the shelf. Another study can make up for the shortcomings of one study. I do not see a problem with this. It is a positive situation that two separate expert teams have made the same decisions about city and bicycle transportation. But of course, when we look at it, neither study was implemented.’’

With this statement, we can say that the fact that a local and a foreign team proposed the same strategy for the city of Ankara regarding bicycle transportation is an important step, at least in determining the strategy for the city. We know that these teams do not work together in the strategy development process and that ARUP does not follow EGO in determining the strategy. Although it is open to debate, the rail system and bicycle integration is an accepted strategy for the city.

4.4.3. Participation in bicycle transportation plans

In this section, the participation process in Bicycle transportation projects is discussed. Interviewee 1 (representative of the Chamber of City Planners) and interviewee 2 (president of the Ankara Bicycle Board) agree on this issue; a participatory process is not carried out

with civil society and professional chambers in bicycle studies. Other interviewees did not have any opposing statements about the participation of civil society and the professional chamber in the process. Only interviewee 5 stated that in the ARUP project, the cooperation between other institutions participating in the process, except civil society and the professional chamber, was good. Particularly the ARUP report focuses on the participation process, and it is stated that the participatory process is carried out in the project. Therefore, the interviewees were asked through this plan, *"It is stated that the participatory process is carried out in the ARUP plan. Is this statement true? What can you convey about this issue?"*

Interviewee 2 says:

'Arup managed the project, and the pandemic intervened with the start of the project. The mentioned workshops were held online due to the pandemic. At that time, they notified the meeting on the same day and invited a few cyclists to the meeting. However, we had no contribution to that project because the meetings were not a participatory process but a presentation of the project. In other words, a participatory process was not carried out in the project as claimed. The participation of the bicycle council and the participation of cyclists remained very shallow.'

Researcher:

'What do you think is the reason for this situation? Why was the participatory process conducted this way?'

Interviewee 2 says:

'A work carried out by ARUP company with funding from the European Union. The company is trying to complete the work it has undertaken as soon as possible. Because now, when you start to include cyclists in the process, you have to go beyond that standard guide, because the cyclist's demand is something different. Since it breaks the standard patterns, civil society and relations with civil society are kept at a minimum level in the projects. In other words, it takes place in the form of a presentation.'

Apart from the ARUP project, interviewee 2 also commented on the participatory process in other projects:

'EGO also has studies on bicycle transportation, there is also the Smart Ankara project, and then there is the 2040 Bicycle Master Plan study. However, I think that these projects

do not promise any development in bicycle transportation. In all these projects, our participation as civil society was minimal. A participatory process was not carried out in any of these projects, they were just for show. I would like to add that I was invited to a few of Smart Ankara's workshops, but I did not go there on purpose. Because I didn't want to sit in the protocol, drink tea, eat food, and then be a pawn of their business.’’

Interviewee 1's answer to the same question is as follows:

‘‘ There is no such thing as the Chamber of City Planners being included in the bicycle transportation planning study. The chamber was never included as a stakeholder in the process while the plan was being prepared. We only went to the presentation.’’

In line with the statements of these two interviewees, we can clearly say that contrary to what is stated in the ARUP report, a participatory planning process was not carried out. There is no statement in the EGO plan report that a participatory process is being carried out.

4.4.4. Place of bicycle transportation plans in legislation - implementation status

The main question to be asked in this part of the research was the approval status of the projects. However, as a result of the interviews with experts, it is seen that the main factor in the implementation of the projects is not their approval status, but the lack of a legal equivalent of the plans. The EGO's study was prepared independently of this situation and was decided to be implemented in stages. However, ARUP's Bicycle Master Plan is directly affected by this situation. Because there is no regulation or legal framework regarding Bicycle Master Plans in today's legislation. Therefore, no matter how well prepared, bicycle master plans depend on the local authority's willingness to implement them. There is also an additional situation that interviewee 4 added on the subject, which is considered important, and that is the access status of the plans. Although the EGO's bicycle study, which was discussed in this thesis study, can be accessed from the website, the Bicycle Master Plan prepared by ARUP was shared with the researcher by ABB's Transportation Planning and Coordination Branch Manager. No official report of ARUP's plan has been shared on the internet. The opinions of Interviewee 2, 4, and 5 on this issue are given below.

Interviewee 2 says:

“The Bicycle Master Plan study has been completed and delivered, but this project does not have a place for approval. Who will approve it, for example, the municipal council or the mayor who will sign and accept the project? Unfortunately, there is no provision for this completed work in the legislation. These projects are not binding. In other words, a bicycle master plan is made, but municipalities that will build bicycle paths may deviate from this plan or may not implement it at all. A reference source, that's all.”

Interviewee 4 says:

“Bicycle legislation has become a patchwork. There is a bicycle regulations and a bicycle path regulation, but there are many mistakes in these regulations. Yes, projects have been done, reports have been completed, but there is no intention to implement them. The bicycle master plan is not a transportation master plan anyway, so there is no obligation to sanction it. The intention of the managers is important here. They say that they cannot allocate a budget for bicycle paths, but they do not see that the bicycle transportation system is quite cheap, even the cheapest, compared to other transportation systems.

Another issue is that transportation plans or bicycle plans are prepared, but the reports and studies are not uploaded to the Internet. Governors do not like transparency at all.

...It is necessary to show the law to people so that they obey the law. Is it possible to comply with an unknown secret law? However, there is no open access to many plan studies.”

Interviewee 5 says:

“I remember that the plan received approval from the Municipality. This is an important issue. As you look at the legislation, you will see that there is a zoning plan, and a transportation master plan, and the plans have approval processes and are binding. However, there was such a problem in the bicycle master plan from the very beginning.

...I mean, this plan has no place in the legislation. That's why work is starting, a tremendous effort is being spent on the project, but if the municipality does not have enthusiasm and desire, there is a possibility that the project will be shelved plan.

...If there was a Transportation Master Plan, let this be what we compare it to because the transportation master plan has a legal place in the legislation. It is a plan that every provincial municipality must make. If you approve it, it becomes your binding document. It needs to be coordinated with the zoning plan and you need to shape your city by complying with the decisions there. However, we cannot say this for the bicycle master plan. Although Ankara does not currently have an official Transportation Master Plan. Bicycle Master

Plan's continuation and implementation again depends on the intentions of the municipalities.''

4.4.5. Ankara Transportation master plan and bicycle plans

Some data from the Ankara Transportation Master Plan was used in the ARUP's Bicycle Master Plan, using expressions such as "not yet approved" and "draft" about the plan. First of all, to understand the approval status of the UAP, the following question was asked to the experts:

'While using Ankara Transportation Master Plan data, expressions such as "draft" or "not yet approved" are used about the plan. May you tell me your information regarding the approval status of UAP?'

Here, interviewees 1, 4, and 5 state that the plan was not approved or even canceled, and 1 and 4 also conveyed what they know about the reasons for the cancellation. Interviewee number 5 agrees that the plan has not been approved, but he does not have detailed information about the situation. However, he finds the fact that the planned study cannot be used in the current projects negative for transportation works. Interviewee 3 has an opposing view on this issue and states that the plan is left in pendency and that using expressions such as an unapproved draft about the plan is an attack against the study.

Interviewee 1 says:

'It was a plan that had flaws in the institutional functioning and scope of the plan and was ultimately not approved. The flaws of the plan were not discussed much, and a transparent process was not carried out. It was a project carried out by Gazi University.

Ankara is currently considered a single-centered city with a Red Crescent focus in terms of transportation. There were polycentric decisions in UAP, these were decisions dating back to the Melih Gökçek period, and this situation posed a problem for us. Of course, we support polycentric transportation, but we are not against this idea.

...The disapproval of the plan is related to the cancellation of the 2038 environmental plan. Transportation decisions were transferred to the new environmental plan, and, the basis for Gökçek's plan, which would increase Ankara's population by almost 2-3 times, was created. ...We objected to the 2038 Environmental Plan and the transportation decisions it contained

and filed a lawsuit. This plan was canceled at the end of 2020. When this plan was canceled, transportation decisions were also canceled.’’

Interviewee 4 says:

‘‘The whole story is actually about Melih Gökçek's desire to secure the investments he made around Ankara, after ruling Ankara without a plan for 20 or so years. Because the elections were approaching, and he was unlikely to win. In fact, he had to have his investments recorded somewhere under the law. Therefore, the man who was mayor without a plan for 20 years started to love plans and planning.

The work started late, the surveys were not conducted on-site, there were major errors in the rates, and they proposed 2 rail lines in the plan that were unrelated to the results. The location of the stations was also related to the investments made by Melih Gökçek. Rail system routes were controversial in this respect. Another situation is that the population in the transportation plan is 430,000 more, it is not clear where this population is settled. It is placed somewhere so that the calculations can be done feasibly. In the rail system model, subways were given a speed of 300 km per hour so that some lines could attract passengers and be feasible. So the plan contained such miscalculations.

As for the cancellation, the decisions of the Transportation Master Plan were transferred to the Environmental Plan. Because the Transportation Plan could not get approval for a long time, they tried such a way, that at least the decisions in the Environmental Plan should be approved. However the environmental plan was canceled, so the population and land use information of the transportation master plan was canceled, and then the transportation master plan was also canceled.’’

Interviewee 5 says:

‘‘We always know that this is a finished plan, but there is no approval status. I asked this several times, and I also asked G.M. (an academician from ODTU), why was not this plan approved. Everyone talks about it as an unapproved plan because it is a finished plan but not in effect. This was one of the most important questions while making Ankara SUMP. They said, "This city has a transportation model, it has a lot of data collected, let's use it." However, since it was not an approved plan, no data on that plan was used in any way. It was as if that effort had been completely thrown away, which is a bit sad actually. There is

no public information about that plan anyway, but all its documents are in the hands of EGO and the municipality. The team making the new plan now has that data, but it cannot be used directly. Nothing from that plan is currently available.’’

Interviewee 3 says:

‘‘UAP is a project entrusted to Gazi University during Melih Gökçek's term. An agreement was reached in the form of a public-public partnership (joint work of two public institutions). The planning process was a year. The work was carried out between 2013-2014 and all official documents were completed at the end of the process and delivered to the municipality. However, afterward, the municipality made frequent requests for regulations, and the Ministry of Transport also had feedback and requests during the inspection process. Updates and revisions have been made, in this respect, the plan has exhausted us. We went through a plan review and revision process that was longer than the planning process. Although we submitted the plan in 2014, even in 2017 we were still dealing with the problems raised by the Ministry of Transport and the municipality. As a result, we delivered the work, and the plan is at the municipality and is still there.

The report of the plan, its annexes, and all technical elements constituting the draft plan were completed and delivered to the municipality; in other words, the university completed its duty here. After that, it is the decision to pass the plan through the parliament. We do not know what the then-president and technical committee thought. There was never any disapproval. My personal opinion is that such high-scale strategic plans become binding when they are passed by the parliament. I think this approval was not given in order not to fall into this context.

Even if the technical statements are missing or incorrect, the word "unapproved" creates the perception that something is missing in the plan. I think these words are used consciously by those with non-impartial views. Frankly, I see the use of words such as draft or unapproved as an attack on the work. I witnessed attempts to dissolve this plan in political and ideological chaos. This issue has turned into a political situation rather than a technical concept. As a university, we have completed our work regardless of all these situations.

This is not disapproval, this is a "suspension" situation. The municipality refused to finalize the process. The issue is not the fault of the plan, but other reasons that have not been fully explained to us. These reasons may be commercial, economic, or political, or there may be conflicts between parties. The plan is in the parliament.’’

When we look at the statements of all interviewees, we can clearly say that there are different opinions on the subject because the developments after the planning process were not carried out transparently. Even today, there is still no clear legal decision about the Ankara Transportation Master Plan. Transportation studies cannot be handled separately from political issues. However, the data collected from the plan is used in some plan studies and not in others. Here, the researcher received an answer by renewing the question as follows: *"What is your opinion about the use of Ankara Transportation Master Plan data in ARUP's Plan study?"*

Interviewee 3 stated that there is no problem in using the data. Based on Interviewee 5's previous statement, we can add that he finds it wrong that the plan study is not used today. Interviewee 2 did not make any statement against the use of the data. Interviewee 1 did not make a statement about whether the use of the data was right or wrong. Interviewee 4 emphasized again that the plan data was wrong and made an explanation as to why the data is used today. Interviewee 3 says:

"I did not see any harm in using the plan data in the Bicycle Master Plan. Topography and spatial patterns do not change easily. Data were studied scientifically in the form of a universe and a sample. The study was conducted on a 3% sample in Ankara. In this study, 125,000 people and 46,000 households were contacted and analyses were made on their trends. No study was conducted in Ankara to falsify these studies. It would be quite correct to use technical data."

Interviewee 4 stated the following regarding this issue:

"When I talked to working students, they told me that they filled out the surveys in cafes, so there may be errors in the data. In the transportation plan, the survey is conducted on weekdays, that is, on work-school days. However, in this study, the survey was also conducted on weekends, and they processed this data together. Normally the model is set up for a typical working day. But in this plan, it is modeled as an average day of the week. Naturally, all results in the model will be wrong. This was already a situation that the team personally accepted."

Now the problem is that this city did not have a transportation plan for 25 years during Melih Gökçek's term. Normally, a transportation master plan is made and this is revised every 5 years. Nothing has been done in 25 years, so people researching transportation in

Ankara are hungry for information. Currently, there is this transportation study and there is a data set that you do not know whether it is true or false. For it to be wrong, a new study needs to be done, but there is no such study. Therefore, even though they know that this plan is not a draft, they describe it this way because this is what is available.’’

We can say that the reason for the difference of opinion regarding the use of data is again the transparency issue regarding the transportation plan. To make a clear comment on this issue, we need to consider in detail which data of the UAP is handled and how. Because the interviewers do not have precise information about which data and how they are used.

Interviewee 1 touches upon a different issue regarding this situation, independent of the question. He draws attention to the need for a new transportation plan and how this is addressed within the SUMP-SKUP conceptual change:

‘‘ A transportation master plan needs to be made again, but an urban sustainable mobility plan is currently being made. But its content is almost as full as a transportation master plan. They will probably use this sustainable urban mobility plan as a transportation master plan. However, the ministry changed the name of this plan to a sustainable urban transportation plan and translated it into Turkish as SKUP. The concept of mobility and the concept of transportation are not equivalent concepts.

... This is a consciously chosen concept. Our policymakers empty the scope of this matter and make comments in line with their interests. If you ask why this name change was made, very large loans can be obtained for SUMPs with international financing support. Looking at this from the perspective of the ministry, in short, such a path is being taken so that the SUMPs can replace the transportation master plan.’’

4.4.6. Future for bicycle transportation in Ankara

Bicycle plans are discussed around different topics. New problems have been discovered about the plans and the implementation processes of the plans, other than the situations previously anticipated by the researcher. After all the discussion topics were discussed, the following question was asked to the experts;

"Do you see a future for bicycle transportation in Ankara?"

All experts are generally positive about bicycle transportation, but they agree that bicycle transportation in Ankara has not made any progress following the plans and that there are serious problems in implementation. They draw attention to situations such as the lack of bicycle awareness in society, the political atmosphere, the technical and budgetary inadequacy of institutions, the failure of governors to take decisive steps regarding bicycle transportation, and most importantly, the lack of legal validity of the bicycle master plan. Due to these situations, they do not find the future of Ankara city very bright in terms of bicycle transportation.

Interviewee 1 thinks that healthier transportation in the city can be achieved with simple solutions regarding bicycle and pedestrian transportation. However, he stated that there was no improvement in this regard due to the lack of implementation of the studies. Interviewee 2 points out the insufficiency of the bicycle studies carried out, the lack of bicycle awareness in society, and that any studies carried out without respect for cyclists will be invalid:

‘EGO has studies on bicycle transportation, there is the Smart Ankara project, and there is a 2040 Bicycle Master Plan study. However, I think that these projects do not promise any development in bicycle transportation. In all these projects, our participation as civil society was very limited. As I mentioned before, simply integrating bicycles into rail systems will not be enough.

...Our traffic law is very clear about this issue. A bicycle is a non-motorized vehicle, and if this non-motorized vehicle does not have a dedicated bicycle path or an access-controlled road on the road, it travels in the right lane at its own defined speed. Other drivers have to wait for the bicycle and if it is possible they can overtake the bicycle by following rules. If the provisions of the law were implemented, there would be no need for bicycle paths, since all the roads here are ours, and we can ride bicycles on them.

It is very necessary to create bicycle awareness in society. Just building a bicycle path is not enough. Even during this year's 100th Anniversary of the Republic bicycle ride, vehicles were parked on the bicycle path in front of the police chief's house, and when we asked the police, we got the answer: "What's the big deal?" Even the police are not mindful of this issue, we were even warned about lifting the windshield wipers. "Ohh, also and these (cyclists) appeared," said those who saw us. ’’

Interviewee 5 included the city of Ankara in his article compiling good practice examples on bicycle transportation, published in early 2023. In his research, he includes bicycle studies carried out in Ankara in recent years. For the city of Ankara, where the number of cyclists is below 1%, the Bicycle Masterplan sees the Bicycle Paths Regulation, participatory planning studies, and electric shared bicycle systems as important steps (Erçetin, 2023). (Since Interviewee 5 allowed his name to be used in the research, there was no harm in citing his relevant article). In the interview with him, he similarly found the studies positive but expressed various concerns due to the implementation processes not being completed.

Interviewee 5 says:

“Lately, I've been thinking "I wonder?" about the Bicycle Master plan. As someone who has been involved in the project from start to finish, this plan makes me say "I wonder..." right now... It's been almost 2 years since the plan was finalized. There is not much progress, I mean there is almost no progress at all. There is no implemented project other than the pilot project we did.

...Unfortunately, politically, the following situation occurs; ABB, which is doing this project, is the municipality of Party A, and the district municipality of party B. That's why municipalities from the B party don't accept the plan made by ABB, they make their plan from the beginning.

...Although it is a very new plan, unfortunately, there is a lack of experience and determination in implementation. There is no determined authority to implement the project. Authorized institutions are also very busy with their work, and they also have budget problems.

...We are like this, while making the cake, we try to add the candle before baking the cake. The candles here, for example, the bike-sharing issue, scooters, bus hangers, or bicycle parking areas in stations. So, okay, good steps, I can understand why they are done, but this is the answer to the question "Why not work?". Bicycle Master plan is the cake of this cake, without plan, other works would not be efficient. Shared systems will be established, for example, no matter how many stations are installed, people will not want to get on easily. Because there is no way this system will work efficiently, it is not safe. Cycling in Ankara is not easy at all, I can understand the complaints of Ankara residents on this issue. On the contrary, Ankara is getting worse in terms of vehicle addiction.”

Interviewee 4's statements both summarize the process of general bicycle transportation studies and point out that the implementation in bicycle transportation is late and adequate regulations have not been made.

Interviewee 4 says:

'The COVID-19 pandemic was a great opportunity to improve bicycle transportation, but the local government failed to use this opportunity. Therefore, bicycle transportation went into a dormant period again. If you look at the data of the previous transportation master plan, the rate of bicycle travel in Ankara is 8 out of 10 thousand. It is not even one in a thousand. We use the phrase "one in a thousand" for things that would not normally happen. Being on a bike in Ankara is like this. One of the main features of using bicycles for transportation purposes in Ankara is that it is dependent on the metro

...During times such as car-free city Day and Mobility Week, big names came and took two tours on bicycles, and such shows were held. But afterward, these shows were not reflected in daily life. However, these efforts should have been embraced and supported with a major campaign. Currently, electric bicycles are being completed, stations, shared bicycles... but there is nothing else, there are still no users.

...There were two dimensions to this. The first one is what needs to be done at the local level, for example, there are a few bicycle users here in Çayyolu. During the pandemic, people saw that they could make short trips by bicycle. But neither the district municipalities nor the Metropolitan Municipality does anything about this issue, that is, in a place like Çayyolu, almost everyone has a bicycle at home, but since safe bicycle paths, bicycle parking areas, and the necessary infrastructure are not provided, on the contrary, cars are still given priority, so even here bicycles are not used as a means of transportation. Ankara should have safe bicycle paths connected to the metro line, and this idea should be supported and campaigned, bicycles should be seen as the primary means of transportation in these networks. At the district and neighborhood level, the concept of a 15-minute city needs to be created. Only in this way can a comprehensive system that will combine the lower scale and upper scale be obtained. However, the investments made did not yield any results because the governors were not aware of the importance of bicycle transportation and this type of transportation. Therefore, the first wave of bicycles in Ankara has died and the ongoing studies will not yield any results because they are a part of this trend, that is, they are progressing within the wrong framework.'

4.5. Concluding Remark

Several studies were conducted to acknowledge the significance of bicycle transportation in Ankara, but challenges with implementation resulted in these efforts remaining as mere reports.

- Numerous research projects have been conducted on the use of bicycles as a mode of transportation in Ankara. However, there has been a lack of effective implementation in terms of spatial planning and infrastructure. Consequently, the intended objectives outlined in these studies have not been realized.
- It is uncertain if the survey questions concerning bicycle transportation are based on a scale devised by experts, which raises doubts about how accurately the results of the EGO bicycle survey represent real-life scenarios. The municipality or EGO cannot be held accountable for determining the scientific validity of this survey study.
- There are inadequacies in the implementation and regulation of bus and bicycle integration. The finalization and implementation of e-bike systems have not been completed. Overall, there is a lack of coherence in the infrastructure for bicycle transportation. Processes and projects appear to advance independently without proper connection to each other.
- The EGO cycling investigation is an urgent undertaking. Upon closer scrutiny, it becomes evident that a bicycle study initially developed solely based on the requests of non-governmental organizations was introduced as part of an election pledge. Nevertheless, experts deemed this approach hazardous for cyclists, leading to development of a new strategy and a report outlining the bicycle road network. It can be concluded that the initial study lacked comprehensiveness as it only represented the demands of a minority group of cyclists. Furthermore, the absence of access to the knowledge and expertise of professional specialists is a key issue that resulted in excluding the bicycle study from the election declaration.
- Two expert groups independently recommended integrating bicycle and rail systems for the strategy, which is a positive development. This is particularly significant considering that the EGO team had previously opposed the election declaration in their report.

However, both projects were unsuccessful in their implementation. Based on interviews with experts, the causes can be outlined as follows:

- Both teams have proposed a similar bike transportation method, but they did not cooperate effectively.
- A successful collaborative planning process could not be established.
- The NGOs have not effectively communicated the strategy, leading to a lack of involvement from many cyclists, including interviewee 2, who serves as the chairman of the bicycle council.
- There is a lack of skilled staff and insufficient funds to execute the projects.
- Since the projects lack a legal counterpart in the regulations, they are not capable of serving as an official document for sanctions. Consequently, unlike the transportation master plan, the bicycle master plan does not prescribe rules and decisions that must be adhered to and executed.
- Experts and cyclists are pessimistic due to the absence of spatial execution of projects from 2020 to the present.

In reference to Figure 3.10 in the preceding sections of this thesis, it has been asserted that the spatial, social, and governance needs are interconnected and they complement each other in facilitating bicycle transportation. Figure 4.36 was produced using Figure 3.10 as a reference, along with specific terms identified through the expert opinions chapter.

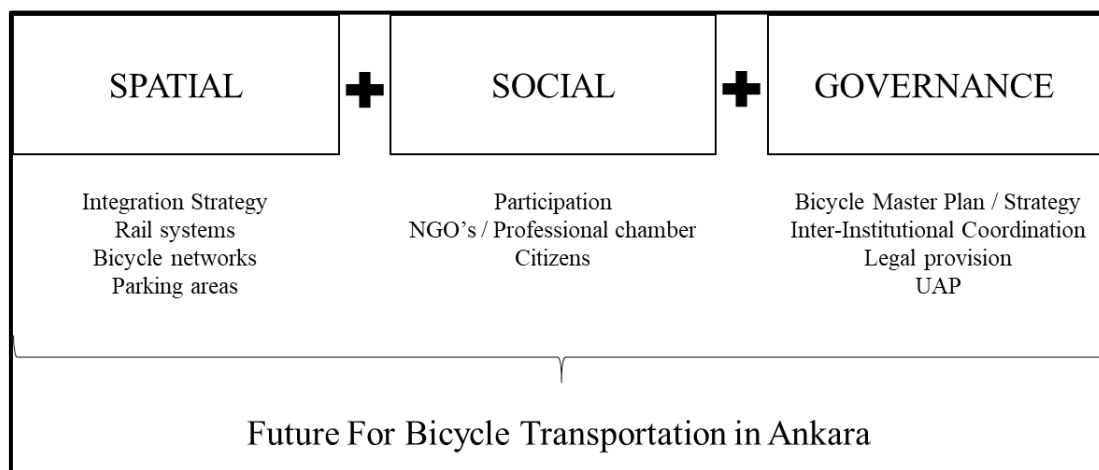


Figure 4.36. Keywords derived from the concept of bicycle transportation and discussions

Analysis of the city of Ankara using this framework;

There are serious problems and deficiencies in spatial application. Local government cannot show sufficient determination in implementing projects and cannot allocate personnel and budget. Professional experts and NGOs have disagreements on many issues, and projects are

not embraced and supported by society. Even if there are demands for bicycle transportation, it is not enough to mobilize local governors, as in the Amsterdam example mentioned in this thesis. In general terms, the city of Ankara has entered a vicious circle regarding bicycle transportation, and it is important to increase the work on this issue and take it seriously.





5. CONCLUSION AND RECOMMENDATIONS

The challenges of the energy crisis and global warming are crucial issues that pose a threat to human civilization in our era. As a society, we need to confront and address these pressing concerns. The dangers of climate change and unsustainable energy consumption are critical issues that require immediate attention. The transportation sector plays a major role in these two major threats. It can be said that the provision of energy from unsustainable petroleum-based fuels, especially in the transportation sector, will cause major problems in terms of both environmental and economic aspects in the coming years. Transitioning to renewable energy sources and implementing sustainable practices are essential steps toward mitigating the impacts of global warming and the energy crisis. Sustainable transportation systems should be targeted for cities and the role of bicycles in these systems should not be ignored.

However, for cycling to play an active role in the city and become a part of urban transportation, decisive steps need to be taken. These mutually reinforcing requirements, such as the development of appropriate cycling strategies for the city, social acceptance of cycling as a means of transportation, and the establishment of the necessary legal and governance frameworks, need to be defined and implemented. Integrating cycling infrastructure with existing transportation systems, such as rail networks, can further enhance the accessibility and feasibility of using bicycles as a mode of transport in cities.

When creating a comprehensive plan for combining rail and bicycle systems, it is essential to clearly outline how the integration will be accomplished, as well as understand the system's constraints, infrastructure, and user demographics. Inadequately considered or partially implemented strategies may have adverse effects on bicycle transportation rather than enhancing it.

One effective way to encourage the use of bicycles as a mode of transportation is to invest in dedicated cycling infrastructure. This includes the construction of bike lanes, bike-sharing programs, and secure bike storage facilities. By creating a safe and convenient environment for cyclists, cities can significantly increase the appeal of biking as a transportation option. Furthermore, promoting a cycling culture through educational campaigns and community events can help foster social acceptance of cycling as a legitimate and practical mode of

transportation. In terms of legal and governance frameworks, cities can develop and enforce traffic laws that prioritize the safety of cyclists, as well as provide incentives for businesses and individuals to invest in cycling infrastructure. Ultimately, by taking these decisive steps to promote cycling as a viable transportation option, cities can not only contribute to reducing greenhouse gas emissions and combating the energy crisis but also create healthier and more sustainable urban environments for their residents.

The city of Ankara has also implemented measures to enhance bicycle transportation, especially in 2020-2021 when numerous projects were launched for this purpose. This thesis primarily centers on two studies related to bicycle transportation. These include:

- Within The Framework Of Decarbonization Of Ankara Urban Transportation and Non-Motorized Modes Project, Ankara Priority Bicycle Network Study, Ankara Bicycle Strategy (July 2020)
- Bicycle Strategy, Master Plan, and Pilot Implementation Project for Integrated, Non-Motorized, and Multimodal Transportation in Ankara (March 2021)

These two studies represent significant initiatives aimed at promoting an increase in the city's cyclist population. However, as we approach 2024, it is evident that these studies have not been effectively put into practice. The study aimed to investigate the challenges in implementation, planning processes, and other potential underlying issues encountered in bicycle transportation research. To determine the appropriate methodology for the study, a preliminary field investigation was carried out by the author to identify possible concerns and obstacles that need attention. Subsequently, to thoroughly investigate the identified problems, an expert opinion method was chosen, and experts were interviewed using a carefully prepared semi-structured questionnaire. Additional issues that the researcher had not anticipated emerged as a result of expert opinions, and further discoveries indicated the effectiveness of the methodology. These findings collectively influenced the development of the thesis structure.

Before unveiling the results of the research, it is essential to discuss the shared elements of the two bicycle reports, which form the fundamental components of this thesis. These two projects both utilized the rail transit integration bicycle transportation strategy and

encountered similar implementation challenges and outcomes. Common elements of the studies include:

- Both research projects were conducted within the framework of ABB.
- Both studies are foreign-funded.
- Common bicycle transportation strategy is the rail system and bicycle integration.
- In this context, bicycle networks accessing rail systems have been proposed.
- An approach from parts to the whole was adopted by selecting focal areas in Ankara.
- In this context, bicycle networks accessing rail systems have been proposed.
- An approach from parts to the whole was adopted by selecting focal areas in Ankara.
- Both plans are based on the safety of bicycle paths and propose a bicycle network that will keep cyclists away from heavy and fast vehicle traffic.
- The target audience of both studies is "bisikletli", an interested but concerned group according to Geller's category.
- Neither bicycle study is a mandatory sanction document, they do not have exact equivalents in the legislation.
- The participatory planning approach has not been applied. However, participation meetings were held in the ARUP project. EGO does not make any claims regarding the implementation of participatory planning (contrary to the demands of NGOs, it is a study carried out to create a safer bicycle network).
- There was no cooperation between the teams while the studies were carried out; the EGO study was completed before ARUP's study, but there was no interaction afterward.
- It was stated that some data of UAP were used in the studies.
- ARUP's study is a more detailed report than EGO's study, but basically, similar strategies and stages are proposed.
- Neither bicycle study is a mandatory sanction document, and they do not have exact equivalents in the legislation.
- Today, only a very small part of both studies has been implemented.

Based on the shared elements of the projects and insights gathered from interviews with experts, these conclusions were drawn;

- The primary issue appears to be that decision-makers and local authorities do not prioritize bicycle transportation. There is a lack of commitment or initiative to establish bicycle transportation as an active and integrated mode of mobility within the city. Bicycle transportation remains a fragmented collection of practices, with bicycle strategies and network plans left unimplemented. These studies were conducted in an uncoordinated and haphazard manner, without a cohesive, planned approach.
- Given the vast size of Ankara, both initiatives undertook the planning process by segmenting the city into smaller sub-regions. However, as the projects lack legal approval, district municipalities are not required to carry out the project. Interviewee 5 also discussed this matter in the interviews section. The political circumstances in Türkiye make collaboration between municipalities challenging and contentious. This situation can be considered problematic for the implementation of the plans.
- According to Interviewee 4, establishing an interconnected bicycle network spanning from the local neighborhood level to larger regional scales is crucial for promoting bicycle transportation in a metropolis like Ankara. However, as mentioned previously, Turkey's political landscape hinders the realization of this vision. Furthermore, Interviewee 5 noted that even when bicycle infrastructure is planned at the neighborhood level, disagreements can arise if the adjacent neighborhoods fall under the jurisdiction of different political parties.
- The projects represent efforts funded from abroad, but their successful implementation relies on the allocation of budget and staff by the local government. However, resources were not allocated for bicycle research, which has contributed to spatial initiatives not being realized.
- While the two teams recommend integrating the rail system and bicycles as a suitable strategy, there is no measurement to assess its suitability or effectiveness due to inadequate spatial infrastructure and undefined necessary regulations.
- Both strategies are designed for potential users who currently do not use cycling as a mode of transportation. However, the cycling organizations in the city mainly comprise individuals from minority groups who presently rely on bicycles for their commute. The variance in target demographics leads to disagreement between experts and non-governmental organizations, resulting in a lack of adoption of the projects by NGOs. This situation has an adverse impact on the demand for bicycle transportation from a societal standpoint.

- The development process of the projects did not involve a participatory approach. The presentation of completed studies and reports was limited to a small group of cyclists. Failing to incorporate the input from professional chambers and NGOs into the planning process is one of the factors that led to a lack of social acceptance for the project.
- Objective and transparent planning processes play a crucial role in raising awareness about projects and encouraging their adoption. The EGO project's comprehensive report is publicly available on the relevant website. The interviewed experts displayed a good understanding of this project. However, the project report of ARUP is not publicly available, and the researcher acquired detailed documents from the municipality's relevant unit. Interviewees 1, 2, and 3 have limited knowledge about the ARUP project. It would be valuable to provide an example from the Ankara Transportation Plan; five different experts lacked clear information about this plan. It will be difficult to effectively assess a closed plan report with accuracy.
- Two bicycle projects were undertaken within the framework of ABB, though the rationale behind this decision remains unclear. This situation highlights the absence of a designated authority or branch responsible for overseeing bicycle transportation, despite there being no apparent conflict between the two bicycle projects in terms of strategy and network.
- One of the primary issues is that these projects lack legal legitimacy. Experts are primarily concerned that these studies will only exist on paper and may not be put into practice. The absence of provision for the work in the regulation also has a detrimental impact on the spatial implementation process. When local governments view these project reports as a policy document, they need to be committed to its implementation and allocate budget and personnel accordingly. Unfortunately, local authorities have not yet demonstrated adequate dedication to promoting bicycle transportation.

In brief, the shared characteristics of the projects align with the challenges they commonly encounter. Based on the findings of the study, the research queries were addressed in the dissertation as follows:

The main question 1, as well as the sub-inquiry 1.1, is answered in the fourth chapter of the thesis by examining various projects, plans, and implementations conducted by EGO and ARUP within the framework of ABB. The 4.4.3 section of the thesis provided answers to

Questions 1.2 and 1.3 by analyzing expert opinions, demonstrating that the projects lacked a collaborative approach and did not involve NGOs or professional chambers in project and planning processes. The necessity to establish a more secure bicycle infrastructure, as opposed to the requests put forth by the NGO in the initial stages of the EGO project outlined in section 4.2.2 of the thesis, highlighted differing viewpoints between cycling advocacy groups and experts. There is evidence of conflicting views between Interviewee 2 and other professionals on numerous topics. Furthermore, these results suggest that NGO representatives are not the type of cyclist of the cyclist demographic that experts have identified as the primary audience for the plan.

Chapter 4 provides the answer to question number 2, outlining that projects and plan studies incorporate a fundamental strategy of integrating rail systems with bicycles. Question 2.1 remains unanswered despite gathering input from experts in section 4.4.1. While most experts support the strategy for the city of Ankara, there are two dissenting opinions. The effectiveness of the integration strategy is still uncertain as it has not been completely put into action yet. Question 2.2 was addressed by outlining the EGO and ARUP projects' target audience and plan objectives in sections 4.2.2 and 4.3 of the thesis, respectively. Cyclists are categorized into various groups, and these projects aim to make inclusive decisions that consider the majority and devise appropriate strategies.

The response to question number 3 has been addressed by furnishing details regarding the progress of the projects outlined in sections 4.2.2 and 4.3. Despite the completion of plan studies years ago, minimal implementation has taken place since then. The answer to question number 3.1 is that local governments have not shown enough support for bicycle transportation efforts. However, the explanation for this circumstance is detailed in sections labeled 4.4.2, where experts discuss the challenge of insufficient staffing and funding resources. As a result of limited personnel and budget allocated to bicycle transportation, bicycle transportation projects were a secondary task within other departments. Questions 3.2 and 3.3 were answered in section 4.4.4, indicating that there are no existing regulations for the plan studies and no legal requirement to implement them. A major challenge of these projects is the absence of a legal mandate for implementing bicycle plans.

Experts have provided different responses to the queries raised in question 4, under heading 4.4. They highlighted negative circumstances such as inadequate physical and legal

infrastructure, insufficient commitment to bicycle transportation, absence of a well-executed participatory planning process, shortage of authorized organizations and personnel for bicycle transport, limited backing for planning initiatives through campaigns, and lack of transparency in processes. In section 4.4.6, questions 4.1 and 4.2 are addressed, with experts expressing concerns about the insufficient support for bicycle transportation in the city. Bicycle transportation in Ankara is hindered by incomplete studies, uncompleted projects, and practical deficiencies, indicating a lack of potential for development under the current circumstances.

The research findings have led to the following recommendations, which are categorized under spatial, social (participation), and governance aspects.

Recommendations

Spatial recommendations:

The city has implemented various bicycle transportation initiatives based on the findings of EGO-ARUP reports, including EGO's bus racks for bicycles, bicycle parking spaces within stations, and new bike lanes. However, it can be said that there are deficiencies in every implementation.

- The bicycle racks project was discussed as a problem discovered as a result of interviewee 2's statements during the thesis research process. It can be said that this project was left incomplete because bicycle racks can only be installed on certain models of buses, bus drivers are not sufficiently informed about this system, and most importantly, there is no public information about the buses and lines with bicycle racks. This issue can be discussed and explained separately with the cyclists who use this integration in their transportation, the drivers whose buses have bicycle racks, and the relevant authorities. Only Interviewee 2 provided detailed information on this issue, discovered through the semi-structured interview model. Otherwise, the integration of bicycles and buses is not the research topic of this thesis and no questions were asked of the experts on this topic.
- Especially when we look at the photographs taken in different years of the bicycle parking area at Dikimevi Ankaray station, we can say that the bicycle parking application

has attracted users over time. Bicycle parking areas are necessary for the strategy defined as Bike and Ride. This system should be preferred in situations and hours when the cyclist cannot board his bike into the train wagon. However, when we look at the technical specifications of the bicycle parking areas at different stations and the bicycle parking at Dikimevi station, it is seen that there is no integrity in practice. Again, similar to bus and bicycle integration, information on which stations have bicycle parking areas or whether there are bicycle rails on the station stairs is not published to the public. An in-depth examination of this issue could involve investigating all rail transit stations, such as Ankaray, Ankara Metro, and Suburban train lines.

- For the integration strategy to be successful, it is important to have well-designed bike pathways connected to the stations, secure parking facilities both inside and outside the station, and infrastructure such as turnstiles, stairs, and elevators that are tailored to accommodate cyclists' needs. This will facilitate smooth movement for cyclists within the station premises.
- About E-Bike system it can only be suggested that this issue could be clarified through discussions with relevant experts and officials, as is the case in this thesis study. No information has been obtained on why e-bike systems have not been implemented for years, as this issue is not the main subject of the thesis study.
- All infrastructure projects should be carried out with consistency, the guidelines for using the implemented infrastructures must be established, and lastly, efforts should be reinforced through promotional activities.
- Furthermore, it is essential to establish plans for the maintenance and repair requirements of infrastructures following their implementation. Implementing infrastructure without thorough and effective planning is not a viable long-term strategy. Interviewee 4 noted that certain roads had to be turned into one-way streets as a result of this issue.

Social (Participation) recommendations:

Civil society, professional chambers, and the public are not sufficiently included in the bicycle transportation development and planning processes. This causes the projects to become final documents without feedback from NGOs or cyclists. It should be clearly stated here that, in the words of Interviewee 2, "*There is no such thing as what civil society says must happen.*" However, carrying out the process only by presenting the work done causes

tensions between authorized professionals and civil society. This affects the "demand" process of cyclists; cyclists do not make requests from local governments for bicycle transportation, thinking that "*it will not be done anyway*". Unless there is demand, bicycle transportation cannot be expected to improve and develop. To avoid this scenario;

- The analysis should aim to determine which cycling groups are more effectively represented by NGOs. This will enhance experts' understanding of the demands put forth by these organizations.
- Cyclists from groups not traditionally recognized by NGOs should be included as stakeholders, which would contribute to a more diverse participation process.
- NGOs should be apprised of the perspectives of experts and organizations advocating for cycling.
- If there is a conflict with NGOs, the plan reports should include a section that outlines the reasons for rejecting their requests. This approach will help to communicate to the NGOs that their concerns were taken into consideration despite being turned down.
- A planning process that is inclusive, participatory, and transparent should be implemented.
- EGO's survey on bicycle awareness could also be viewed as a type of social or participatory research.. The bicycle survey conducted to measure bicycle use and awareness in the city of Ankara was found to be too "optimistic" by Interviewee 4. Interviewee 4 can be justified in this regard because it is true that the survey questions do not specify a scale. For example, the question "Would you like to use bicycles and public transportation together in your transportation?" was answered yes by 90.4%. However, there is no description of how bicycles and public transportation can be used together. Perhaps the question could be asked "Would you like to use bicycle and public transportation together, although you cannot use them between 8:00 am - 11:00 am and 4:00 pm - 7:00 pm?". For this reason, the questions of the bicycle survey can be transformed into a scale by taking the opinions of experts in a scientific framework and reapplication can be recommended.

Governance recommendations:

It is crucial to consider the governance aspect at all times. Setting regulations for both physical and social aspects, endorsing the practices, sharing them publicly, and ensuring their protection can only be achieved if governmental authorities embrace bicycle transportation and give it priority within the transportation system. Otherwise, as evidenced by research from EGO and ARUP, reports end up being mere documents without any real impact after generating anticipation.

- ARUP's work, such as the Master Plan and related documents, lacks legal validity under the legislation. As a result, these reports and bicycle network plans are rendered as mere "shelf documents". For this purpose, it is important to research regulations with a legal guarantee for their execution.
- The absence of an officially designated branch or institution for bicycle transportation presents a significant challenge. Bicycle transportation duties are often considered secondary within existing transport branches. Due to the lack of authorized and adequately staffed personnel for bicycle transportation, there is no opportunity to allocate time or budget for improving bicycle infrastructure.
- After each infrastructure implementation, it is crucial to establish and communicate the regulations that cyclists and other users are required to follow. For example, in the pre-research, it was noted that a cyclist hesitated to use the bicycle and rail system integration due to unclear rules.
- It is crucial to establish and enforce penalties and regulations to safeguard the physical infrastructure. This situation was pointed out by interviewees 2, 4 and 5. The Milli Kutuphane-Besevler bicycle path was separated from vehicle traffic by a concrete barrier to prevent cars from parking in the bicycle path. However, in cases where regulations must be implemented, a rigid obstacle is not the answer. This presents a notable threat to bicycle infrastructure as the lack of consequences for individuals parking their cars in bike lanes may encourage them to continue this behavior.
- Campaigns play a crucial role in supporting studies, as noted by interviewees 2, 4, and 5. They can help foster a biking culture within society and raise awareness about cyclists in traffic, potentially leading to increased social demand for bicycle transportation.

- Prioritizing and protecting cyclists in traffic will also encourage the abstaining audience targeted in bicycle plans. However, nowadays we frequently see news of deaths involving cyclists. It can be said that respect and attention towards cyclists in vehicle traffic should be improved. Excluding cyclists from bicycle transportation initiatives will limit the involvement of cyclists, as previously highlighted. The input of cyclists, representing a small fraction of the population in Ankara, is crucial and they should be actively engaged and informed about bicycle transportation. Neglecting current cyclists may discourage potential new participants.
- It is essential to address the topic of open and easily available initiatives, which are also covered in the social suggestions, once more within this section. Even clear information about the transportation master plan of Ankara city has not been shared with the public, and the reports and data of the plan are inaccessible. Since the plan does not have legal validity, the situation regarding the use of data collected in the plan was asked of experts. All experts see no harm in using the data. Interviewee 5 has already stated that not all data of the plan has been used regarding this issue. Interviewee 4 stated that, apart from UAP, no comprehensive data was collected in Ankara, so these data were compulsorily used in new projects. Transportation data with confirmed validity should be generated or the reliability of existing data should be unquestionably acknowledged.
- Today, SUMP studies are being carried out in Ankara, and Ms. 1 stated that this plan will most likely be used instead of the transportation master plan. The current study, SUMP, was not discussed because it is not related to the research topics of this thesis. SUMP's potential proposals for bicycle transportation and the extent to which this study will draw upon previous research conducted by EGO or ARUP are currently unclear.

Further research recommendations:

The research indicates that as these types of studies are often conducted by municipal and public sector employees, there can be hesitancy among some personnel to openly discuss the plans. Nevertheless, the expert interviews have provided valuable insights regarding the fundamental reasons why the bicycle-related initiatives were ultimately not implemented.

- This research identified distinct differences in perspectives between non-governmental organization (NGO) representatives and professional experts. Future studies could

explore the underlying reasons for these divergent opinions by analyzing the NGO representatives according to the Geller typology of bicyclists.

- The findings of this thesis research suggest that the survey results conducted by EGO may have been overly positive. It would be beneficial to develop a new survey instrument and implement it on a defined scale, to either validate the EGO survey findings or obtain fresh insights.
- Although not the primary focus of this thesis, the study on bicycle and bus integration has been included due to the similarities in implementation and the shared responsible institutions. As a separate research endeavor, an investigation into bus and bicycle integration, involving feedback from drivers, passengers, and cyclists, could shed light on the shortcomings of the current situation.
- Insufficient resources and information are available regarding Smart Ankara's e-bike project. Akin to the approach employed in this thesis study, the underlying reasons for the lack of implementation of this project can be uncovered through direct interviews with experts closely affiliated with it.

Up to this point, the analysis has covered bicycle transportation research conducted in Ankara and its scope. The key issues and challenges regarding these studies have been examined through discussions with experts in the field. Following these investigations, various factors that have a negative impact on bicycle transportation in Ankara and hinder the implementation of such studies have been identified. These factors were classified based on spatial, social, and governance aspects. While there was some disagreement among experts, they have emphasized shortcomings in infrastructure development, insufficient project support through campaigns, inadequate staffing and budgeting, as well as the crucial absence of legal enforcement in regulating these initiatives.

The one issue on which we can say that experts agree is their statements regarding the future of bicycle transportation in Ankara. Although there have been promising initiatives in the city, it can be observed that the momentum gained in 2020 has dissipated and, according to Interviewee 4, *'we have regressed into a period of sleep in terms of bicycle transportation'* once more.

It may be thought that it is difficult to make bicycle transportation a type of active transportation in the city, but we see in many cities around the world that this is possible

with years of effort and correct implementation and strategies. Although our experts are not very hopeful about bicycle transportation for the city of Ankara, if a clear decision is made and the necessary steps are taken regarding the necessity of bicycles to play an active role in urban transportation, Ankara can also be a bicycle-active city.





REFERENCES

- ABB Transport Departmen's Presentation. (2021). *Ankara Bisiklet Master Planı ve Pilot Uygulama Projesi*. closed access
- ABB, ARUP. (2021). *Ankara'da Entegre, Motorsuz ve Çok Modlu Ulaşım için Bisiklet Stratejisi, Master Planı ve Pilot Uygulama Projesi, Ankara Bisiklet Masterplanı 2040*
- Akın, M. (2021). *Bisiklet Erişilebilirliği İle Kullanım Davranışı Arasındaki İlişkinin Kentsel Politikalar Bağlamında İncelenmesi: Ankara Örneği*. Yayımlanmamış Yüksek Lisans Tezi, Gazi Üniversitesi Eğitim Bilimleri Enstitüsü, Ankara.
- American Association of State Highway and Transportation Officials. (2012). *Guide for the development of Bicycle Facilities*. Washington, DC.
- ARUP, (2020). *Ankara'da Entegre, Motorsuz ve Çok Modlu Ulaşım için Bisiklet Stratejisi, Master Planı ve Pilot Uygulama Projesi Bisiklet Stratejisi Çerçeve Raporu*.
- Aun, L. E. S. (2010). *Promoting sustainable transportation through the integration of cycling with public transit: Lessons from Copenhagen and Munich for Singapore*. Published master thesis, Massachusetts Institute of Technology, Department. of Urban Studies and Planning, Massachusetts.
- Babalık-Sutcliffe, E. (2016). Urban rail operators in Turkey: Organisational reform in transit service provision and the impact on planning, operation and system performance. *Journal of Transport Geography*, 54, 464–475.
- Bachand-Marleau, J., Larsen, J., El-Geneidy, A. M. (2011). Much-anticipated marriage of cycling and transit. *Transportation Research Record: Journal of the Transportation Research Board*, 2247(1), 109–117.
- Berndt, A. E. (2020). Sampling methods. *Journal of Human Lactation*, 36(2), 224–226.
- Bleviss, D. L. (2020). Transportation is critical to reducing greenhouse gas emissions in the United States. *WIREs Energy and Environment*, 10(2).
- Bopp, M., Sims, D., Piatkowski, D. (2018). *Bicycling for transportation: An evidence-base for Communities*. Amsterdam, Netherlands. Elsevier.
- Börjesson, M., Eliasson, J. (2012a). The value of time and external benefits in bicycle appraisal. *Transportation Research Part A: Policy and Practice*, 46(4), 673–683.
- Bruno, M., Dekker, H.-J., Lemos, L. L. (2021). Mobility protests in the Netherlands of the 1970s: Activism, innovation, and Transitions. *Environmental Innovation and Societal Transitions*, 40, 521–535.
- Calimente, J. (2012). Rail-integrated communities in Tokyo. *Journal of Transport and Land Use*, 5(1), 19–32.

- Cannon, R., Zhao, C., Winslott Hiselius, L. (2024). Barriers to better bicycle parking for promoting Intermodal Journeys: An inter-organizational collaboration perspective. *Transport Policy*, 145, 65–73.
- Cervero, R., Caldwell, B., Cuellar, J. (2013). Bike-and-ride: Build it and they will come. *Journal of Public Transportation*, 16(4), 83–105.
- Charreire, H., Roda, C., Feuillet, T., Piombini, A., Bardos, H., Rutter, H., Oppert, J. M. (2021). Walking, cycling, and public transport for commuting and non-commuting travels across 5 European urban regions: Modal choice correlates and motivations. *Journal of Transport Geography*, 96, 103196.
- City of London Planning Division. (2005). *Bicycle Master Plan a Guideline Document for Bicycle Infrastructure In the City of London*.
- Coyle, E. D., Simmons, R. A. (2014). *Understanding the global energy crisis*. West Lafayette, IN: Purdue University Press.
- Curtis, T. M. (2012). Pedal to the Metal: Bicycle-transit integration in San Francisco: Existing conditions, needs, and recommendations for Polk Street. *Transportation Research Board National Research Council*, 250-258.
- Çalışkan, Z., Kurt, Ü., Timur, M. C. (2017). İklim Değişikliği ve Ulaşım Sektörü İlişkisinin Ekonometrik Analizi: Türkiye Örneği. *International Congress of Energy, Economy and Policy Proceedings Book*, 78–88.
- Çubuk, K., Türkmen, M. (2003). Ankara’da Raylı Ulaşım. *Gazi Üniversitesi Mühendislik Mimarlık Fakültesi Dergisi.*, 18(1), 125–144.
- Dill, J., McNeil, N. (2013). Four types of cyclists ? *Transportation Research Record: Journal of the Transportation Research Board*, 2387(1), 129–138.
- Dill, J., McNeil, N. (2016). Revisiting the four types of cyclists: Findings from a national survey. *Transportation Research Record: Journal of the Transportation Research Board*, 2587(1), 90–99.
- Doolittle, J. T., Porter, E. K. (1994). *Integration of bicycles and transit*. Washington, D.C.: National Academy Press.
- EGO (2020, July). *Within The Framework Of Decarbonization Of Ankara Urban Transportation and Non-Motorized Modes Project, Ankara Priority Bicycle Network Study.*, Ankara Büyükşehir Belediyesi.
- Erçetin, C. (2023). Çevresel Sürdürülebilirlik ve Ulaşım Aracı Olarak Bisiklet: İyi Uygulama Örnekleri. *Çevre, Şehir ve İklim Dergisi*, 3(3), 238–269.
- Etikan, I., Bala, K. (2017). Sampling and sampling methods. *Biometrics & Biostatistics International Journal*, 5(6), 215-217.

- Forester, J. (1994). *Integration with Mass Transit and Long-Distance Carriers*. In *Bicycle Transportation*. Cambridge, Massachusetts. MIT Press, 283-288.
- Friman, M., Ettema, D., Olsson, L. E. (2018). Travel and wellbeing: Future prospects. *Applying Quality of Life Research*, 255–265.
- Geurs, K. T., La Paix, L., Van Weperen, S. (2016). A multi-modal Network Approach to Model Public Transport Accessibility impacts of bicycle-train integration policies. *European Transport Research Review*, 8(4), 25: 1-15.
- Goel, R., Goodman, A., Aldred, R., Nakamura, R., Tatah, L., Garcia, L. M., Woodcock, J. (2021). Cycling behaviour in 17 countries across 6 continents: Levels of cycling, who cycles, for what purpose, and how far? *Transport Reviews*, 42(1), 58–81.
- Gonzalo-Orden, H., Linares, A., Velasco, L., Díez, J. M., Rojo, M. (2014). Bikeways and Cycling Urban Mobility. *Procedia - Social and Behavioral Sciences*, 160, 567–576.
- Guo, J., Nakamura, F., Li, Q., Zhou, Y. (2018). Efficiency assessment of transit-oriented development by Data Envelopment Analysis: Case Study on the den-en toshi line in Japan. *Journal of Advanced Transportation*, 2018(2), 1–10.
- Hong, A. (2018). Environmental Benefits of Active Transportation. *Children's Active Transportation*, 2, 21–38.
- İnternet: Ankara Büyükşehir belediyesinden ego otobüslerine bisiklet taşıma aparatı. (2023a). URL: <https://www.ego.gov.tr/tr/haber/6035/ankara-buyuksehir-belediyesinden-ego-otobuslerine-bisiklet-tasima-aparati>. Last Access Date: 10.09.2023
- İnternet: Ankara Büyükşehir Belediyesinden Ego Otobüslerine Bisiklet Taşıma Aparatı. (2023, April 18). EGO.. URL: <https://www.ego.gov.tr/tr/haber/6035/ankara-buyuksehir-belediyesinden-ego-otobuslerine-bisiklet-tasima-aparati>. Last Access Date: 28.12.2023
- İnternet: Ankara Büyükşehir Belediyesinin 'Bisiklet Yolu Projesi'nin ilk etabı tamamlandı. URL: <https://www.aa.com.tr/tr/turkiye/ankara-buyuksehir-belediyesinin-bisiklet-yolu-projesinin-ilk-etabi-tamamlandi/2135272>. Last Access Date: 15.09.2023
- İnternet: Armstrong, M. (2022, November 10). Energy Efficient Travel: Nothing Beats the Bike. URL: <https://www.statista.com/chart/28710/energy-efficiency-of-modes-of-transport/>. Last Access Date: 10.11.2023
- İnternet: Bloomberg. (2020, August 4). Gasoline Prices Around the World: The Real Cost of Filling Up. URL: <https://www.bloomberg.com/graphics/gas-prices/#20202:Turkey:USD:g>. Last Access Date: 25.10.2023
- İnternet: Brake, J. (2022, October 20). A Bicycle for the Mind. URL: <https://joshbrake.substack.com/p/a-bicycle-for-the-mind>. Last Access Date: 24.11.2023

İnternet: EGO [@egobilgi]. (2021, October 22). ANKARAY İşletmesi Dikimevi İstasyonu'nda 5 bisiklet kapasiteli Bisiklet parkı pilot uygulaması, ücretsiz olarak Ankaralıların kullanımına sunuldu. Haberin devamı [@mansuryavas06](https://bit.ly/2ZiSmJP) [Image attached] [Tweet]. Twitter URL: <https://twitter.com/egobilgi/status/1451617309706047488?lang=tr>. Last Access Date: 28.12.2023.

İnternet: EGO Genel Müdürlüğü. (2021). Ankaray işletmesi Dikimevi istasyonu'nda 5 bisiklet Kapasiteli Bisiklet Parkı pilot Uygulaması, ücretsiz Olarak Ankaralıların Kullanımına sunuldu. URL: <https://twitter.com/egobilgi/status/1451617309706047488?lang=tr>. Last Access Date: 05.11.2023

İnternet: EGO Genel Müdürlüğü. (2022, April 21). Elektrikli Bisiklet Paylaşım Sistemi Hayata Geçiriliyor. URL: <https://bisiklet.ego.gov.tr/elektrikli-bisiklet-paylasim-sistemi-hayata-geciriliyor-2/>. Last Access Date: 25.12.2023

İnternet: EGO Genel Müdürlüğü. (2022a). URL: <https://bisiklet.ego.gov.tr/elektrikli-bisiklet-paylasim-sistemi-hayata-geciriliyor-2/>. Last Access Date: 27.17.2023

İnternet: EGO Genel Müdürlüğü. (2022b). URL: <https://www.ego.gov.tr/tr/haber/5910/ankara-buyuksehirden-bisiklet-hamlesi-smart-ankara-icin-tedarik-sozlesmeleri-imzalandi>. Last Access Date: 27.12.2023

İnternet: EGO Genel Müdürlüğü. (2023, December 22). Ankara Büyükşehir Belediyesi Elektrikli Bisiklet Şarj Ünitesi Kurulumu'na Devam Ediyor.. URL: <https://www.ego.gov.tr/tr/haber/6123/ankara-buyuksehir-belediyesi-elektrikli-bisiklet-sarj-unitesi-kurulumuna-devam-ediyor>. Last Access Date: 25.12.2023

İnternet: EGO Genel Müdürlüğü. (2023, September 11). Smart Ankara Projesi Kapsamında Yeni Elektrikli Bisikletler Geldi. URL: <https://www.ego.gov.tr/tr/haber/6087/smart-ankara-projesi-kapsaminda-yeni-elektrikli-bisikletler-geldi>. Last Access Date: 25.12.2023.

İnternet: EGO Genel Müdürlüğü. (2023b). URL: <https://www.ego.gov.tr/tr/haber/6123/ankara-buyuksehir-belediyesi-elektrikli-bisiklet-sarj-unitesi-kurulumuna-devam-ediyor>. Last Access Date: 05.01.2024

İnternet: EGO Genel Müdürlüğü. Ankara Büyükşehirden “Bisiklet” Hamlesi: ‘Smart Ankara’ İçin Tedarik Sözleşmeleri İmzalandı. URL: <https://www.ego.gov.tr/tr/haber/5910/ankara-buyuksehirden-bisiklet-hamlesi-smart-ankara-icin-tedarik-sozlesmeleri-imzalandi>. Last Access Date: 25.12.2023.

İnternet: EGO General Directorate (2019). Ankara BüyükşehirBelediyesibisikletanketisonuçları. URL: <https://bisiklet.ego.gov.tr/ankara-buyuksehir-belediyesi-bisiklet-anketi-sonuclari/>. Last Access Date: 24.12.2023

- İnternet: Environmental Impact | U.S. Bicycle Route System. URL: <https://www.adventurecycling.org/routes-and-maps/us-bicycle-route-system/benefits-and-building-support/environmental-impact/>. Last Access Date: 18.10.2023
- İnternet: EPA (2022, May 19). Carbon Pollution from Transportation. URL: <https://www.epa.gov/transportation-air-pollution-and-climate-change/carbon-pollution-transportation>, Last Access Date: 20.12.2023
- İnternet: euronews (2022, March 08). *Son üç ayda benzine yüzde 102, motorine yüzde 113, LPG'ye yüzde 29 zam*. URL: <https://tr.euronews.com/2022/03/08/akaryak-t-fiyatlar-son-uc-ayda-benzine-yuzde-102-motorine-yuzde-113-lpg-ye-yuzde-29-zam#:~:text=Son%203%20ayda%20benzin%20y%C3%BCzde,%20TL'ye%20%C3%A7%C4%B1kt%C4%B1>. Last Access Date: 11.12.2023
- İnternet: Europarl (2022, March 22). CO2 emissions from cars: facts and figures (infographics). URL: <https://www.europarl.europa.eu/news/en/headlines/society/20190313STO31218/co2-emissions-from-cars-facts-and-figures-infographics>. Last Access Date: 05.11.2023
- İnternet: Hockenos, P. (2013). Where “share the road” is taken literally. URL: https://www.nytimes.com/2013/04/28/automobiles/where-share-the-road-is-taken-literally.html?_r=0. Last Access Date: 10.09.2023
- İnternet: IEA (2023b), World Energy Balances Data Set. URL: <https://www.iea.org/data-and-statistics/data-product/world-energy-balances>. Last Access Date: 09.10.2023
- İnternet: Republic of Turkey Ministry of Environment, Urbanization and Climate Change. (2021). Turkish Cycling Network Master Plan. URL: <https://webdosya.csb.gov.tr/db/cygm/icerikler/turk-ye-b-s-klet-agi-c-lt1-20211202125047.pdf>. Last Access Date: 16.09.2023
- İnternet: TUIK, Turkish Statistical Institute. *Vehicle usage by province, Ankara* URL: <https://data.tuik.gov.tr/Bulten/Index?p=Motorlu-Kara-Tasitlari-Aralik-2023-49432> (May 2024). Last Access Date: 15.06.2024
- İnternet: United Nations SDG (2022, April). Sustainable transport. URL: <https://sustainabledevelopment.un.org/topics/sustainabletransport>. Last Access Date: 20.11.2023
- İnternet: Uyar, V. (2019). Ankara Adaylarının Vaatleri. URL: <https://www.dogrulukpayi.com/bulten/ankara-adaylarinin-vaatleri> Last Access Date: 9.12.2023
- İnternet: van der Zee, R. (2015). How Amsterdam became the bicycle capital of the world. URL: <https://www.theguardian.com/cities/2015/may/05/amsterdam-bicycle-capital-world-transport-cycling-kindermoord> . Last Access Date: 24.12.2023

- Internet: World Bank (2019, December 19). Sustainable Mobility for All (Sum4All). URL: <https://www.worldbank.org/en/topic/transport/brief/sustainable-mobility-for-all>. Last Access Date: 20.10.2023
- Jonkeren, O., Kager, R., Harms, L., Te Brömmelstroet, M. (2019). The bicycle-train travellers in the netherlands: Personal Profiles and Travel choices. *Transportation*, 48(1), 455–476.
- Kager, R., Bertolini, L., Te Brömmelstroet, M. (2016). Characterisation of and reflections on the Synergy of bicycles and public transport. *Transportation Research Part A: Policy and Practice*, 85, 208–219.
- Kager, Roland, Harms, L. (2016). Synergies from improved cycling-transit integration. *International Transport Forum Discussion Papers*.
- Knowles, R. D. (2012). Transit Oriented Development in Copenhagen, Denmark: From the finger plan to ørestad. *Journal of Transport Geography*, 22, 251–261.
- Koçak, F. (2016). Türkiye’de Bisiklet Kullanımı: Bisiklet Kullanma Nedenleri ve Elde Edilen Faydalar. *Journal of Human Sciences*, 13(3), 5760.
- Krizek, K. J., Stonebraker, E. W. (2010). Bicycling and transit: A marriage unrealized. *Transportation Research Record: Journal of the Transportation Research Board*, 2144(1), 161–167.
- Krizek, K. J., Stonebraker, E. W. (2011). Assessing options to enhance bicycle and transit integration. *Transportation Research Record: Journal of the Transportation Research Board*, 2217(1), 162–167.
- Lasky, M. (2005). *Understanding the Link Between Bicyclists and Light Rail, Survey Results from Bicycle Riders on MAX in Portland, Oregon*. unpublished master thesis, Portland State University, Portland.
- Martens, K. (2007). Promoting bike-and-ride: The Dutch experience. *Transportation Research Part A: Policy and Practice*, 41(4), 326–338.
- Mebarki, B., Draoui, B., Allaoua, B., Draoui, A. (2020). Road transportation industry facing the energy and climate challenges. *Renewable Energy - Resources, Challenges and Applications*. 1-26.
- Morris, A. (2015). In *A practical introduction to in-depth interviewing*. essay, London. SAGE Publications Ltd.
- Napper, R. (2023). Napper cycling typology: Identifying and understanding different bicycle trip purposes. *Transportation Research Interdisciplinary Perspectives*, 17, 100740.
- National Association of City Transportation Officials. (2016). *Urban Street Design Guide*.

- Oeschger, G., Carroll, P., Caulfield, B. (2020). Micromobility and Public Transport Integration: The current state of knowledge. *Transportation Research Part D: Transport and Environment*, 89, 102628.
- Öncü Yıldız, A. M. (2017). Developments of Ankara Urban Structure and transportation systems in the 20th century. *Journal of Ankara Studies*, 5(1), 108–122.
- Pan, H., Shen, Q., Xue, S. (2010). Intermodal transfer between bicycles and Rail Transit in Shanghai, China. *Transportation Research Record: Journal of the Transportation Research Board*, 2144(1), 181–188.
- Pucher, J., Buehler, R. (2008). Making cycling irresistible: Lessons from the Netherlands, Denmark and Germany. *Transport Reviews*, 28(4), 495–528.
- Pucher, J., Buehler, R. (2009). Integrating bicycling and public transport in North America. *Journal of Public Transportation*, 12(3), 79–104.
- Pucher, J., Buehler, R. (2017). Cycling towards a more sustainable transport future. *Transport Reviews*, 37(6), 689–694.
- Pucher, J., Dill, J., Handy, S. (2010). Infrastructure, programs, and policies to increase bicycling: An international review. *Preventive Medicine*, 50-52.
- Ramadhan, A., Dinata, R. (2021). Development of electric bicycle and its impact on the environment. *IOP Conference Series: Materials Science and Engineering*, 1122(1), 012054.
- Reid, C. (2017). *Bike boom: The unexpected resurgence of cycling*. Washington, DC. Island Press.
- Samaras, Z., Vouitsis, I. (2013). Transportation and Energy. *Climate Vulnerability. Reference Module in Earth Systems and Environmental Sciences*, 183–205.
- Scheltema, N. (2012) Recycle City: strengthening the bike-ability from home to the Dutch railway station. unpublished master thesis, TU Delft. Delft.
- Sharma, G. (2017). Pros and cons of different sampling techniques. *International Journal of Applied Research*, 3(7), 749–752.
- Sherwin, H. (2010). Bike-Rail Integration as one Sustainable Transport Solution to Reduce Car Dependence. *Centre for Transport & Society*, 122-125.
- Sherwin, H., Parkhurst, G., Robbins, D., Walker, I. (2011). Practices and motivations of travelers making rail–cycle trips. *Proceedings of the Institution of Civil Engineers - Transport*, 164(3), 189–197.
- Singleton, P. A., Clifton, K. J. (2014). Exploring Synergy in Bicycle And Transit Use. *Transportation Research Record: Journal of the Transportation Research Board*, 2417(1), 92–102.

- Suzuki, M., Nakamura, H. (2017). Bike share deployment and strategies in Japan. *The International Transport Forum*. Draft Discussion Paper.
- Tekeli, İ. (2010). *İstanbul ve Ankara Kent içi Ulaşım Tarihi Yazıları. In Ankara'da Kent içi Yolcu Taşıma Hizmetlerinin Örgütlenmesinin Gelişimi.* , İstanbul. Tarih Vakfı Yurt Yayınları., 119-130.
- Tucker, V. A. (1975). The Energetic Cost of Moving About: Walking and running are extremely inefficient forms of locomotion. Much greater efficiency is achieved by birds, fish and bicyclists. *American Scientist*, 63(July-August 1975), 413–419.
- Ulvi, H. (2019). Üniversite Yerleşkesi için Yolculuk Davranış Analizi: Gazi üniversitesi Maltepe Yerleşkesi örneği. *OPUS Uluslararası Toplum Araştırmaları Dergisi*, 11 (18), 1568-1588.
- Uslu, F., Demir, E. (2023). Nitel Bir Veri Toplama Tekniği: Derinlemesine Görüşme. *Hacettepe Üniversitesi Edebiyat Fakültesi Dergisi*, 40(1), 289–299.
- van Mil, J. F., Leferink, T. S., Annema, J. A., van Oort, N. (2020). Insights into factors affecting the combined bicycle-transit mode. *Public Transport*, 13(3), 649–673.
- Villwock-Witte, N., van Grol, L. (2015). Case study of transit–bicycle integration. *Transportation Research Record: Journal of the Transportation Research Board*, 2534(1), 10–15.
- Vitosoglu, Y., Ozden, R., Yaliniz, P., Bilgic, S. (2014). Comparison of light rail systems in Turkey with the method of comparative standard determination. *Transportation Research Procedia*, 3, 670–679.



APPENDICES

APPENDIX-1. Semi-structured interview form

INTERVIEW FORM FOR EXPERT OPINIONS IN ANKARA TRANSPORTATION PLANNING

This interview form was prepared for the master's thesis study titled *"Integration of Bicycles into Rail Transportation Systems: Ankara Example"*, which is being carried out at Gazi University, Institute of Science and Technology. The interview aims to examine expert opinions about transportation and bicycle transportation in the city of Ankara within the framework of three main headings.

- Ankara Transportation Plan.
- Bicycle Master Plan and other bicycle transportation projects.
- Institutions and Coordination in Transportation projects.

Your personal details will not be shared with third parties within the scope of the research.
Thank you in advance for your contribution and valuable opinions.

Date: Click or tap to enter a date.		At:	
Personal Details			
a	Gender	☐ Woman	☐ Man
b	State of Education	☐ B.Sc.	☐ MSc.
c	Profession	Choose an item.	
d	Period of Service		
e	Employed institution /organization		
Name (Optional): Click or tap here to enter text.			

The transportation project discussed in the interview	Click or tap here to enter text.
Authorized institutions or organizations	Click or tap here to enter text.
Planning Year	Click or tap here to enter text.
Target year of the plan	Click or tap here to enter text.
Approval status of the plan	Click or tap here to enter text.

APPENDIX-1. (continued) Semi-structured interview form

If approved, how much the plan has been implemented	Click or tap here to enter text.
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Interview questions may change depending on the transportation plan discussed and the course of the interview. The following questions will be asked and the answers will be arranged as a whole.

1. What are your opinions about the mentioned transportation plan?
- 2.a. If the plan was not approved, for what reasons was it not approved?
- 2.b. If the plan is approved, at what stage is the implementation process? Do you think the plan can be implemented correctly?
3. Did you take part in this plan? If you took part of the plan, how was the planning process, what was the obstacles?
4. Are there any aspects of the plan in question that you disagree with?
5. What would you like to convey about participation in planning processes?
6. What would you like to convey about the cooperation between the institution and the branches?
7. What is your opinion about the future of bicycle transportation in Ankara?
8. What are your suggestions for bicycle transportation in Ankara?



Gazili olmak ayrıcalıktır