
# DEVELOPING URBAN TRANSPORT IN TURKEY WITH MUCH HIGHER DEPENDENCE ON WALKING AND CYCLING

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# Abstract

Providing genuine alternatives to the use of just a personal motor vehicle for transportation within urban areas is one of many vital components that can make cities of the future prosperous and liveable. This kind of inspirational and realistic vision can offer new insights towards a more sustainable and desirable future. Developing an urban road transportation system where a much higher preference for a low-cost sustainable model is encouraged (i.e. walking, cycling, and public transport). Creating a great work environment is at the heart of this newly proposed 20-year urban transport vision for Turkish cities, which also draws upon inspiration from many other Western European cities.

The usefulness and credibility of any proposed assessment of this kind will undoubtedly depend on the level of cooperation of its participants. A detailed literature review revealed the need for increased public participation in its planning and developmental stages. As such, a wide range of potential participants must be selected carefully to maximise their contribution for creating future sustainable transportation systems.

A review of some previous sustainable transportion scenarios in other areas has also revealed that each key change usually did not represent an aspirational urban mode of transportation that was interconnected through underlying systemic relationships. Development of a framework that facilitates a set of quality criteria would, therefore, represent a significant advance in the evaluation and design of a sustainable vision. In that regard, this thesis presents a methodological framework, which inductively arrives at a systematic mechanism for developing sustainable transportation scenarios.

It was determined that two essential steps needed to be taken to make this vision a reality. First, it was reasoned that convening with different users and professionals from various disciplines to investigate the reliability of this idea was the best approach. Second, the policies that need to be designed (from the present to 2035) by the central and local administrations to achieve our specific goals were discussed and evaluatd by national and local decision makers.

Overall, the conclusion of the thesis indicates that the content of our aspirationally based proposal was credible and effective. Our innovative approach provided an opportunity for several creative choices and alternatives to be determined by thoroughly addressing our research objectives. Future areas of research were also identified and described.

## Dedication

*I dedicate this thesis to my effort.*

## Acknowledgements

The author would first like to express his sincere gratitude and appreciation to the Ministry of Turkish National Education (MEB) for sponsoring his PhD studies at the University of Birmingham, United Kingdom. This project would not have been done without the financial support from them.

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# List of Abbreviations

| | |
|---|---|
| 2D | Two-Dimensional |
| 3D | Three-Dimensional |
| AHP | Analytic Hierarchy Process |
| ANOVA | One-Way Analysis of Variance |
| ANN | Artificial Neural Network |
| A-S-I | Avoid-Shift-Improve Action |
| BGUS | Turkish National Spatial Strategy |
| CNG | Compressed Natural Gas |
| CO | Carbon Monoxide |
| $CO_2$ | Carbon Dioxide |
| CNG | Compressed Natural Gas |
| CSD | United Nations Commission on Sustainable Development |
| ECF | European Climate Foundation |
| EU | European Union |
| FIA | Foundation for the International Automobile |
| FSM | Four Study Method |
| GA | Genetic Algorithm |
| GATEDE | Genetic Algorithm Transport Energy Demand Estimation |
| GIS | Geographic Information System |
| GIT | Geographic Information Technologies |
| GNSS | Global Navigation Satellite System |
| GPS | Global Positioning System |
| $H_0$ | Null Hypothesis |
| $H_1$ | Alternative Hypothesis |
| HOV | High Occupancy Vehicle |
| IIS | Intelligent Infrastructure Systems |
| ITS | Intelligent Transportation Systems |
| ISA | Intelligent Speed Adaptation |
| ITHIM | Integrated Transport and Health Impact Modelling |
| METI | The Ministry of Economy and Trade |
| NTM | National Transport Model |
| NTS | National Travel Survey |
| R&D | Research and Development Activities |
| SPSS | Statistical Package for the Social Sciences |
| STEEP | Social, Technological, Environmental, Economic, and Political |
| SWOT | Strengths, Weaknesses Opportunities, and Threats |
| TCM | Torque Control Method |
| TDM | Transportation Demand Management |
| UPT | Urban Planning Transport |

# CHAPTER ONE: INTRODUCTION

## 1.0. Overview

This chapter begins with an explanation of the research background and a description of the research problem. The development of the research aim and objectives are given, the significance of the research is then explained, and the structure of the thesis is outlined.

## 1.1. Research Background

Urban transportation systems have always shaped cities. The private car brought with it the most prominent consequences for urban development and has become a critical cause of environmental, social, and safety problems in urban areas (Groenewegen *et al.*, 2006). Economically advanced countries have made dreadful mistakes when relying on the private car as an almost exclusive means of mobility (Logan & Molotch, 2007; Marcuse & Van Kempen, 2011). However, recently, the most liveable cities have transformed their prospects significantly with a configuration that includes a more progressive and pleasant place to live and invest. Many such cities either make important investments in modern sustainable transportation systems with suitable infrastructure or are somewhere inbetween. They waver on how much to invest, where to invest, and the best means to invest in sustainable transport systems (Kenworthy, 2006).

In many developing countries, non-motorized systems are regarded as secondary modes of transportation where there is little financial support to facilitate good transportation practices. Cities in developing countries have experienced a rapid growth in transport-related challenges, including social inequalities, negative perceptions towards different transportation users, accessibility problems, air pollution, congestion, and lack of road safety infrastructure for pedestrians and cyclists (Nkurunziza, 2013; Addae, 2014; Kim, 2014; Hagere, 2014).

Numerous studies have attempted to explain that a majority of Turkish cities are not environmentally friendly or efficient, as determined by current car-oriented urban transport patterns (Dargay, 2007; Kayan, 2012; Erçetin, 2014). The core arguments are economic development, increasing income, rapid urbanization, and car-oriented policies (Babalik, 2008). Commonly held thoughts are that private car ownership is a normal desire as people's incomes increase. Therefore, a car based society is seen as an inevitable consequence of

successful economic development, which summarizes the existence of the non-human oriented transportation society in Turkey. This perceived view implies that little could be researched in order to shift the present situation into a more efficient and environmentally friendly series of urban environments.

At the heart of this transformation is the opportunity to get the whole city walking, cycling, and using the public transportation system. Sustainable transportation systems (in most cases, identified as walking, cycling and public transport) are extensively endorsed as viable solutions for lessening issues concerning car-reliant societies, such as universal emissions of carbon gases, air and noise pollution. Other undersirable consequences include road traffic hazards, worsening of living standards and health conditions associated with more sedentary lifestyles as well as escalating obesity levels (Chapman, 2007; Velazquez *et al.*, 2015; Wells *et al.*, 2016; Giles-Corti *et al.*, 2016).

Therefore, this thesis focuses on future visions of more sustainable and environmentally friendly transportation systems across hypothetical urban centers in Turkey which, have experienced rapid growth rates in private car ownership since 1990 (Başçı, 2006). It also reveals the severity of the urban transportation problem in Turkey and explores how far the current system has diverged from more ideal environmentally friendly aims.

Proposed scenarios include future designs by defining key driver changes and strategic elements. Later on in the study, micro- and macro- policy measures are presented in order to conduct future planning in these areas.

## 1.2. Statement of the Problem

In this study, the researcher recognizes that the current Turkish transportation system is inadequate in order to meet future population demands. It is therefore, imperative to present and engage in a proactive approach in order to alter present policy.

Compared to other techniques, the backcasting approach has been determined to be the most proactive instrument for meaningful change to occur. Primarily, this is due to its strengths concerning aspirational visionary thinking, trend-generating properties, and open future options, which have benefits when dealing with an unpredictable urban environment as well as the ability to acquire new imaginative ideas from the public and experts.

The main question that arises is; where to start? This poses a serious concern, especially in consideration of the scale of the problem. For instance, strategies and interventions to facilitate sustainable transportation systems in Turkey are devoid of a widespread awareness of their probable effects, which may result in unintended impacts and limited success. The challenge is to create local and national policies that work while continuing to foster collaborations that will encourage the construction of viable systems of transportation (Mahmutoğlu & Çukurçayir, 2012; Zeydanli, 2015). A failure to do this is partly due to the collapse of central governmental guidelines, whether it be the creation of viable policy guidance, policy statements, or planning policy directions capable of being utilised by the local administration (Babalik, 2015).

Therefore, a step change in the public transportation systems in Turkey requires a credible vision to be implemented within all of its urban areas or the future of the Turkish urban transport system will remain unsustainable as it is now.

## 1.3. Research Aim

The purpose of this research is to propose different 3D Turkish urban environments with much higher dependence on sustainable transport visions for the year 2035 and to explore the reliability of the imaginary pictures and its comprehensive scenario narratives.

### 1.3.1. Research Objectives

To achieve the research aim, this research thesis has some objectives as follows:

I) To explore the expectations of the participants towards the designing of sustainable transport visions for Turkish urban environments.

II) To investigate possible transport measures that may help to create sustainable lifestyles and behaviours in future Turkish urban transport visions.

III) To test the potential transportation measures whether they may increase the diversity of daily working travel features of potential sustainable transport users in Turkey.

IV) To integrates both qualitative and quantitative survey findings and published secondary data with experts in order to generate future imaginary Turkish scenarios.

V) To construct macro- and micro- policy pathways to demonstrate how the goals of one desirable vision could be reached from the present to 2035.

## 1.4. Significance of the Study

Developing fundamentally different futuristic urban road transport visions in Turkish cities will enable the public and experts to engage with and help policy-makers and other to understand ways in which people may be moved towards more sustainable transport. This study will also help people to understand the scale of change that will be required and how this might be expected to affect their lifestyles.

## 1.5. Expected Contribution of Research

This research seeks to add to the body of knowledge on the development of sustainable urban transport visions. Thereby contributing to understanding the requirements to realise a step change in the future Turkish sustainable transport visions and imagination of archetypal areas inside a simulated Turkish city and by extension help in determining the critical key changes of vision development studies that shape future sustainable transport systems. Backcasting approach for sustainable mobility has been established to be superior motivating for making significant progress towards sustainable action than other scenario techniques. However, very few are focusing on the role of public participation in vision development. Also, qualitative and quantitative efforts have rarely been stated despite their successful applications in other disciplines. Constructing Turkish macro- and micro sustainable transport policy pathways to purposely bring about short- and long-term modifications is also first of its kind to best of the researcher’s knowledge.

## 1.6. Structure of the Thesis

The structure of this thesis is based on the five key research objectives organised into twelve chapters as follows:

Chapter 1 is an introductory chapter presenting background information on the study and the research problem being examined in this work, the overall aim and objectives of the research, as well as the structure of the thesis.

Chapter 2 includes a critical review of the existing literature addressing future sustainable transport approaches. The research focuses on the narrow areas relating to the research objectives and emphasises key findings and theories central to the research argument.

Chapter 3 constructs the research methodology for the investigation of research objectives. The research method includes survey, visualisation, and interview.

Chapter 4 set out a number of future transport visions for the year 2035 which bring about a step change in the level of sustainable transport systems in hypothetical Turkish urban areas.

Chapter 5 demonstrates how survey outcomes and national Foresight literature have been modified in the formation of the vision development work, as presented in Chapter 4.

Chapter 6 and 7 explore the reliability of the future imaginary travel scenarios, according to the perspectives of the public and experts, respectively.

Chapter 8 explores different sets of policy measures that national government and local governments implement for achieving the goals of one specific vision.

Chapter 9 is the final chapter of the thesis and presents an assessment of the original contribution of the research along with the limitations and recommendations for future work.

# CHAPTER TWO: REVIEW OF THE LITERATURE

## 2.0. Overview

This chapter demonstrates that foresight projects are frequently conducted in developed countries by different institutions, but there is a relatively small body of the foresight studies in developing countries (e.g. Megacities on the Move). The literature review reveals that the foresight studies in Turkey can be developed from different perspectives and contributes to previous academic studies.

The chapter firstly explains why the future transport planning studies are crucial for rigorous futuristic studies and describe the historical development processes of futuristic studies. Then, the chapter explains three common typologies (forecasting, exploratory, and normative) to sustainable transport studies conducted in existing knowledge by presenting the most prominent exercises. A distinction between two types of differences between Turkey and Western Europe in terms of the transport characteristics, organisation of cities, attitudes of the public, and political structures are explained. Finally, the chapter indicates that a considerable amount of uncertainty still exists when it comes to project planning in some developing countries (e.g. Brazil, India, and Turkey), while numerous sustainable transportation studies have been published and conducted in developed countries.

## 2.1. Futures Studies

Future studies constitute the step-by-step study done on the possible, probable as well as preferable future and they entail the worldviews and methods that each future is associated with Bell (1996) and Saul (2001). There is a likelihood that the future studies will bring disruptions and challenge the existing framework rather than improve the effectiveness of the strategy. Future studies entail a broad range of studies and methods, and the area is categorised as a very fuzzy multi-field (Marien, 2002). Futurists consider the disruption that methods, such as scenario planning and emerging issues analysis cause to improve the efficiency of the strategy as futurists improve the resiliency and robustness of the plan (Inayatullah 2000).

The popularity of the single point forecasting was highest the period that the future was viewed as knowable as futurists did not consider uncertainty to be decisive. Nevertheless, the faster speed at which change is taking place and the ongoing epistemological debates regarding the nature of knowledge, it has become significantly more important to live with uncertain futures in comparison to developing a certain world (Schwartz, 1996).

## 2.2. A Selective History of Futures Thinking

Approximately three critical phases are notable in the evolution that the future modern studies. The first phase includes 1940s-1950s, the second includes 1960s-1970s while the third stretch from the 1980s to present. The initial phase is considered the golden phase of planning, positivism, quantitative methods, global financing and trade (Mannermaa, 1986). In this era, economic growth, industrialisation, urbanisation, the emergence of the potential of space travel and globalisation arose. This futures boom is characterised by a rising demand for organised trend-extrapolations, long-range planning and general technological foresight and assessment (Bell, 2005).

Figure 2.1 shows the periods of evaluation for future thinking based studies. Among the period from 1940's to the present day, it was seen that future thought-based studies consist of different disciplines and classified under different thinking categories (Kuosa, 2011). As seen from this figure, the first phase of futuristic studies is prediction thinking, which had involved control of life, oracle, seeing the future, magical arguments) until the beginning of the 1950s. Management thinking is the next paradigm of future thinking approaches had been the cornerstone of the military, control of functions and physical arguments from 1960's to 2000's, while the final paradigm of future studies has begun after 1970's and classified into more different named thinking (systems, dialectic and futurology) and topics.

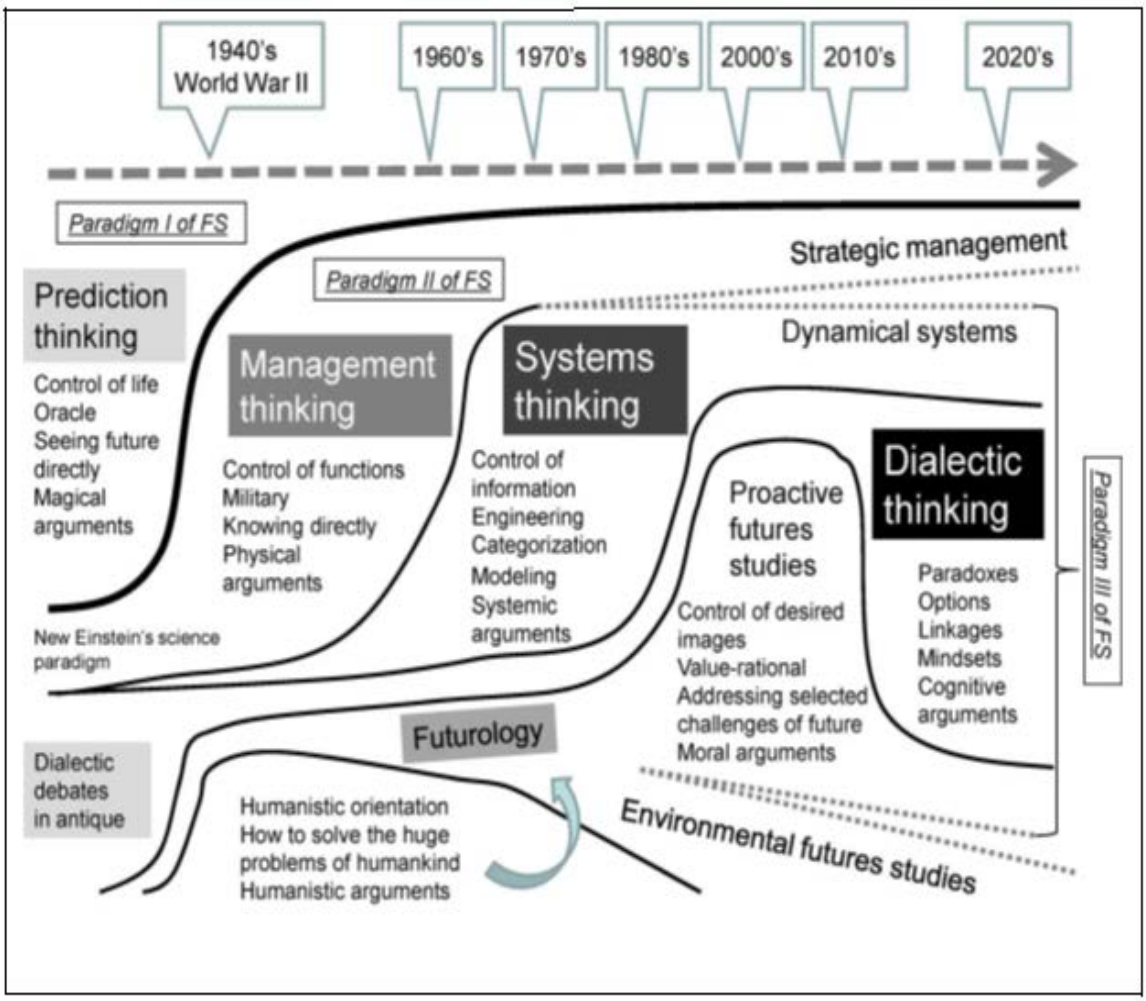


**Figure 2.1.** Evolution of futures studies.
**Source:** Kuosa, 2011.

## 2.3. Overview of Approaches to Futures

It is possible for typologies to be useful tools when seeking to communicate, compare, understand and develop methods for future studies. A range of approaches varies depending on which, ontological technique is considered. These futuristic approaches are divided into three categories: Forecasting, Exploratory, and Normative (Tapio & Hietanen, 2002; Timms *et al.*, 2014).

### 2.3.1. Forecasting Scenarios

Forecasts are defined as accurate future predictions of a mechanism by drawing upon previous information of how the key factors of the mechanism have varied over a specific period of time (Wada *et al.,* 2011). Forecasting methods can be complex mathematical modelling suites which, are periodically re-calibrated to understand which, factors may have a changing amount of importance or they can simply be simple explanation based tools over time (Makridakis *et al.*, 2008).

Forecast scenarios identify extreme conditions and allow for a wide range of possible forecasts to be created. For instance, it is typical for a best, middle and worst case scenario (with many other alternative scenarios) to be presented. Comparing these different extremes can lead to initial contingency planning. Policies are covered after the forecasts are made, but do not create demand (Coates, 2000).

### 2.3.2. Exploratory Scenarios

Exploratory methods begin from the present with an attempt to see where events and trends might be taken. They also look at how they move forward when implying possible futures. This means that exploratory approaches consider pre-conditions, beliefs and social or technological possibilities which, already occur (Bock & Diday, 2012).

Exploratory scenarios usually start with a preliminary assessment of a possible (often a desirable) future that is of interest. Then, they work backwards to look at how these futures might or might not happen in the present. They focus on creating generic pictures of possible, desirable, undesirable or mixed futures to facilitate strategic consideration by organizations (Timms *et al.*, 2014).

### 2.3.3. Normative Scenarios

Normative methods focus only on hypothetically desirable futures and help provide indicators that can be used to design desired futures. Normative scenarios concentrate on designing aspirational future scenarios and planning goals rather than predicting possible scenarios (Kuosa, 2014). It is very suitable for participatory processes and includes the inspirational potential for radical changes, often in the medium and long-term. Visioning and backcasting are representative of this approach. Visioning is a technique that requires looking at how different desirable visions operate. Backcasting considers what actions and policies are required today that will connect the future to the present (Zimmermann *et al.*, 2012).

## 2.4. Example Projects of Future Approaches

### 2.4.1. Forecasting

By the way of the illustration forecast method, Figure 2.2 presents the UK National Transport Model (NTM), which has a four-step travel demand model augmented with sub-models for road traffic forecasts (DfT, 2015).

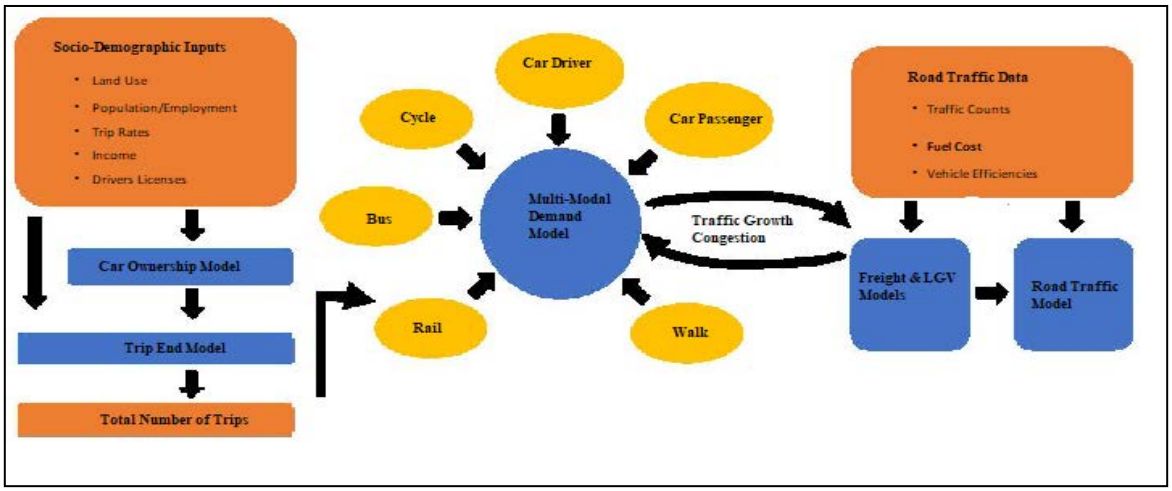


**Figure 2.2.** A structure of the National Transport Model.
**Source:** The Department for Transport, 2015.

The multiple sources of uncertainty around future travel demand including demographics, spatial, autonomous vehicles, and trip patterns have been acknowledged by recent DfT reports (2015a, 2015b, 2015c).

The transformation of population and employment into trips is based on previous behavioural records as captured in the UK National Travel Survey (NTS). The NTM translates exogenous predictions of future population and employment into estimates of vehicle ownership as well as trips, trip distances and mode for eight trip purposes. The drivers are recognized as a subject of uncertainty and the modelling techniques as well as the trip rates are contained within the travel diary surveys.

The next forecast stage ran five different future scenarios. The potential implications of four different levels (and the continuation of a trend of falling trip rates) of income growth and oil prices were evaluated. The different predictions provided a critical reference for what interventions were needed in order to effectively forecast road traffic conditions.

### 2.4.2. Exploratory

The study by Lyons et al. (2014) likely offers the most systematic exercise when it comes to exploring potential travel scenarios within urban centres (see Figure 2.3). This project proposed several factors that were inclined to affect travel demand in New Zealand and acknowledges the extensive effects that a variability of social and political factors has on their perceived likelihood. The exploratory futures are primarily inclined towards utilizing digital technology and observing energy prices.

Different attitudes towards the combinations of those two factors generate 4 different futures (Cooperative and Close, Global Locals, Travellers' Paradise and Digital Decadence) in this work, as seen in Figure 2.3.

Once the exploratory futures were designed, they were assessed against the Business-as-Usual (BaU) scenario in terms of their capability to cut vehicle kilometres travelled.

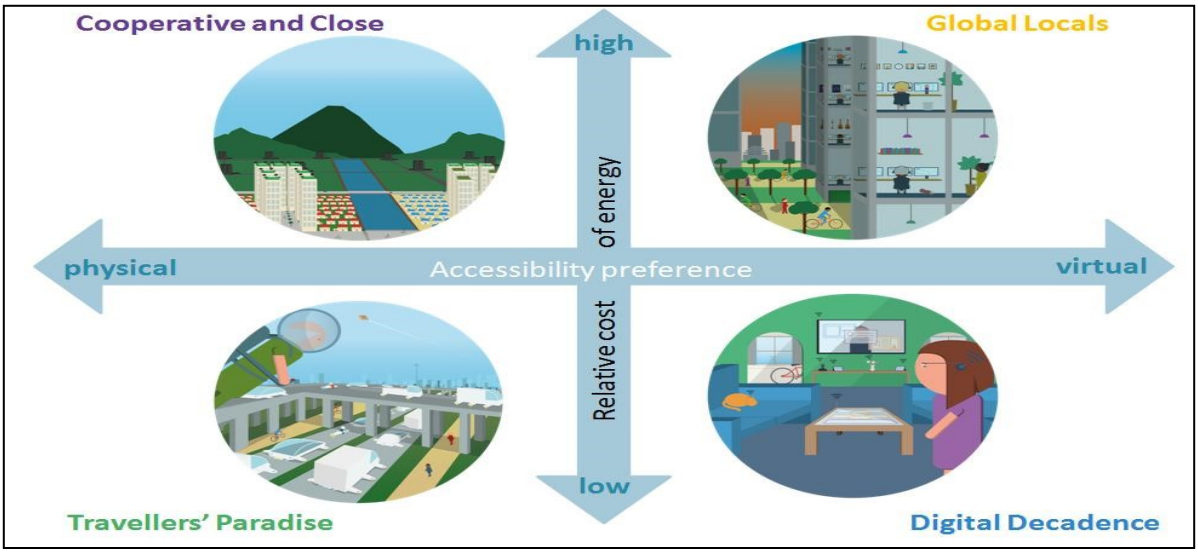


**Figure 2.3.** Exploratory futures based on the combinations of technology and energy.
**Source:** Lyons *et al.*, 2014.

Each scenario illustrates different urban transport environments in New Zealand (see Figure 2.3). Compared to the BaU scenario, the Cooperative and Close scenario portrays that people are travelling more by non-motorized transport modes and have a better healthier lifestyle as they lead more active lives. Choosing large private vehicles is expensive and therefore a massive part of the public prefers to stay close to their local communities and workplaces. While people communicate face-to-face, high energy costs have forced the public to adapt to this kind of environment. Global Locals presents a society which, has moved from car dependency to virtual confidence. In response to increasing energy prices, the government, in this scenario, has invested in energy-efficient technologies and virtual interfaces. People are using all motorised forms of transport far less. Therefore, obesity problems have sharply increased because of a lack of physical exercise. Travellers' Paradise tells that

New Zealand is flushing with cheap energy thanks to has a vibrant South Pacific power plant. The public prefers to meet with other people face-to-face similarly to the Cooperative and Close model. People are travelling more often and support network pricing to ensure that they have the desired transport system. Therefore, mass transit rail and rapid bus systems are common within this model for moving the public around faster. However, cycling becomes more dangerous within this fast-moving road traffic environment. In Digital Decadence, people do not need to travel much at all because they enjoy a vast array of digital services. When they need to remain connected, they prefer to travel in self-driving cars. Thanks to high exports,‑super-efficient technologies and access to abundant renewable energy sources, energy prices in New Zealand have been reduced and energy is widely affordable.

### 2.4.3. Normative

A longitudinal study of UK urban futures by Tight et al. (2011) established multiple visions for the year 2030 which, reveal an aspirational improvement in the level of walking and cycling in hypothetical UK urban areas.

Figure 2.4 demonstrates the generation of three different urban visions at the hypothetical residential street level. The researchers initially built a hypothetical UK residential street for very different traffic requirements, where houses were designed before the need for car parking was planned and mixed-use is an obvious challenge for proper planning. The current situation shows active transport (walking and cycling) are not untypical of those found in many residential areas.

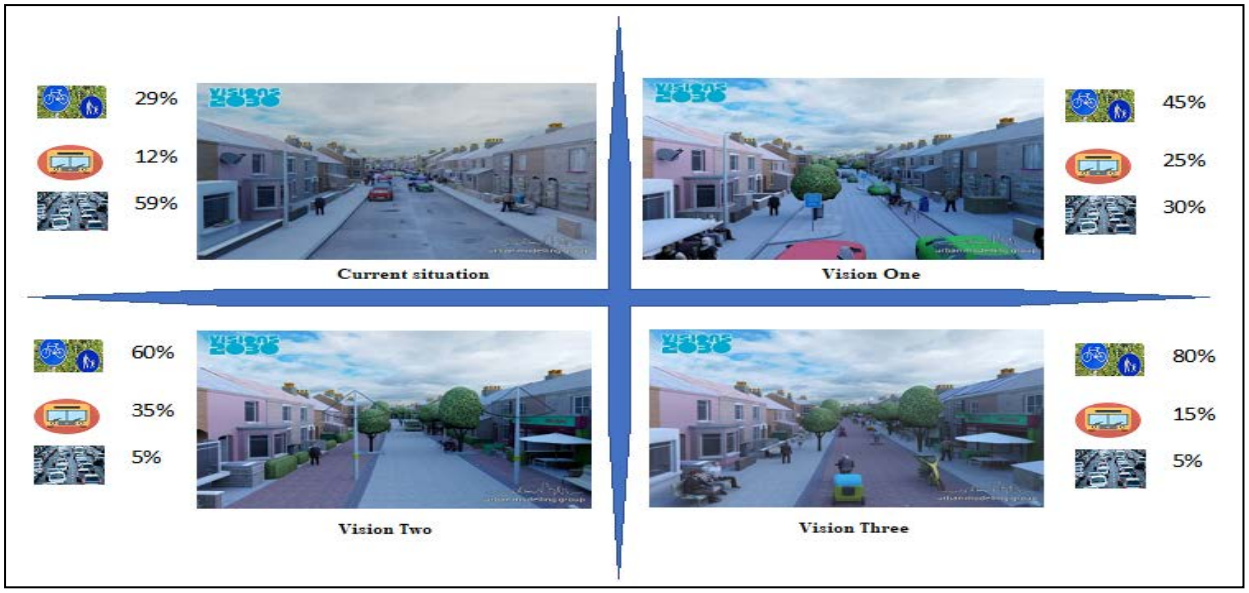


**Figure 2.4.** The current UK residential area and three suggested futures.
**Source:** Tight *et al.*, 2011.

In the current condition, the average mode split is: 29% active transport, 12% public transport, and 59% private car. Vision One (European Best Practice) is a universal implication of existing European best practice in relation to non-motorized transport systems in UK urban areas. Social changes are not observed and the governance system at different levels (national and local) are fundamentally similar. The mode split for this vision is: 45% active transport, 25% public transport and 59% private car. Vision Two (A Car-free Public Transport Orientated Future) describes an extremely significant change in moving away from the current car focused street. Social values are seen to be improving and society is more tolerant of cyclists. Also, a stronger coordination of policies at the national and local level exist. The average mode split for this vision is 60% active transport, 35 % public transport and 5% private car. Vision Three (A Localised Energy Efficient Future) arises from an extreme shortage of fuel in the UK. A more decentralised local governance is a fundamental structure of this vision, but a strong national governance, especially for the use of enhancing supportive technologies is present. The mode split for this vision is: 80% active transport, 15% public transport and 5% car.

## 2.5. Urban Mobility Systems

### 2.5.1. Developed Countries

Many Western European countries have successfully developed modern and convenient sustainable transport systems in their own cities (Newman & Jennings, 2012). Despite high rates of car ownership in this region, different segments of society equally make a considerable percentage of their working trips by foot and cycle (Ewing & Cervero, 2001).

Measures to restrain car mobility in different Western European countries are not uniform between cities (or over differents periods of time). For example, Italian cities are concerned about their ancient centres, Swiss cities acted to reduce air and noise pollution, and land shortage was a chief problem for Dutch cities. English cities have acted to find a solution for traffic congestion and the high cost of land for parking and roads (Pharoah & Apel, 1995). Newman & Kenworty (1999) claimed that European cities (and some wealthy Asian cities) are demonstrating the best examples of restraining automobile dependence.

Swiss cities have acted to reduce air and noise pollution by expanding and redistributing road space to trams and buses (Martínez, 2011). Strategies for accelerating trams and buses have resulted in an enormously sophisticated traffic signalling system, which has been adjusted to allow transit vehicles to pass (stop car drivers at most intersections).

Central London has used a first congestion pricing program for reducing traffic congestion and raising revenues to fund various transport developments (Ison & Rye, 2005). Litman (2005) claimed that the city of London has a suitable location for this kind of action because of its limited road capacity and heavy travel demands which, result in serious traffic congestion. A traffic congestion price program began to be accepted by all parts of the general public in the early days of the implementation of the traffic congestion action plan and

currently, there is not a discussion to implicate this action within different regions of London and other major UK cities.

A modest role in restraining car mobility (and in promoting attractive pedestrian, bicycle, and public transportation infrastructure systems) have been supported by the European Union (EU). The EU contributes toward connecting incomplete cycling and walking networks between nations and finishing infrastructure facilities in less developed locations of the region (Pucher & Buehler, 2008). Policies and strategies for convenient walking and cycling are usually supported at the municipal level. Many local governments have been planning and constructing sustainable transport facilities for several decades. However, policy guidance, coordination and funding have been carried out only by the government thus far. For example, in Germany, the government is devoting over €2 billion, per year, for various urban transport projects. The Dutch government contributes nearly €1.8 billion a year for local transport projects, including the construction of active transport facilities (Helmut, 2013).

### 2.5.2. Turkey

Non-motorization transportation systems in Turkey are mainly limited to specific gender and age groups. Proper accommodation for urban cycling, in particular, lags far behind those in Western European countries and if it exists, it is primarily for recreation and utilitarian purposes (Elbeyli, 2013).

One of the most prominent methods used to limit the use of cars in Turkish cities is parking restraints. This is especially true in busy city centres where support for on-street parking have seriously decreased (Balsas, 2004). Other common measures are used to discourage car use are road humps and low speed limits. However, these restrictive measures are sometimes criticized until

more people appreciate that reducing motor vehicle speed in congested areas helps achieve safer urban road conditions.

In Turkey, local master plans were prepared to estimate future travel demands and provide a means for proper planning urban areas. The typical actions within the framework of the local Turkish transportation plans are focused on seven different objectives; 1) integration of land-use and transportation, 2) increasing the level of commuting service, 3) economic and environmental efficiency, 4) decreasing external dependency, 5) social equity, 6) financial efficiency and 7) public participation with decision makers (Akbulut, 2016). On the other hand, Turkish local governments have a complex structure and there is a lack of coordination between different local departments. For example, the *Transportation Coordination Directorate* is the policy-making body for urban transportation systems, the *Directorate of Traffic* is accountable for managing the existing traffic signalization network and outsourcing horizontal and vertical traffic markings and the *General Directorate* works on the integration of cycling into public transportation systems within its own control (Morova *et al*., 2016). This complex, but fragmented structure among these departments for the implementation of public works usually results in inefficiency to the point where urban transport projects are not carried out within an effective planning framework. Ercetin (2014) suggests that sustainable transportation planning in Turkish cities needs an integrated approach for non-motorized urban transportation systems with enough technical support where the central government should prepare a comprehensive national transportation guidance plan for local governments.

## 2.6. Foresight Methods

Foresight methods vary depending on a variety of factors, including time and funding, the geopolitical context, expected outputs, and scale of participation (Popper & Medina, 2008). This section indicates that a considerable amount of uncertainty still exists when it comes to project planning in developing countries, while many sustainable transportation studies have been published and conducted in developed countries.

### 2.6.1. Developed Countries

Although sustainable transportation systems are funded, directed and carried out at different levels, European, Northern American and some wealthy Asian countries involve an extensive use of foresight approaches in strategic long-term planning (Van de Pol, 2014).

For example, The United Kingdom's foresight plan operates as a comprehensive public outreach program that creates networks of futurists and practitioners within public, private, academic and non-governmental organizations. A recent foresight project on Intelligent Infrastructure Systems (IIS) was undertaken recently and sinclude international dimensions of infrastructure systems which, have contributed to policy recommendations in urban planning design (Curry *et al.,* 2006). The first stage of the project included a series of individual reflections by leading academic experts on how the environment and society may develop synergistically to create more desirable living conditions in the future. These views and their implications through the aforementioned stated scenarios constitute the first part of this report. The next stage focuses on future practitioners rather than the public view and presents a more detailed explanation of how various key drivers and trends were identified to explore alternative futures. The last section is written more for any future practitioner than for the casual reader and it provides a more

detailed description of how we can identify key drivers and trends that were used to explore alternative futures. The workshops of professionals we interviewed narrowed the discussion down to four scenarios (High Shift, Urban Colonies, Good Intentions, and Perpetual Motion) for exploring uncertainties about the future of intelligent infrastructure systems (Lyons & Urry, 2006).

Western European countries with a serious commitment towards implementing sustainable transportation projects also rely on the research of independent futurists and numerous non-governmental organisations (NGOs) (Litman, 2000; Woodcock *et al*., 2009; Hickman *et al.*, 2010; Hunt *et al*., 2012). Within these studies, common concentrations in certain areas can be observed including: the environment (Evans *et al.,* 2001; Berkhout & Hertin, 2002; Hull, 2008), technology (Kemp, 2000; Daim *et al.,* 2009), digital technology (Llyons *et al.,* 2004), urban structure (Crawford & French, 2008; Ogilvie *et al.,* 2010; Phdungsilp, 2011), energy (Steg, 2008; Eriksson & Weber, 2008), infrastructure systems (Tegart & Jolley, 2001; Störmer *et al.,* 2009; Woodburn *et al.,* 2008, mode share (Donaghy, 2004; Chatterjee & Gordon, 2006; Tight *et al.,* 2012), special groups (Carlsson *et al.,* 2005), safety (Harris *et al.,* 2004; Coaffee, 2008) and policy coordination (Eriksson & Weber, 2008; Greenwood, 2012).

In developed Asian countries, Singapore's sustainable development blueprint shows a proactive approach to policymaking. A report from them summarizes various integrated national strategies to cope with land use, urban design, transportation needs, the environment, an emissions policy, energy policy and other areas (Miller, 2011).

One survey revealed that in the more established democracies of Western Europe and North America, participants prefer face-to-face forums (including expert panels and scenarios). By contrast, the Delphi method (or more anonymous methods) are more often used in Singapore (and in other new democracies) as well as in Japan (European Commission, 2009). In Oceania, the

most common methods are citizen panels and interviews, but this may vary as more studies from that region are conducted (Kuosa, 2011).

Any specific technique is not typically preferred on its own, but is rather complemented by other supplementary methods for these types of planning projects. It is noted that the government is also the main sponsor of these types of studies for all its regional areas. Finally, the most significant differences are seen frequently in the most preferred regions for development (Hilbert *et al.*, 2009).

### 2.6.2. Developing Countries

Developing countries are faced with a lot of common challenges, but the challenges explained in this section address the most obvious problems and techniques, rather than making a direct comparison among various developing countries (European Commission, 2009; Chan, & Daim, 2012). First, participants (who are defined as experts) usually do not completely control a foresight exercise. It is expected that the opinions of the experts who are consulted should lead to comprehensively issued guidelines. Secondly, short-term thinking is institutionalized and may affect entire future designs and policy. An institutional arrangement is sometimes not constant and changes in its administration are frequently unanticipated (Capriati, 2001). Additionally, policymakers may consider urban planning propsects as a tool for their own private objectives so their contributions may not employ the most favorable scientific objectives and serve the greater public good (Saghafi *et al.*, 2009).

Within the rapid modernisation of some countries (Brazil, India and Turkey), their governmental based urban planning studies recommend different stages of development, but largely rely on the results of science and technology for how they are implemented (Helmut, 2013).

In Brazil, the number of foresight projects is recently increasing because a wide range of international exercises (the United Nations Industrial Development Organisation (UNIDO) and the European Commission) launched and supported national foresight projects (Nyiri, 2003; Popper & Medina, 2008; Teixeira *et al.*, 2011). Therefore, a wider variety of foresight approaches (scenario development, Delphi style methods, focus groups and expert panels) that combine qualitative and quantitative methods and future-oriented employer surveys have been successfully adopted in Brazil through various foresight projects (Georghiou, 2008).

Brazil has also succeeded in improving its own planning approach, leading to effective innovations and practices (Popper & Medina, 2008). For example, various technological based proposal were designed through expert interviews. Additionally, data-demanding quantitative modelling methods were utilized to prepare each scenario in order to determine the influences of the impact of the kind of technology that was used.

The Indian government embarked upon a scenario- and panel-based technological foresight exercise in 2013 (India Planning Commission, 2013). This was the first-time scenario planning was used within the areas of governance, administration and implementation. The inclusion of the public in collaborative discussions was a proper way for the country to engage on an innovative level as a participating democracy. The exercise provides a policy framework for the development of an integrated science and technology policy at the local and national levels.

Up until now, far little attention has been paid to Turkish foresight projects. Exploratory futures were first described and explored within a publication entitled: *Megacities on the Move Project* by Gazibara et al. (2010), as part of a practical plan for addressing the challenges of future mobility.

*Megacities on the Move* has been led by an organization known as, the *Forum for the Future* in partnership with EMBARQ and was funded by Vodafone and the *Foundation for the International Automobile* (FIA).

In this project, the workshop participants in İstanbul were recruited from a varied mix of stakeholders experienced in different aspects of urban mobility, including: transport planners, architects, companies providing mobility solutions and campaign organisations.

Throughout this exercise, energy supply and governance systems were identified as the most critical key drivers for influencing future mobility solution changes. Furthermore, the most uncertain events and trends that might have potential impacts on the future of urban mobility were deeply considered. These uncertainties are: urban form, mobility, energy, resources, economy, climate change, governance, social structures, values, and business and technology (as seen in Table 2.1).

**Table 2.1.** A summary of four different futures.

| Key drivers | Planned-opolis | Sprawl-ville | Renew-abad | Communi-city |
|---|---|---|---|---|
| Urban form | Cities are downsized and are radically managed with limited personal mobility and efficient public transport networks. | The city is a great fragmented sprawl (huge and low-density suburbs). | Cities are becoming more densely populated. | Cities are informal and chaotic centres of creativity |
| Mobility | Cities ban private cars in central areas to meet carbon targets. | The car-dominant model persists. | Many more personal vehicles are electric or hybrid, and electric rail and buses are the top choices for public transport. | Personal and individualised mobility is important. |
| Energy | Centralised grids rely on gas-fired power stations and carbon capture. | Oil production peaked around but transport still uses fossil fuel. | Renewable energy is rapidly embraced. | Local renewable energy generation and decentralised grids have superseded coal, gas and oil. |
| Resources | Strict planning ensure resources are used as efficiently as possible. | Resource scarcity has lowered the quality of life for the urban masses | Resource use is strictly regulated due to a shortage of land. | Cities have transformed to produce more of their own food. |
| Economy | A strong, regulated economy invests in technology and infrastructure. | The global economy is stagnant | Economic power has shifted south to Asian countries. | Slow global growth. |
| Climate change | Cities are replanned as extreme measures are taken to decarbonise the world. | Short-term thinking rules | The most dangerous impacts were averted. | Weak global policy, but people communities adapt to climate change. |
| Governance | One-size-fits-all governance is effective but reduces freedom. | Cities are governed by the elites | Strict governance holds sway | Central coordination is weak and more power resides at the community level |
| Social structures | Society is fairer but less individualistic. | A less equal world | The rich-poor gap has narrowed within societies. | An unequal world, but full of opportunities |
| Values | It is a hard-working but high trust world | The world is increasingly polarised | Simplicity and authenticity are dominant. | People are less consumerist and less status-driven |
| Business | Big business is everywhere. | A less public service provision | Low impact services in collaboration with governments. | Business is more local and decentralised |
| Technology | A hi-tech world of integrated systems and virtualisation. | There are efficiency gains | Innovation is driven and regulated by the public sector. | Many people are involved in innovation and research. |

Table 2.1 demonstrates the key points of four different futures (Planned-polis, Sprawl-ville, Renew-adab and Commune-city) that created a combination of two main factors; the role of energy and type of governance. Planned-polis describes a place where the supply of energy required for road transportation is difficult to procure, and therefore, suggests planned and controlled urban transport solutions. For example, private car choices are restricted mainly around the city centre, but Intelligent Transportation Systems (ITS) have started to become adopted by many people. Sprawl-ville offers an example of what is known as *ghettoization* (Gazibara *et al.,* 2010). A modern transportation network system could easily be seen within high-income areas. However, poor urban dwellers feel the absence of a good transportation network within their communities. Renew-adab is a technology-based foresight future by promoting an increas in the use of clean energy (and thereby, reducing travel demands within a society). Well-planned transport systems are designed for the benefits of an entire community. Commune-city describes a place where the means transportation used is highly personalised, utilizing several different varieties of urban transportation modes.

The same project was also conducted in Mumbai (India) in order to explore what changes might be happening in future transportation systems. The reason for selecting İstanbul as a case study is that it is rapidly growing in terms of its population and urban sprawl (Megacities on the Move, 2010). The results of İstanbul and Mumbai show some notable differences. İstanbul showed a more general campaign to a promote sustainable culture, whereas Mumbai participants decided to implement an overall action plan that focused on better sustainable public transport systems.

## 2.7. A Review of Alternative Methodologies for Visioning Development

Several visioning techniques, including: Backcasting (Quist *et al.,* 2011), Future Workshop (Eickhoff & Geffer, 2009), Future Search Conference (Oels, 2009), Community Visioning (Okubo, 2000), Sustainability Solution Space (Wiek & Binder, 2005), Visioneering (Kim & Oki, 2011), and other approaches (Constanza, 2000; Shipley, 2002; Raskin *et al.*, 2002; Kemp & Martens, 2007; Newman & Jennings, 2008; Potschin *et al.,* 2010) have been developed in advanced countries.

There is a strong demand to generate (and test) more quality-oriented visioning approaches, but many studies demonstrate that visioning exercises are deficient when it comes to offering a sound methodological base (van der Helm, 2009). A recent systematic review of visioning studies that allude to deficits in visioning approaches, include a lack of public participation, system relationships and resulting visions (Newman & Jennings 2008; van der Helm, 2009; Kallis *et al.,* 2009; Binder *et al.*, 2010; Sheate & Partida ´rio, 2010; Scott *et al.,* 2011).

While various visioning studies support a broad stakeholder engagement, most of these practices are differentiated in terms of how participants (public, experts and policy-makers) are included, or at what level of participation they might be considered. These methodological uncertainties do not allow a proper understanding of the rationale of several methods for the design of visioning studies (Hurley & Walker 2004). Therefore, the determination of participants for public involvement becomes a challenging and contentious issue (Oels, 2009).

This is a relatively simple concept as participants ought to be provided with information that contains all the relevant stages of a visioning process, but it has also been argued that stakeholder involvement may instead include varying stages of lower and higher contribution efforts of different groups due

to limited capacity, time and other resources in most visioning processes (Krutli, 2010).

Hurley & Walker (2004) advised that public involvement might be further selected with respect to different groups, such as: age, gender, profession, socioeconomic background, and other aspects. For example, Uyesugi & Shipley (2005) reviewed planning documents and conducted interviews (i.e. workshops, presentations, surveys) in multiple languages to examine a variety of highlighted visioning stages as part of the Vancouver City Plan. This is because the city faces various challenges when it comes to large-scale and multicultural planning and encounters rapidly changing population demographics in some communities. The visioning practice specifically focuses on minority groups, but it is also targeted to the recruitment of seniors, youth, religious groups, community groups, and business associations.

Secondly, system thinking represents how individual key driver changes become an interconnected mechanism in a desirable future state (Kim & Oki, 2011). In other words, how various driver changes affect each other in terms of indirect and hidden connections between the pieces. For example, a systemic vision of a car-free public transportation orientated future by Tight *et al.* (2012) not only describes a list of urban changes, but also demonstrates how short and long trips within the urban areas are typically undertaken by different transportation modes. Systemic visions, therefore, provide more accurate and rich illustrations of desirable future states.

Finally, a desirable future place needs to have a critical level of consensus among its experts and community so that a common vision among stakeholders is created in order to achieve the desired direction (van der Helm, 2009). The role of visions has been acknowledged by Smith *et al.* (2005), where a critical number of participants can approve of it in order to generate a common and shared means of action.

Contributions from various components of the literature draw three main conclusions from the presented reviews to further enhance visioning practices. First, public participation is essential for developing a more comprehensive planning process as it helps to establish a shared and approved vision for the community. There are many different types and levels of public engagement which, might be designed to interact with stakeholders. Second, a desirable future model needs to be explained in terms of how interdependent pieces of mechanisms are interacting (and free of inconsistencies and conflicts to prevent an ambiguous direction), rather than independently. Lastly, a vision should demonstrate an expressed common idea of future desirable environments in a society that is inspired to achieve this vision.

## 2.8. Research Gap and Opportunities

A large number of foresight studies have been published and conducted in developed countries, as they are used in many local (Litman, 2000; Hickman *et al.*, 2009), regional (Van de Pol, 2014), and national transport planning studies (Curry, 2006). A review of worldwide transport planning literature has emphasised on public and non-motorized transport systems (Lyons *et al.*, 2004; Tight *et al.*, 2011).

The importance of sustainability in visioning has been essentially coordinated toward the investigation of future key drivers (desirability), the assessment and evaluation of visions, and the improvement of the visioning practice (Wiek & Iwaniec, 2013). A principal problem is that the determination of future key changes for sustainability visions and guidelines on how to meticulously craft such futuristic urban environments are dispersed over dissimilar aspects of the literature (Hickman & Banister, 2007). The ambiguity of future transport planning exhibits is an indication of the need to be aware of the vital forces that play a role in vision development but are usually non-

existent among the majority of future studies. Limited coverage of scenario narratives has been given to the crucial factor likely to influence the development of future sustainable transport systems (Hunt *et al.*, 2012). The researchers probably reveal the most comprehensive literature document of disparate future scenarios published between 1997 and 2011 (>450 studies and reports had been identified). The synthesis of published such scenario studies show a critical understanding of the main drivers of future changes. Several scenario studies from this wide-ranging report indicate that the adoption of a similar methodological framework causes inevitable similarities.

Nevertheless, the majority of studies argue that the visioning practice has not a well-grounded theoretical base and methodology (Shipley, 2002; van der Helm, 2009). It is possible to observe the intensity of the qualitative technique in the future scenario planning studies (Ewing & Cervero, 2001; Raskin *et al.*, 2002; Kemp & Martens, 2007; Hilbert *et al.*, 2009). Furthermore, most of the previous studies mention that there are deficits in the sustainability of the visioning process in terms of lack of public involvement (Shipley & Michela, 2006; Newman & Jennings, 2008; van der Helm, 2009; Sheate & Partida´rio, 2010). They criticised that the lack of public participation influences both the general interests of public and the construction of politics, so causing great distrust of the researchers (or authorities) for sustainable transport planning. There also lacks a defined assignment of tasks and duties among citizens about the way each person embraces sustainability or their responsibilities within their community. For example, little is known about the potential uncommon strategies regarding behavioural and lifestyle change impact on future transport visions.

The vast majority of published research has long debated the influence of sustainable transport systems, but there has not been a large-scale detailed

investigation of the future urban transport change in developing countries (Popper & Medina, 2008; India Planning Commission, 2013).

Up to now, far too little attention has been paid to the role of visioning in Turkish transport planning studies (Gazibara *et al.*, 2010). Previous transport studies are unsatisfactory because they do not provide a view of realising radical development in future sustainable transport systems (Elbeyli, 2013; Balsas, 2004). It is therefore not known whether the aspirational thinking of achieving urban transport changes in Turkey is workable. In addition, no research has been found designed Turkish macro- and micro-policy pathways by using backcasting approach.

## 2.9. Conclusion

In this chapter, it was first understood how future studies have shaped from 1940’s to present. Then the chapter emphasized that there is no consensus on the approaches in future transport practices, but most exercises are divided into three categories; forecasting — making predictions of the future, exploratory —designing generic pictures of possible, desirable, undesirable or mixed futures and normative methods — focusing what actions are essential to achieving the target of one hypothetically desirable futures.

Then, the chapter reveals that many foresight projects have been published and conducted in developed countries, but much uncertainty still exists about the foresight projects in developing countries. Therefore, more foresight transport studies are required to explore whether much higher dependence on sustainable systems is reliable in Turkey and to reveal a vital exercise how policy pathways could be designed for achieving the target of a desirable future.

# CHAPTER THREE: METHODOLOGY

## 3.0. Overview

The aim of this chapter is to present the research methodology conducted to achieve the research aim and objectives as outlined in Chapter One. The chapter begins with the justification of the research method and continues with a presentation of the theoretical framework of the research methods that are conducted to answer the research questions. Finally, the chapter concludes with a description of each method, research philosophy and ethical considerations.

## 3.1. Justification of Research Design

Walking and cycling research is a context sensitive and complex part of transport studies, which may include socio-economic issues, cultural factors, and lifestyle changes and behaviours (Bammann *et al.*, 2006; Tzoulas *et al.*, 2007) and therefore it was felt necessary to use a mixed research methodology for collecting different data types.

The main objective of using the mixed method approach was to provide a flexible methodology which enables reflexive analysis suited to achieving the research objectives. Qualitative and quantitative research approaches were used. Examples of the former used in the research include: 'What are the expectations of individuals regarding future transport systems and how does this influence their design?'; 'What transportation measures help to create sustainable lifestyles and behaviours?'; 'How reliable are the alternative transport visions in 2035?' Moreover, the main research question of the thesis: 'What policies and legislation could be implemented to achieve the goals of one specific vision from the present to 2035?'. Qualitative research methods offer an exploratory approach that can address these questions by providing an improved understanding from the perspective of the participant (Merriam, 2009; Kvale & Brinkmann, 2009; Silverman, 2013).

The quantitative research method is also frequently used to examine perceptions towards walking and cycling studies (see for example Owen *et al.*, 2004; Wardman *et al.*, 2007; Parkin *et al.*, 2007). The first research question ('Which measures designed to increase the sustainability of urban transport systems could be incorporated into the visions to be developed in this research?') and the fourth research question ('What are the possible elements of future alternative transport systems that could encourage different groups to use more non-motorized transport systems in Turkish cities?') could be only answered by using secondary data and a quantitative-based survey, respectively.

Therefore it may be seen that the mixed method strategy proposed here is required to address all of the research questions and it will enable the provision of comprehensive information and evidence to address the proposed research questions (Charmaz, 2011).

## 3.2. Research Methods

This section describes the research methods used to collect the data required to investigate the answer to the research questions in this project. This section presents the research approaches employed to design future transport visions in Turkey. Four main methods, which emphasise (a) questionnaires, (b) visualisations, and (c) interviews are undertaken.

**Table 3.1.** A breakdown of each research stage.

| Research method | Research objective | Research question |
|---|---|---|
| **Survey** | To understand the expectations of individuals for future transport visions.<br>**(Objective 1)** | What are the expectations of individuals regarding future transport systems and how does this influence their design?<br>**(Research Question 1)** |
| | To identify what transport measures promote sustainable lifestyles and behaviours.<br>**(Objective 2)** | What transportation measures help to create sustainable lifestyles and behaviours?<br>**(Research Question 2)** |
| | To increase the diversity of non-motorized transport users in urban mobility.<br>**(Objective 3)** | What are the possible elements of future alternative transport systems that could encourage different groups to use more sustainable transport systems in Turkish cities?<br>**(Research Question 3)** |
| **Visualisations and interview** | Justify the reliability of alternative transport visions.<br>**(Objective 4)** | How reliable are the alternative transport visions in 2035?<br>**(Research Question 4)** |
| | To construct macro- and micro-pathways to demonstrate how the goals of one desirable vision could be achieved from the present to 2035.<br>**(Objective 5)** | What policies and legislation could be implemented to achieve the goals of one specific vision from the present to 2035?<br>**(Research Question 5)** |

### 3.2.1. Questionnaire Survey

The questionnaire survey aims to enable the participation of the public in the development of the future imaginary scenarios. The associated objectives of this study are (i) to learn the personal expectations of the participants about the sustainable transport visions (the first research objective); (ii) to seek the strategies which will ensure sustainability in transport behaviours and lifestyles (the second research objective) and; (iii) to analyse the factors which will encourage users with distinct demographics to use active transport systems more (the third research objective). The same online survey is utilised for the questions associated with the first, second and third research questions (see Table 3.1). The survey results are available at http://www.bisikletizm.com/bisikletli-ulasim-nasil-gelisebilir/ (by clicking Anket Sonuçları). The consent form, participant information sheet and online survey form are provided in Appendix 1-3.

Open-ended survey questions give participants an opportunity to share their opinions freely, and hence, it provides more efficient data analysis (Van Selm & Jankowski, 2000). Open-ended questions have different targets in this study; ***the first research question*** is to understand participants' requirements towards developing alternative transport visions for the future. ***The second research question*** is to explore effective transport practices that may help to build a positive lifestyle and behaviour change in Turkish urban streets. All strategies offered from the participants are shown in Appendix 4.

The quantitative part of the survey aims to explore transport practices that effectively promote different socio-economic groups to use non-motorized transport systems for work journeys, and so eliminates inequality in the profile of active transport users. Therefore, ***the third research question*** is designed to test transportation strategies that may increase the diversity of pedestrians and cyclists for the development of desirable urban environments (see Table 3.1).

Accordingly, participants are asked several motivation questions. For example, which of the following changes (safety, social, and environmental) would motivate participants to use active transport systems more? The Statistical Package for Social Science (IBM SPSS Statistic 21) are used to test the difference between the mean variances (e.g., female and male) based on various safety-, social-, and environment-dependent factors. Interval scale questions are formed to ask about agreement strength, likelihood or satisfaction (i.e. completely satisfied, satisfied, neutral, unsatisfied, completely unsatisfied). All statistical results are provided in Appendix 5.

### 3.2.2. Visualisations

The scenario narratives of the visions are created by considering the outcomes of published foresight project, qualitative and quantitative findings. Future travel scenarios are discussed at a workshop attended by the employees of İstanbul Metropolitan Urban Design & Architecture Company.

2D (Two-Dimensional) modelling is firstly used for drawing of many geometric and physical components (many small and mid-level companies usually use conceptual 3D models is by making 2D drawings). Subsequently, these drawings are transferred to 3D modelling through the image processing software package, Photoshop™ (CS6) and illustrations are performed using the modelling via Photoshop's render process. Large-sized of the pictures are demonstrated in Appendix 6.

Three main activities are taken to increase the quality of the illustration work: (1) choose the locations from the real spaces in which four different transport modes (pedestrian, cycle, public transport and car) are used, (2) give priority to planned cycling road areas by İstanbul Transport Planning Department, (3) prioritise the compatibility of the chosen areas with the

demography, socio-economic features and the street structure of the urban areas in Turkey.

### 3.2.3. Interviews

The interviews are conducted to assess (i) the persuasiveness of the alternative visions (the fourth research objective) and (ii) to construct sufficient policy pathways that can be designed to achieve a specific vision in Turkish cities (the fifth research objective). Semi-structured interviews are utilised because a little work had been previously done on the justification of transport visions, focussed on walking and cycling (Richardson, 2007; Tight *et al.*, 2011). Such a methodological approach is considered due to the complexity of the challenges that needed to be addressed.

Initially, the generic pictures are demonstrated to voluntary participants, and the key changes of the scenario narratives are briefly explained (see Appendix7, Table1). Visions and their metaphors are demonstrated to the volunteer street and expert participants to evaluate the reliability of future alternate visions. The survey questions are designed to address ***the fourth question of the research*** (see Table 3.1).

In the interviews with the public, only the images of current and alternative futures at the relevant location is described and the pictures of any relevant location and its current condition are explained in a more general way. For example, the researchers do not elaborate on the key variables of visions for participants in this part of the work.

In the interviews with the experts (urban designers, transport engineers, non-governmental cycling groups, and academics), the identical questions are asked, all imaginary pictures are displayed, and the explanations are given in more detail. The reason of using two different approaches for public and experts

is that the required time for each of them are different from each other. Another difference between both approaches is that the public and the experts are asked to answer the questions according to daily transportation modes and working disciplines, respectively. The average times to complete the interviews with the public and experts were nearly 5 and 35 minutes, respectively.

***The fifth research question*** is addressed through an informed discussion with the local and central policymakers by the imaginary pictures of all visions is explained, but they are requested to explain the questions only for the specific vision. They are asked to construct a timeline for the implementation of measures that would assist to achieve the vision targets. Imaginary future travel scenarios are explained to those taking part. With the aim of obtaining the characteristic data for each urban area, the participants are asked to assess the future imaginary travel scenarios for their cities and share their comments and suggestions in order to capture more natural and distinctive responses. In the interviews with the central policy makers, the focus is mostly given to the key descriptions of the scenario narratives. The questions of the interview made with the local and central decision makers are included in Appendix 8.

## 3.3. Study Locations

### 3.3.1. Survey Questionnaires

Survey data is collected from five different Turkish cities; Ankara, Eskişehir, İstanbul, İzmir, and Konya, as shown in Figure 3.1.


**Figure 3.1.** Selected urban areas and their geographical regions in Turkey.
**Source:** Türkiye bölgeleri haritası, 2016.

These cities are selected to represent different demographic, socioeconomic, transportation culture, land use characteristics, and population ranges (see Table 3.2).

**Table 3.2.** The population of the selected cities in Turkey.

| City size distribution in Turkey | Number of cities in 2010 | Population of case cities | Case cities |
|---|---|---|---|
| > 10 million | 1 | 13,120,596 | İstanbul |
| 5 million – 10 million | 1 | 5,130,735 | Ankara |
| 2 million – 5 million | 3 | 3,401,994 | İzmir |
| 1 million – 2 million | 8 | 1,107,886 | Konya |
| 500,000 – 1 million | 12 | 629,609 | Eskişehir |

**Source:** Avcı, 2012.

Therefore, the selected locations offer to observe a wide variety of Turkish sustainable transport barriers and recommendations for these challenges. The selected cities also indicate different population distributions and the populations of the selected Turkish cities in various distribution categories. Each selected urban area has different population distributions; thus, these cities are important when considering the entire country within various population ranges.

### 3.3.2. Hypothetical Turkish Urban Streets

The locations were adopted and modified from a specific region of the country by the İstanbul Metropolitan Urban Design and City Planning Office. Generic imaginary streets of the current situation were based on describing the common features of most Turkish urban areas (although recently, there are many Turkish cities which have familiar urban transport traffic problems in such locations). Therefore, each of these three locations in the hypothetical Turkish urban areas during 2015 are not intended to represent one specific city (or region) of the country – indeed many examples of such locations exist in different Turkish urban areas with similar traffic requirements. However, these generic imaginary urban areas are not best (or worst) of their kind in Turkish urban areas.

Three locations of the hypothetical Turkish city were created and demonstrated as they were in 2015 in Figure 3.2. Specific archetypes used included a suburban area, an area close to a busy university campus, and part of the city centre.

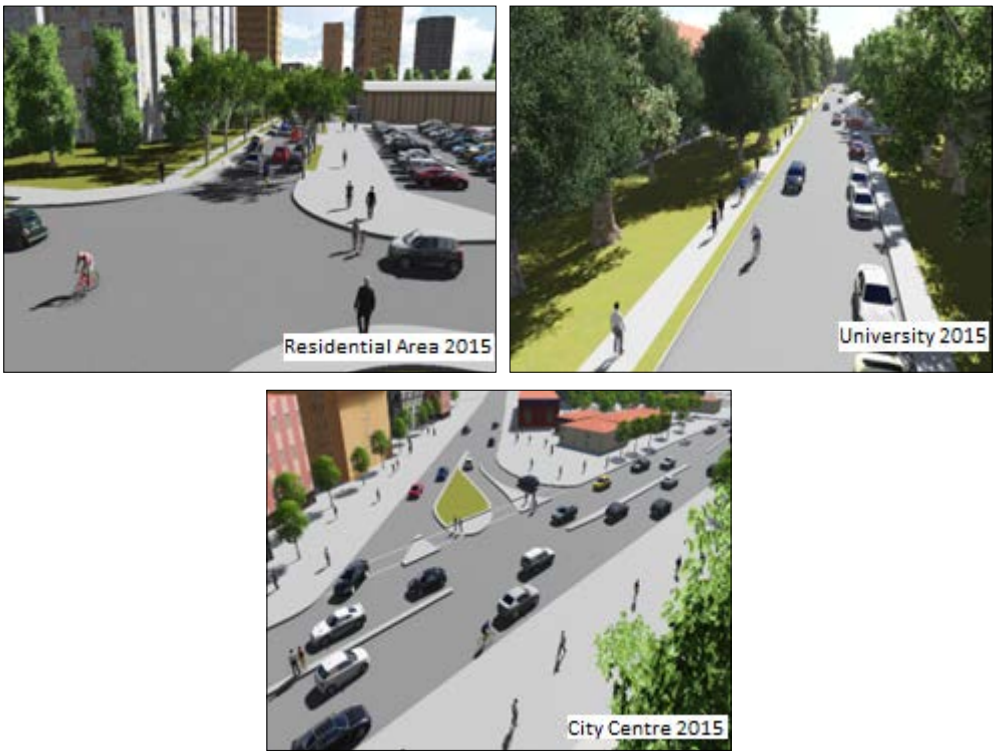


**Figure 3.2.** Three different hypothetical Turkish locations in the urban areas of 2015.

- An Ataköy suburb describes a modern residential place to travel and live but road parking is the main problem as the need for parking was considered after the houses were constructed. Therefore, illegal parking along the road, which complicates walking for pedestrians, draws the attention and cyclists travel on the same road that is used by cars; one where amenities accessible on foot and by bicycle are limited as well. The road is deprived of signs that enable the pedestrians to cross the road in a safe and comfortable way. There is a huge field containing the biggest taxi stand in a residential area, but an unaffordable public transport link between the residential suburb and the outer locations of the city (and the city centre) is the norm.
- A university location where the urban fabric meets huge open and green space. The university campus is bound by a ring road, although beyond this there was recent development such as scientific research and development centres and shopping areas. Pedestrian and bicycle access (and public transport) on the ring road is weak. The current roads for the pedestrians and cyclists are

narrow and uncomfortable, and irregular, illegal car parking along the road is remarkable. There is plenty of space, as the estate was not designed on a high-density model and hence, unlike some university campuses in major Turkish cities, there are a lot of opportunities to construct a more pedestrian and cycling-friendly environment.

- A location at the edge of the city centre, Nuhkuyusu Street, has not successfully adapted to changing traffic circumstances over the years. This is essentially an average Turkish urban centre, where urban space is very much constrained by the building line. The street lacks sufficient physical equipment for the comfortable and safe passages of pedestrians, perhaps within the range of infrastructure problems which characterises such central locations. For example, the junction designs for motorised vehicles are inadequate. The location is cluttered and traffic congestion (and also noise and local air pollution) seems to be the norm.

### 3.3.3. Interview Locations

First, different road transport users are randomly invited to undertake the survey at three different locations, which are performed in the illustration study (see Figure 3.2). This survey is conducted in open public spaces in which the volunteer participants can spend more time on the survey (for instance, people sitting in the cafeteria or on the bench, non-customer tradesman, etc.).

In the interview with the experts, two major cities (İstanbul and Ankara) are initially focused due to having more potential participants. The meetings are carried out at the offices and workplaces of the participants. Then, local policy-makers are those from related transportation units of five selected local municipalities. Finally, national decision makers are recruited from the Ministry of Environment and Urban Planning.

### 3.4. Sample Size

Approximately 75,000 links to the online survey are distributed to random participants who live and work in one of the five selected cities of the country. For simplicity, an effort is made to send an approximate number (i.e. 15, 000) of survey links to each selected urban area (see Table 3.4). This allows a similar number of participants attend the survey study from cities in different population ranges.

**Table 3.3.** An overview of response rate from case studies.

| Local area | Questionnaires delivered | Questionnaire responded | Response rate % |
|---|---|---|---|
| Ankara | 15,000 | 221 | 1.5 |
| Eskişehir | 15,000 | 196 | 1.3 |
| İstanbul | 15,000 | 319 | 2.1 |
| İzmir | 15,000 | 243 | 1.6 |
| Konya | 15,000 | 156 | 1 |
| SUM | 75,000 | 1,135 | 1.5 |

The participants are categorised as pedestrians, cyclists, or motor vehicle users according to their major travel mode to work (or to school). A summary of the response rate is given in Table 3.3 from which it may be seen that the survey was answered by 1,135 people (316 pedestrians, 489 cyclists, and 330 motor vehicle users) reflecting a 1.5% overall response rate. In İstanbul, 319 questionnaires were returned from approximately 15,000 surveys sent out, creating the highest response rate from all the cities with 2.1%, whereas in Konya 156 questionnaires were returned, with the lowest response rate of 1%. It should be noted that these response rates are somewhat lower than typical response rates of at least 20% quoted in some social science surveys (Babbie, 2015). The reasons why the participation rate is too low in this study are not completely known, several strategies were used to try to maximise this ratio (see Section 3.6).

As regards the interview study, many researchers explain that an average of 10-25 interviews is required to reach data saturation (Cassell and Symon, 2004; Sinclair 2005). This study is conducted by surveying 50 voluntary participants who use different transport systems and 10 experts from various transport related disciplines. This part of the research is performed between March and April 2015. Additionally, ten local and two national experts are interviewed to construct macro- and micro- policy pathways for achieving the target of one specific vision in March 2016.

### 3.5. Limitation

The analysis of the identified worldwide studies, which are used as a basis for the vision development aspect of the research, may lead to several inconsistencies. The following strategies are developed to minimise such contradictions:

- The outcomes of the previous national foresight study are transferred to show the fundamental characteristics of each vision in this study.
- Both qualitative and quantitative evidence is investigated to understand potential key drivers of future changes (energy, urban structure, policy coordination, etc.) and are considered and adopted in accordance with the formation of scenario narratives.

Data associated with young participants are not homogenously captured because the survey considers participants between 18-65 years. It was also problematic to encourage seniors to participate; however, it is difficult to understand why they did not want to respond to the survey questions. It may be related to the fact that older people are less interested in the use of social media (Cornejo *et al.,* 2013). The research feels that social networking would probably a better way to outreach to senior participants. Potential senior participants can

be more likely to be able to response the survey on their convenience time rather than having to get arrangements and things of the sort. The ratio of highly-qualified participants among the participants is also much higher than the proportion of highly-educated people in Turkey. The main reason for this might be related to the fact that the participants who have a higher level of education have a higher level of interest in this project.

### 3.6. Techniques to Improve Response Rates

The reasons for very low participation rate in the questionnaire are difficult to identify precisely. However, some of the feedback received may attribute low response rates to the following issues: Firstly, the participants stated that the questionnaire survey took a long time and numerous similar questions were repeated in the study. Secondly, it is recognized that some of the participants did not understand several issues, and although online support is provided to answer questions instantly during the questionnaire period, many participants ended the questionnaire survey because such parts were not clearly understood. Thirdly, the reluctance of the participants about completing the questionnaire was evident. Some of the participants said that they had less than one minute available. For the questionnaire survey, it was apparent that many participants only took a glance at the first and second pages and then ended the survey. Additionally, the social network used gives the user the opportunity of sending a limited number of messages per day. Although the researcher used more than ten different social accounts to send survey invitation links, some of the social accounts had been completely or permanently deactivated. Therefore, it was assumed that the messages forwarded to the potential participants were also deleted. In addition, the questionnaire link was forwarded to the inbox of other messages in different user accounts, so it was noticed that numerous volunteers tried to complete the survey even in the six month period after the

end of the collection process. Lastly, it is probable that most of the volunteers participated in the questionnaire link via their mobile phones and therefore had trouble in answering both the numerical and verbal questions.

Some strategies were used to prevent a low participant rate. The primary method was to inform the participants that this study would be an important practical application for the urban areas of Turkey. Some of the participants received online support when they need to ask anything about the content of survey questions. As a result, this enabled greater participation. Further, it was observed that the participants were more willing to attend the questionnaire study at weekends and in other holiday periods, so the links of questionnaire invitation were also sent to the potential participants at these times.

### 3.7. Research Philosophy

The concept that vision is perceived as a persistent open-ended procedure instead of a fixed presently-established end-state. The research philosophy is explained by diverse current literature and occurrences as presented in a certain issue on ‘Futures Methodologies’ within the Futures (Van der Helm, 2009; Sandercock, 2009; Pinder, 2011). The notion of perceiving the future in social constructivist terms (how the society shapes the future) instead of perceiving it as something capable of being scientifically determined by the extrapolation of present trends, is a key aspect of such literature.

## 3.8. Ethical Considerations

One of the most critical thoughts in social research is the treatment of human subjects. Since human subjects were the source of data in this project, all steps of this research methods were conducted within the ethical guideline set by the University of Birmingham (intranet.birmingham.ac.uk/finance/Financial Services/Research-Support-Group/Research-Ethics/Ethical-ReviewForms.aspx). The duration for the ethics approval was three months, and the adoption of the research was received on 1st September 2014.

All participants were first asked to read and approve an informed consent form and participant information sheet, as mentioned above (see Appendix 1-2). Relevant quotes have been translated from Turkish into English, and therefore, participants were not selected according to their level of English language.

All the names cited in the text are pseudonyms. All subjects were between the ages of 18 to 65. Therefore, they were above the legal age of consent in Turkey, thereby removing the requirement to obtain parental consent.

Each interviewee's approval was recorded and uploaded from the voice tracer onto a laptop and transcribed for subsequent assessments. The textual data were finally analysed according to themes.

## 3.9. Summary

This chapter explained how a mixed-method research methodology was conducted to achieve the research aim and objectives. Each research method employed in this thesis was described in detail. Qualitative and quantitative questionnaire was designed to understand potential and efficient transport strategies towards developing future transport visions; a 3-D software program was used to develop illustrations of the scenario narratives alongside the outcomes of the previous national foresight study and questionnaire findings; two separate interview studies were conducted to explore the reliability of the visions and to the construction of the policy pathway for one desirable future.

The following chapter set out three future transport visions (in which the scenario narratives are characteristically formed before the generic images) for the hypothetical Turkish urban areas.

# CHAPTER FOUR: VISION DEVELOPMENT FOR HYPOTHETICAL TURKISH CITIES

## 4.0. Overview

This chapter aims to set out a number of future transport visions (in which the scenario narratives are characteristically formed before the generic images) for the year 2035 which bring about a step change in the level of sustainable transport systems in hypothetical Turkish urban areas. The future urban locations in this chapter were designed for the next 20 years from the main hypothetical Turkish streets created for the year 2015, as presented in Section 2.6.3. The visions have been generated by a process of the national transport planning review, discussion amongst the members of the İstanbul Metropolitan Urban Design and City Planning Office and extensive discussions with the public through a comprehensive survey. The key changes of visions were adapted for this study from Section 2.6.1.

The three visions describe: an ‘avoid’ future (common application of reducing travel requirements – indeed balanced and slight improvements in bicycle, pedestrian and public transportation systems), a ‘shift’ future where major changes in urban transport systems have led to almost all working transport using non-motorised transport modes, an ‘improve’ future rely to a greater technological and mode share extend on public transport.

## 4.1. Vision Development

The development of sustainable transport systems can be achieved through the Avoid-Shift-Improve (ASI) approach. These approaches are the most broadly adopted ways to deal with the challenges of urban transport (Fulton & Wright, 2013; Bakker *et al.,* 2014).

Figure 4.1. shows the influence of each factor's duration on three different sustainable urban transport futures over the next 5 – 20 years. The arrows show the trend in influence of the key factors on the urban future system. Vertical and diagonal arrows indicate progressively increasing trends of influence at a specific period and horizontal arrows indicate a continuation of the existing level of influence (or restricted growing trends of impact).

The key factors vary in their importance within and among future systems. Several key factors critical to the future of sustainable transport systems became a focus of the early part of the study into future travel scenarios (see Section 2.6.1). These include environment, technology, digital technology, energy, urban structure, infrastructure improvements, safety, mode share, special groups, and policy coordination.

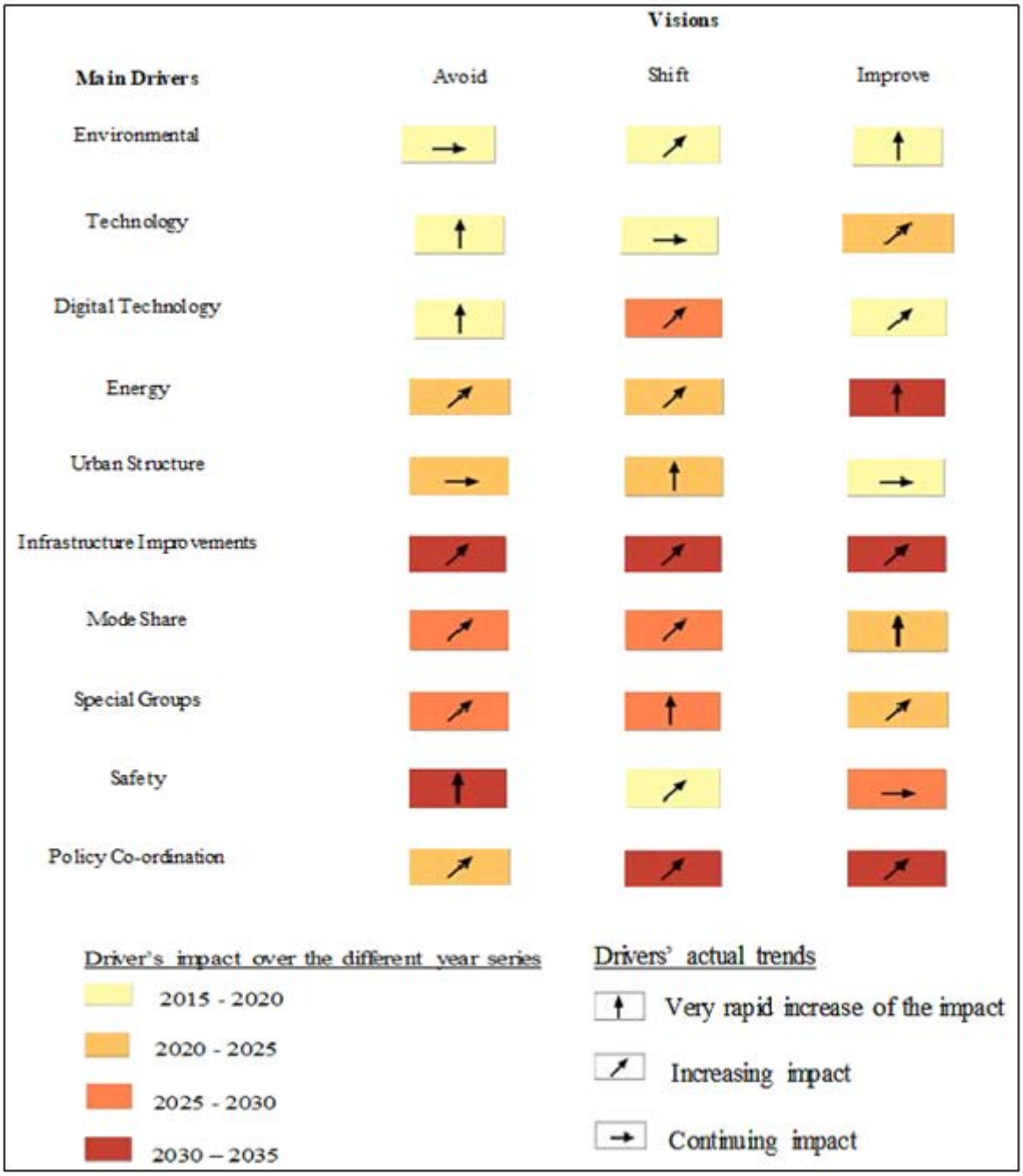


**Figure 4.1.** Factor's impact of sustainable transport futures over the different periods.

### 4.1.1. Avoid Vision

Avoid action seeks to diminish travel demand (the number of trips and the distance of each journey). For example, through telecommuting, online shopping, and improving access to jobs, goods, and services. Smarter land use planning focused on designing dense urban environments has assisted in decreasing the need for motorised trips (Couclelis, 2010).

The most important factors of transport urban environment change in the Avoid Vision are safety (such as decreasing the speed limits for cars and improving official regulations regarding school services), technology (vehicle driving and Intelligent Speed Adaptation systems), and digital technology (working online working platforms and government services).

As seen from Figure 4.1, the number of key indicators showing an improvement fell over both the short (2015 - 2020), medium (2025 - 2030), and long term (2030 - 2035). In the short-term measures, it is because for the initial purpose, the safety of all urban transport users – especially for keeping young non-motorised users safe – is ensured to minimise the risk of accidents among different groups.

Strengthening the infrastructure systems to encourage children and young people to use non-motorised vehicles (and taking other safety measures for all transport users) in the short term clarified the predictions about future transport mode share (and also the tendency of some special groups to use non-motorised vehicles) to be made in the medium term. Despite the significant advancements in technology and digital technology, the adaptation of these developments will provide future urban systems in the long term. Such technological innovations are implemented in the long term because especially coordinated efforts between the business sectors and several automotive industries cannot start early effectively. Such long-term impacts have weak influence on reducing car dependency and cause air pollution problems in urban transport, which are not

efficiently minimised in the long term. The price of energy was relatively stable over the following five years; however, in the short to medium term, the pressures on energy prices appear to increase. The model of urban growth is showing little or no overall change in the medium term.

### 4.1.2. Shift Vision

Shift action seeks to contribute to the efficiency of urban space and reduces fuel consumption by shifting people away from their cars to public transport and non-motorised modes. High-quality public transport systems, safer infrastructure for non-motorised modes, increased fuel taxes, and vehicle registration fees are deterrent measures to provide this action (Bongardt *et al.*, 2010).

Figure 4.1 shows that the variables related to the encouragement of distinct groups towards sustainable transport systems and the generation of more compact urban forms start to become evident in the long term.

Coordinated, efficient, and unilateral efforts between local and central governments for developing sustainable transport systems awaken the interest of different users in these transport systems in the short term. The activities of various non-governmental organisations make the public spheres more attractive, and the implementation of the breakthroughs in preventing parking violations over a short period cause a decrease in car usage. When the use of non-motorised vehicles becomes desirable, numerous digital applications for the users of such transport methods develop significantly, especially in some parts of the city centre. But progress in these technological breakthroughs is limited and in the long term.

Then, it was understood early on that technological developments would apparently not reduce air pollution; therefore, strategies were taken to create

denser areas and pedestrianise several streets to decrease the demand for transport to certain locations in the city. The application of such breakthroughs in the long term enable the easier adaptation for society to sustainable transport systems but cause concerns regarding the core subjects, such as safety and environment, to be relieved difficultly.

### 4.1.3. Improve Vision

Improved action seeks to reduce the adverse effects of private cars by improving the environmental performance of transport systems and management technologies (Steg & Gifford, 2007).

For the Improve Vision, Figure 4.1 portrays that fossil fuels used in transportation exceed specific levels in a short time, and the strategies for decreasing urban transport-based air pollution cannot be easily produced. To resolve such problems rapidly, the local and central governments work on planning the infrastructure systems which support modern and intelligent public transport systems and measures for reducing emissions in traffic.

Although it is not observed that a specific investment in the infrastructure systems raise the safety of distinct users in the urban transport in the medium term, developed public transportation infrastructure systems and newly-modernised green vehicles enable the interest of different income groups in these transport vehicles to maximise in the medium term. In the medium term, it is because the most significant advancements in the environmental subjects are in parallel with the technological progress.

The existence of energy-saving motorised vehicles with less emissions in traffic seems to be the most important catalyst in reducing air pollution, but a dramatic fall in car dependency will contribute to the formation of more suitable areas for the use of non-motorised vehicles in the medium term. The offer of a

more comfortable, more affordable, and more serial transport alternative via public transport systems does not create significant problems in the travel behaviours of society. This is particularly because travellers can easily access many online applications on public buses.

## 4.2. Vision Mode Shares

### 4.2.1. Mode Shares of the Selected Cities

Table 4.1. shows the mode split of walking, cycling, public transport, and private car in the selected Turkish cities.

**Table 4.1.** The mode shares of the main transport systems in the case cities.

| | **Urban transportation mode shares in 2010** | | | |
|---|---|---|---|---|
| **Case cities** | Walking | Cycling | Public Transport | Private Car |
| Ankara | 12 | 1 | 57 | 30 |
| Eskişehir | - | 3 | - | - |
| İstanbul | 22 | 1 | 54 | 23 |
| İzmir | 19 | 3 | 56 | 22 |
| Konya | 27 | 5 | 39 | 29 |

**Source:** Cirit, 2016.

As seen from the table, in Ankara, public transport systems have the highest urban transport mode share (57 percent). The usage rate of non-motorised vehicles corresponds to approximately 12 percent in Ankara, whereas the utilisation rate of automobiles is over 30 percent (Cirit, 2016). There is no clear information available to classify the working journey percentages of different urban transport mode shares in Eskişehir; however, it is estimated that 3 percent of all urban trips in Eskişehir are made by cycling (Ercetin, 2014). Table 4.1. indicates that the share of public transport systems and automobiles of overall working trips in Istanbul approximately correspond to 54 percent and 23 percent, respectively, while the usage rate of non-motorised vehicles (23 percent) is almost the same as that of private cars. Table 4.1 demonstrates that

56 percent and 22 percent of daily journeys in İzmir were taken by using public transport and passenger car, respectively (Cirit, 2016). The table illustrates that nearly 39 percent, 29 percent, and 27 percent of daily journeys were taken through public transport systems, personal vehicles, and on foot, respectively. In Konya, cycling has the highest usage rate (5 percent) in all the sample cities (Cirit, 2016).

### 4.2.2. Mode Shares for the Hypothetical Turkish Urban Area

Table 4.2 shows the current mode split in Turkish urban areas and a proposed mode split for 2035 in three alternative futures. The modal share of walking, cycling, public transport, and private cars in 2015 reflect the Turkish national (urban) average.

All desirable futures were created as part of this research, which considered urban transport systems in which walking and cycling (and public transport) are more major transportation systems than is currently the case in many Turkish urban areas (though there are recently cities such as Antalya, Mersin, İzmir, and Konya where the levels of fundamental sustainable transport systems are particularly high).

**Table 4.2.** Approximate transport mode split into urban areas.

| | **Current situation (2015) *** | **Avoid Vision (2035)** | **Shift Vision (2035)** | **Improve Vision (2035)** |
|---|---|---|---|---|
| Walk | 37 | 40 | 45 | 40 |
| Cycle | 1 | 5 | 10 | 5 |
| Public transport | 33 | 35 | 35 | 50 |
| Car | 29 | 20 | 10 | 5 |

***Source:** Turkish Statistical Institute, 2015.

Table 4.2. summarises that that the Avoid Vision demonstrates a moderate increase in walking and cycling compared to the current base. Public transport usage would also increase, while car use within the urban area would substantially decline. The Shift Vision is a situation where urban land use patterns would slowly but notably change through the provision of supporting infrastructure for non-motorised and public transport modes. The Shift Vision represents a radical shift towards less car travel behaviour. Private car mode share would decrease from 29 percent to 5 percent. Improving the key performance indicators (comfort, convenience, frequency, reliability, and cost) of public transport would provide significant stimulus for the public to change their transportation patterns.

### 4.3. Scenario Narratives

Three visions first describe scenario narrative, which illustrates the comprehensive properties of these future urban transport environments. The first scenario considers future circumstances where a change from the present has been offered through a desire on the public's part to reduce the number of working trips in urban areas; the second scenario has in part been forced upon the public by making a much wider range use non-motorised transport modes; the third represents one major travel method by external constraints – in this case, a fuel crisis – so the extensive and affordable urban public transport systems offer high energy efficiency and vehicle technology for the whole society.

### 4.3.1. Avoid Vision

Environmental Solutions:

Growth in the country's economy is making automobile use more appealing for many people, and environmental problems still constitute a significant problem in urban areas. The central administration is putting various strategies in place to overcome these challenges, step-by-step. Firstly, people are being encouraged to meet their basic needs online to decrease the length of automobile travel in urban areas. Various conveniences and promotion coupons are being provided for online shopping and bill payments. In addition, the car industry is continuing to develop the efficiency of new vehicles, which would operate on petrol or electric engines. Although big improvements are happening in battery technology, electric vehicles are not going to push people to use them very efficiently. Passenger capacities in public transportation are increasing. The central government keeps the work hours of its officials flexible to solve the high exhaust emission rates due to traffic jams. At the same time, the spread of digital technologies will be effective in decreasing congestion, and thus the resultant carbon dioxide emissions. However, this practice would be only successful in a few Turkish urban areas.

Technology:

Technological innovations will be most improved to decrease possible accidents in road transportation and to develop a more environmentally friendly transportation system. The automotive industries would improve their safe vehicle driving systems. Through the use of new security systems integrated into private and public transportation vehicles, the risk of motor vehicles hitting cyclists and pedestrians is being minimised. In addition, Intelligent Speed Adaptation (ISA) would be installed in new vehicles, which uses Global Positioning System (GPS) combined with a digital map of speed limits to ensure that drivers comply with speed limits at all times. Drivers who break the law by

speeding are penalised. Intelligent transportation systems inform drivers of traffic congestions on their route with the estimated waiting time.

Digital Technology:

Digital technology is viewed as a meaningful solution to reduce road accidents. People would do major activities and pay their bills via state online programmes. Some meetings would be carried out from home by work platforms. Follow-up work systems are being monitored and reported more rigorously than before; however, there may be some implications of home working due to the effect it could have on active lifestyles.

Energy:

There would be significant increases in the fuel prices, but technological developments in fuel performance would prevent prices from going above a certain level. High energy prices are not effective in decreasing automobile dependency because the price of public transportation would also go up. However, higher energy prices would encourage certain sections of society to increase their digital technology use, causing new lifestyles to form in the community.

Urban Structure:

There are no significant changes taking place in the physical structure of cities. House prices in the city centre going up would make it harder to form compact cities. High home prices would cause the population increase to move towards outer parts of the city. In the new settlement areas, walking would become more convenient, more comfortable, and safer for the needs of physically challenged people. People would not feel the disadvantages of living on the outer edges of the city due to redesigning some of the road capacity for pedestrians and cyclists, with the priority, particularly in residential areas.

Infrastructure Improvements:

Local traffic is becoming more limited with vehicles only being used for essential communication and transportation needs. Strategies to either provide good street lighting or physically separate cyclists from vehicle traffic would be expected to improve road safety significantly. A new type of low-speed, multi-lane roundabout is planned specifically to increase safety for pedestrians and cyclists. Strengthening road infrastructure with a concern for safety and penalising drivers for not giving priority to pedestrians. The crossing would spur a change of culture, in which car drivers think of child pedestrians and cyclists first. Implementing physical measures, such as roundabouts, speed humps, dedicated lanes for pedestrians and cyclists would also reduce the risks to child cyclists and pedestrians from road traffic crashes and increase the comforts of families with babies.

Mode Share:

Active transportation systems would be more comfortable and safer than in the present situation. Car dependency would decrease by 10 percent. Some improvements would be made regarding the use of public transportation systems, but there would be a little increment from the current user. This vision presents a higher mode share of walking and cycling. Widespread use of digital technology would cause a significant decrease in transport demand.

Special Groups:

The accident risks that children and young users may face would be targeted. Improvements in pedestrian infrastructure systems (lighting systems, improvements at crossroads and turns, increasing the comfort of crossing at multi-turn roads) and decreasing motor vehicle speeding limits would encourage children and women to cycle and walk more. Dedicated walking and

cycling lanes would promote more children and young people to use non-motorised systems to go to school.

Safety:

Traffic and driver education programs become an integral part of the National Curriculum, to create a safe and responsible manner either as a driver, cyclist, or pedestrian. Improvement in regulations regarding school services will ease parents' concerns about their children's safe arrival to schools. There would be more traffic signs visible around schools and shopping malls. Drivers will be prohibited from driving over 30 km/h on the busiest streets in the urban areas. Lowering the speed limits for cars would decrease the risk of accidents in the city centres. Integrated sensors would enhance motor vehicle safety, and ID chips would be attached to new cars, significantly reducing accident risks. The chips monitor whether drivers exceed speed limits or drive in a way that would present a risk of crashing. Drivers that disobey the rules would be punished to discourage them from driving that way again. The scope of driving license exams would be expanded, and it would become harder to pass the exams. It will ensure that driver candidates obey the rules more by informing them of the rights of the non-motorised vehicle drivers. Responsible units would be formed to prevent residents from some younger drivers.

Policy Co-ordination:

The national government would make big investments in road transportation infrastructures in urban areas to be safer and for digital technologies to be activated. These investments would be highly coordinated with the technology sectors. Local administrations would receive funding for making cycling or walking transportation safer and more attractive by implementing calming traffic measures.

### 4.3.2. Shift Vision

Environmental Solutions:

Local administrations would encourage the public to use non-motorised transport modes more due to air pollution problems. With the development of newly pedestrianised locations, a decrease will be expected in the car dependency, and so a decline in air pollution emissions would be expected. The public transportation infrastructure systems will be drastically improved to manage travel demand. The key issues are: reducing forecast fuel use for private vehicles and ensuring higher quality and affordable services in public transport systems.

Technology:

Technological applications will provide significant convenience for pedestrians and cyclists. Weather reports, events, health measurement equipment, public transportation stops and routes information will be easily accessible.

Digital Technology:

The majority of the population claims that digital technology will obliterate social bonding. For this reason, people do not want to change their mode of shopping and so transport decision to work. However, there will be many digital maps for pedestrians and different digital platforms for public use in the city centres.

Energy:

Although the effects of increasing petrol prices on some features of urban form are hard to forecast, growing petrol prices would increase employment densities and so lead to denser urban areas. However, the changes of urban form tend to happen very slowly because increases in urban density are constrained

by local land use strategies. However, people tend to move through some part of the locations closer to workplaces.

Urban Structure:

Compact, mixed-use areas would be developed. Local decisions will be made to prevent security problems due to cars being parked on narrow streets. Multi-storey car parks would be constructed in some areas of the city. Municipalities warn the residents to park their automobiles in a way that would not block pavements and cycle lanes. A high-quality public and cultural formation are beginning in the city centres. The formation of these cultural areas also causes cycling events and campaigns to increase and, therefore, respect for cyclists also growing. High parking prices and cycling awareness events encourage people to utilise cycling modes. Individuals would rent cycles for a nominal fee from mobility hubs situated at transfer stations. Walking and cycling takes place away from the threat of motorised vehicles in many parts of urban streets and offers several advantages over travelling because the kerb fewer lanes make cycling and walking quick and comfortable.

Infrastructure Improvements:

Wider areas are assigned to cyclists and pedestrians. There would be more walking maps and seating places on the extended routes. Hybrid cars would be more widespread than the present situation, but the use of hybrid vehicles are limited by the inadequacy of the infrastructure systems. Pedestrianisation projects and running parks are becoming more common to increase people’s physical activity. Some private and governmental establishments would provide shower facilities for cyclists. Cycling and the integration of cycles with the public transportation system at transfer stations would make cycling transportation more appealing for different income groups.

Mode Share:

Organised cycling cultural events, reduced tax and prices of cycles and their accessories make non-motorised vehicle use more attractive.

Many of the local governments would start to boast a strong walking and cycling culture. They design urban traffic system for the needs of active transport users are now formed. A culture of cycling will have reached in some Turkish cities to the extent that 10% of all daily working journeys will be by cycle in 2020.

Special Groups:

New settlement areas close to the city centre decrease car dependency and make a much wider range to use non-motorised transport modes. The government would offer incentives for the purchase of electric bicycles. The tax incentives would mainly promote adults to go to city centres by cycling more. Public buses are becoming cheaper and more comfortable than the current situation would enable different income groups to access town centres with more ease.

Safety:

The pedestrianisation of some locations in town centres offers big advantages for the safe transport mode of cyclists and pedestrians. More dense urban areas would require automobiles to go slower, which in return helps to significantly decrease possible accident risks in urban areas.

Policy Co-ordination:

Local administrations are encouraging cities to become more compact and multi-purpose. The prevention of new settlement areas at the edges of the city would be approached in a planned manner. The government will finance local administrations on public transportation systems to become developed pedestrianisation projects. Local officials would develop more efficient plans

for sustainable transportation systems; however, the coordination between local and national government seems weak.

### 4.3.3. Improve Vision

Environmental Solutions:

Local administrations are trying to find more efficient, unilateral solutions for traffic jams and air pollution caused by cars. Car drivers are encouraged to use their institutions' service buses or public transportation for their commutes. Renewable fuels' efficiency and energy prices are going up simultaneously. Private cars would become smaller, and they would use fuel more efficiently than the present situation. Extra charges would be applied to limit vehicle use during rush hours.

Technology:

A significant proportion of technological development consists of innovations regarding the improvement of fuel performance and economy. The new vehicles would operate on renewable energy that produces fewer emissions, or on electrical power. Hybrid buses that would also operate on electricity function with lower energy costs. Technological developments will be limited, but city centres would be reachable through small cars that operate on renewable energy systems and would be integrated with cycles. Solar panels in some bus stops would store energy, which would be used later to illuminate its surroundings. Due to energy prices reaching high numbers, automobile manufacturers are working on the development of alternative fuels to protect their economies. New vehicles are now operating on biodiesel and hydrogen energies. Cars would cost a quarter of the price of current cars. Cyclists would use tricycles to carry their heavier loads.

Digital Technology:

Free-of-charge Wi-Fi systems spearhead public transportation systems, which are becoming a more practical transportation mode. Thanks to many applications on board buses (Internet, e-mail, radio, television, music, event pages) travel times would not be perceived as a waste of time. People would prefer to access shopkeepers and other people by face-to-face.

Energy:

Global unrest will cause frequent fluctuations in the energy market. With the fast growth of Asian and Latin countries, procuring energy will become harder. High energy demands would impose enormous hardships on private and public agencies in Turkey. The scarcity of energy resources will cause the price of fossil fuels to go up. Therefore, the government needs to overcome the difficulty of procuring energy by investing in public transportation systems and by increasing awareness about sustainable energy trends.

Urban Structure:

For the urban areas to appear more environmentalist, the number of green fields is being increased. Due to a significant decrease in car dependency, traffic jams would be significantly rarer than the current state. Public transportation systems would become faster, more comfortable and will ensure that transportation to the city centre is less stressful. The development of public transport would make new social and business settlement formation on the outer parts of the city more appealing. Residential areas will be available close to peoples' homes, and land use changes will be very similar to the current pattern. Local administrations are reserving areas like parks or forest land to prevent the rapid population growth from quickly spreading in the outer parts of the city. There are more bicycle tracks for mainly recreational purposes in outer, natural areas of the city. The accessibility and comfort of public transportation systems

will be drastically improved, and public transportation systems would be integrated with cycles as well. The number of public transportation terminals would be increased in the outer parts of the city and so the accessibility of public transportation from people who live in these parts of the city.

Infrastructure Improvements:

With the public transportation systems, accessing city centres faster and cheaper, automobile dependency would significantly decrease. The government would collect high taxes from drivers to make more infrastructure investments in public transportation systems. People would be provided with better public transport journeys via integrated, easy-to-use ticketing systems. The increase in the number of rounds in public transport will provide significant advantages for the comfort of passengers. People will have access to information regarding which bus is coming at what time, and which stops it is going to make. More public transport terminals would be located in essential parts of rural areas. A significant decrease in traffic jams will play a major role in cities becoming more aesthetically pleasing. Drivers will be encouraged to use vehicle-sharing systems that operate on alternative energy. Many people on the edge of the city centre will be expected to use car-sharing systems, would bring social and environmental benefits to society as it leads to the reduction of car ownership and parking space demand.

Mode Share:

Car dependency would show the sharpest decline and non-motorised transport mode would increase by nearly 10 percent in this vision. Local authorities will make massive investments in improving the quality and frequency of public transport systems by 20 percent in 2025. Most car users will be encouraged to use public transportation systems. Offering incentives to encourage individuals' use of existing public transport options will decrease the individual cost for such transport, and so would change the travel behaviour of

many people in these systems. Public transport systems, school buses, and institutions' service buses will cover 50 percent of the traffic in urban areas.

Special Groups:

Active transport user profiles will not differ much from the current situation. However, cheaper, more affordable housing now tends to be situated in some part of the residential areas with strong transport connectivity and strong service provision, so it becomes increasingly comfortable for those on lower incomes and without an automobile to access jobs.

Safety:

There would be a significant decrease in the number of fatal accidents as drivers are encouraged to use public transportation services or non-motorised transport systems. Local authorities would also undertake a range of off-street trials of innovative cycling improvements. Protected cycling lanes will be implemented to improve everyone's safety; for example, route marking and signposting will become more familiar and dedicated cycling lanes will pass behind bus stops, enabling cyclists to continue past a stationary bus, away from the traffic lane. Public transport users will be trained for interaction with cyclists as part of their driver training when applying for their driving licence.

Policy Co-ordination:

The central government and business sectors would work in coordination, especially towards supporting more environmentally friendly transportation systems. The market agencies would make substantial investments for renewable and electric vehicles to become more widespread. The local governments are beginning to work towards strengthening the infrastructure of these systems in their cities. The central and local administrations will implicate a series of important strategies regarding public transportation systems and complicate car purchase.

## 4.4. Visualisations

### 4.4.1. Avoid Vision

In Figure 4.2, the car drivers are forced to travel at lower speeds through speed control systems to reduce particular worries of the families with children about road safety in the Avoid Vision. So, portable speed bumps and various warning signs are placed where the risk to active travel users is higher. A new speed enforcement technique is applied to calculate the average speed of vehicles based on the time interval between two different points along the road. Height difference practices for car drivers are used before the passages with pedestrian priority, and the drivers are made aware of giving priority to pedestrians. Cyclists can cross the road more conveniently by using the road parallel to the arrangements with pedestrian priority (see Figure 4.2). Additionally, to reduce accident risks lighting systems enable the users of non-motorised vehicles to notice each other more easily during their commute in the evening.

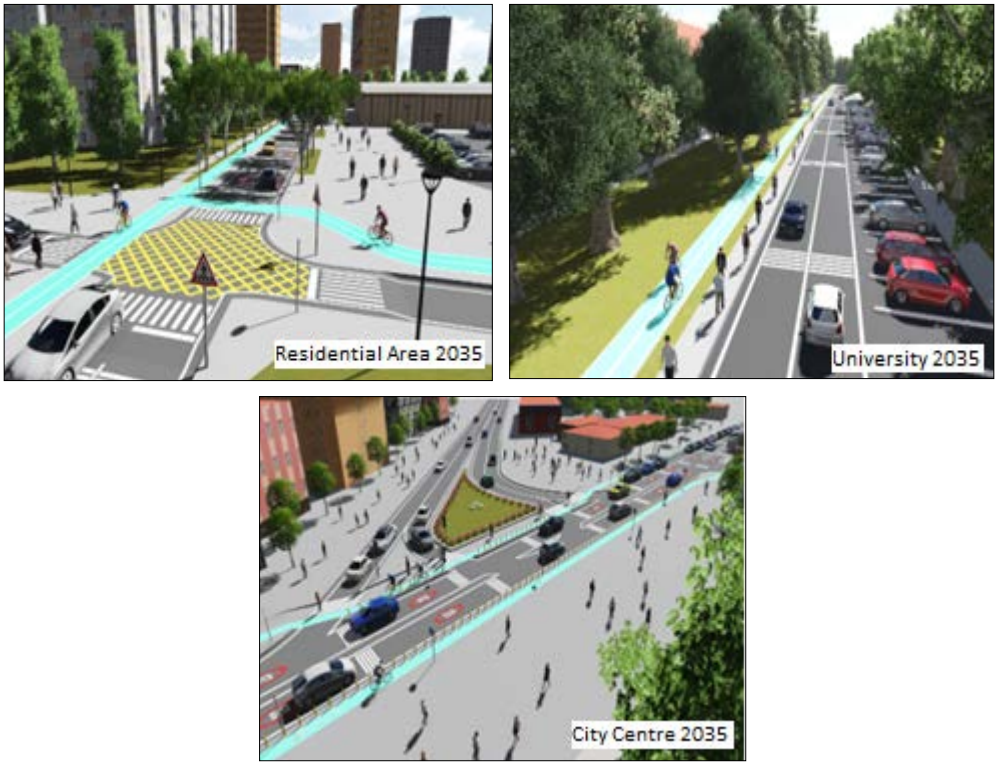


**Figure 4.2.** The hypothetical Turkish locations as they may look in the Avoid Vision.

The Avoid Vision develops a regular car parking system and makes the road lanes more clear, mainly on the campus of the university (see Figure 4.2). Moreover, the newly-arranged parking lanes prevent the pavement on the right side of the road to be occupied by cars, enabling pedestrians to walk more comfortably on the pavement. Speed bumps are often used to ensure slower movement of the cars in the university campus. The fact that the cycling road is at the far-left of the pedestrian road allows young cyclists to experience fewer conflicts with pedestrians and cars. Thus, it offers more direct and faster travel.

Figure 4.2 illustrates that the Avoid Vision protects cycle users and ensures their safe transport by separating their road from the motor road using iron barriers. Furthermore, physical speed bumps and speed reduction practices are placed in the street to enable the motorised vehicles to move at a slower speed. On the left side of the road, infrastructure systems which ease the crossover of the pedestrians are arranged. As the roads for the cyclists and pedestrians are expanded, the motor road is decreased to a single lane.

### 4.4.2. Shift Vision

Figure 4.3 shows the same three locations as in Figures 4.2 and how they may look in 2035 under the Shift Vision. In this vision, the street in the settlement is closed completely considering the travel needs of motorised vehicles users . There are also numerous social facilities, such as cafes and art galleries, which enable people to socialise.

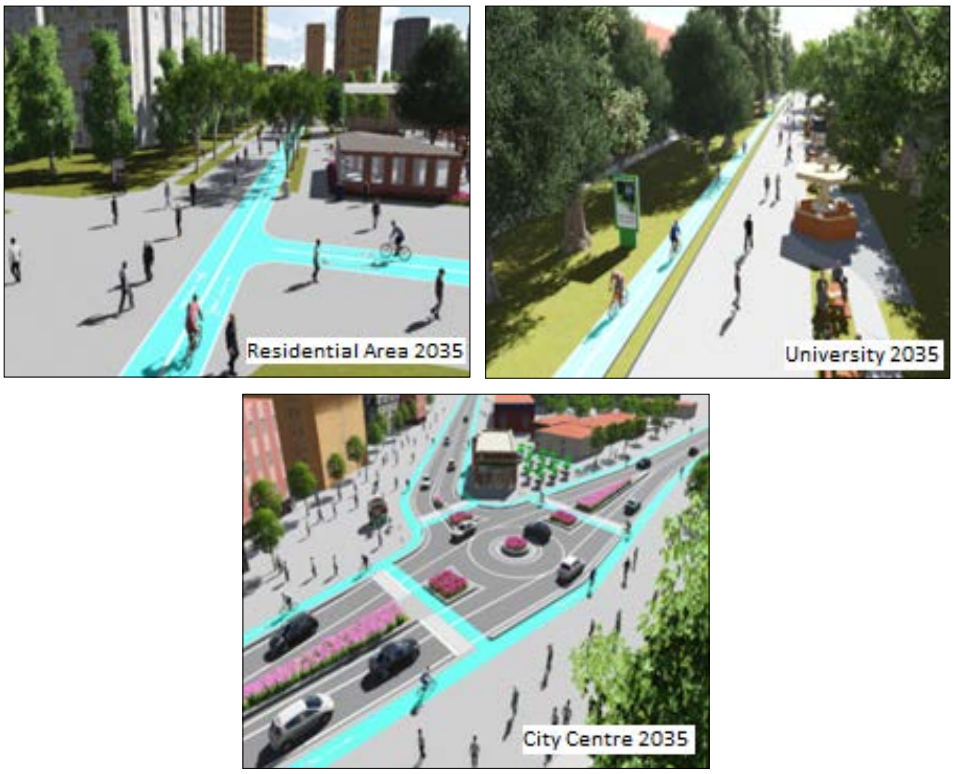


**Figure 4.3.** The hypothetical Turkish locations as they may look in the Shift Vision.

The Shift Vision presents a broader and more socialised location for the users of non-motorised vehicles. It also allows students and personnel to spend time in these areas and socialise. Moreover, many public informaton spots are placed at the university to raise awareness of environmentalist transport issues (see Figure 4.3). A separate and independent road at the far-end of the broad pedestrian area was designed for the cyclists. The objective of the Shift Vision is to increase the accessibility of cyclists, pedestrians, and even the users of motorised vehicles to the opposite side of the road at junction points, and to offer more social facilities in the city centre.

### 4.4.3. Improve Vision

Figure 4.4 provides a visual perspective on how parts of typical generic urban transport systems might look (and operate) in the Improve Vision. In this vision, systems with pedestrian priority are designed and roads for motorised

vehicles are restricted. Thus, a more efficient transport system for public transport is planned and the urban space for private cars are narrowed considerably. The Improve Vision shows a three-lane road in the university campus, which is allocated only to public transport vehicles (see Figure 4.4). A broad area is arranged for pedestrians, and its design allows cyclists and pedestrians to act from two different sides of the road. As in the settlements and at the university, the Improve Vision keeps the tradition of single-lane applications for public transport vehicles and cycles in the city centre as well. In this vision, in which car use is reduced to 5 percent, an additional road lane separate from the public transport lanes prevents potential conflicts among road users, such as the users of service vehicles, is suggested in several central streets (such as those close to the hospital).

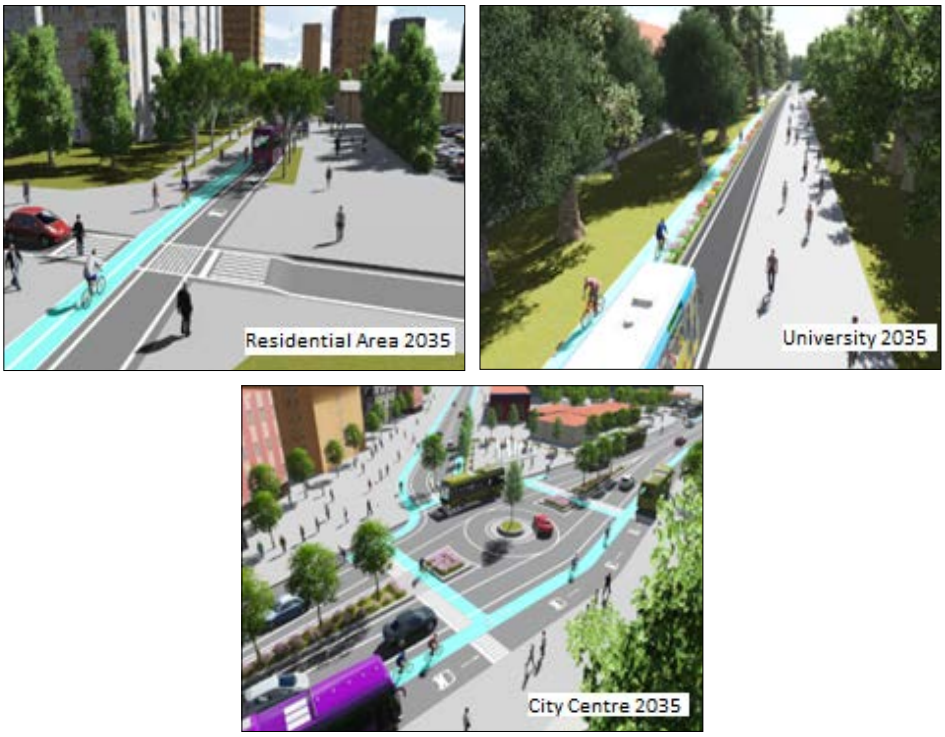


**Figure 4.4.** The hypothetical Turkish locations as they may look in the Improve Vision.

## 4.5. Summary

This chapter outlines three alternative urban transportation scenarios, in which all the sustainable transport modes are significantly improved compared to the current case. The future visions were firstly demonstrated in the form of a metaphor which explains the features of the desirable urban transport places and secondly through a series of generic pictures of how streets of the hypothetical Turkish urban areas might look (and operate) in 2035.

The Avoid Vision emphasises technological development and infrastructure improvements for increasing the security of non-motorised users; the Shift Vision emphasises the encouragement of different transportation groups regarding the use of non-motorised transport systems and a more compact urban structure in future urban environments, and the Improve Vision highlights better public transport systems and new vehicles that will operate on sustainable energy.

The next chapters ask the views and desires of members of the public in Turkish cities for future transport visions and show how the outcomes of the Megacities on the Move project and of the survey results are modified for adapting theses initial visions.

# CHAPTER FIVE: PUBLIC DESIRES FOR FUTURE VISIONS

## 5.0. Overview

This chapter aims to demonstrate how survey outcomes for first three research objectives and the previous Turkish foresight project (see Section 2.5) have been modified in the formation of the vision development work, as presented in Chapter 4. The socio-economic characteristics of the participants and public views about future visions are first revealed. Secondly, the chapter explores what sustainable lifestyles and behaviours may occur by changing the travel behaviour of the public into more desirable futures and presents some lists (and its discussions) that show essential practices for providing the potential lifestyle and behavioural changes in the vision development stage. Then, potential transport measures, which may lead to increase the diversity of active transport users are tested and the statistical findings are discussed in conclusion.

Tables in the final part of the chapter show how the survey outcomes and the national literature are comprehensively used in the development of research visions. The full outcomes of the public views and statistical analysis are listed in Appendix 4 and 5, respectively, and the discussion of the statistical findings are explained in conclusion.

## 5.1. Socio-economic Characteristics of the Participants

The social-economic features of the participants are demonstrated in Table 5.1. Females accounted for 28.9% of participants, and males 71.1%. The breakdown of age groups was as follows: 68% of the participants were 18-35 years old. Middle-aged people between 36-55 comprise approximately 27.6%, and the remaining 3.7% were 55+. Less than a third of those (32%) indicated that they earn less than €300 income per month, while 44% of the participants earn between €300 and €900, monthly. The remaining 24% earn over €1,200 per month.

**Table 5.1.** Socio-economic characteristics of the participants.

| Item | Subgroups | Number of participants | Percentage | Std. deviation |
|---|---|---|---|---|
| **Gender** | | 1135 | 100.0 | .454 |
| | Male | 807 | 71.1 | |
| | Female | 328 | 28.9 | |
| **Age (years)** | | 1135 | 100.0 | 1.115 |
| | 18-25 | 390 | 34.4 | |
| | 26-35 | 390 | 34.4 | |
| | 36-45 | 194 | 17.1 | |
| | 46-55 | 119 | 10.5 | |
| | 56-65 | 42 | 3.7 | |
| | | | | |
| **Education** | | 1135 | 100.0 | .943 |
| | Primary | 25 | 2.2 | |
| | Secondary | 32 | 2.8 | |
| | High school | 183 | 16.1 | |
| | Bachelor's degree | 639 | 56.3 | |
| | Master's degree | 184 | 16.2 | |
| | Doctoral degree | 72 | 6.3 | |
| **Monthly income** | | 1135 | 100.0 | 1.584 |
| | No Income | 203 | 17.9 | |
| | Less than €300 | 160 | 14.1 | |
| | €300 – €600 | 240 | 21.1 | |
| | €600 – €900 | 260 | 22.9 | |
| | €900 – €1,200 | 143 | 12.6 | |
| | Over €1,200 | 129 | 11.4 | |

## 5.2. Imbalance in the Profile of Non-Motorised Mode Users

A significant difference was found between gender and cycling (chi-square= 170.080, df=1, p= .0001), and between gender and walking (chi-square= 13.785, df=1, p≤= .0001). It was observed that 48.3% of male participants were cyclists, and 23.7% of males were pedestrians, while 30.5% of female participants were cyclists, and 30.5% of them were pedestrians.

A significant difference was also found between age and cycling (chi-square=257.534, df=1, p≤=.0001), and between age and walking (chi-square=82.006, df=1, p≤=.0001). 36% of cyclists were in the age range of 18-25 years, 37% were in the 26-35 range, and 16% were in the 36-45 range. The remaining 11% were 45+, while 35% of pedestrians were in the age range of 18-25 years, 28% were in the 26-35 range, 17% were in the 36-45 range, and the remaining 20% of all pedestrians were 45+.

## 5.3. Background to Case Cities

Figure 5.1 indicates the proportions of people are walking and cycling to/from work on a given number of days in a week. It is observed that cycling usage rates for two days per week vary between 26 percent and 33 percent and these rates are higher than walking for the same frequency in all these cities. The maximum cycling usage rates in Eskişehir and İstanbul are 3 and 4 days, respectively; whereas, in Konya, it is over four days per week. The cycle utilisation rate decreases only in Ankara. On the other hand, significant differences in cycling usage frequency between the urban areas are not observed ($p < 0.05$ for all days).

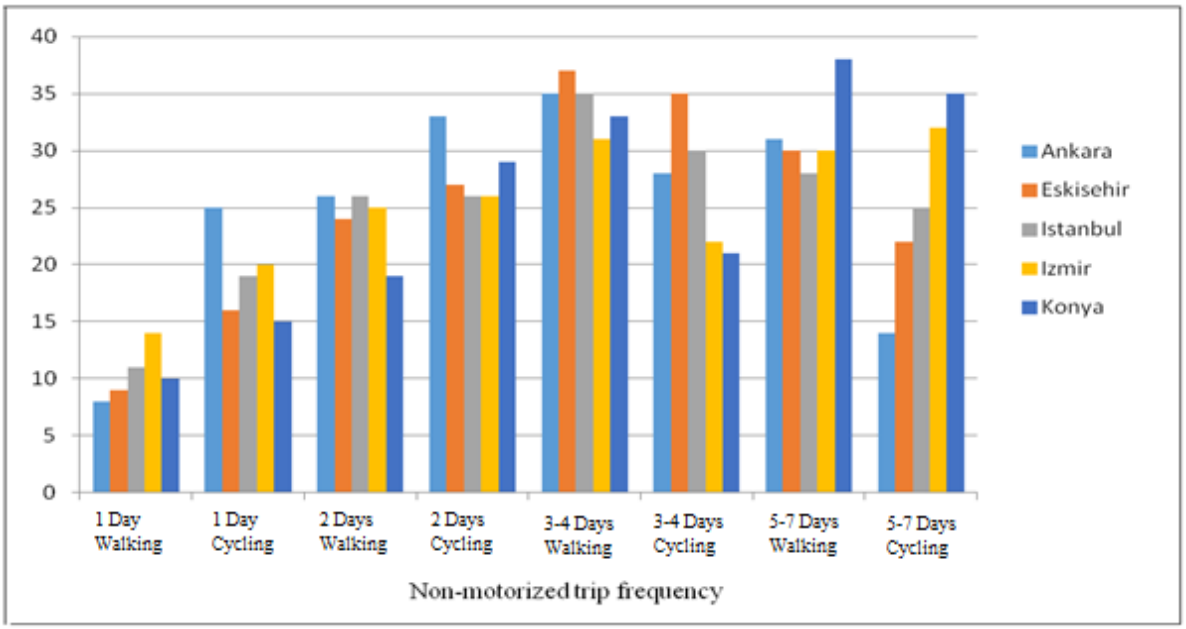


**Figure 5.1.** The proportions of people are walking and cycling to work in a week.

The frequent usage of the pedestrian mode mostly changes between two and four days. According to the figure, the frequencies of pedestrian mode usage in the example cities are similar; however, the usage over four days is higher in Konya than in other cities. However, there are no significant differences in the frequency of pedestrian mode usage between the urban areas ($p < 0.05$ for all days).

Of all journeys, 28-37% are travelled on foot at least two days per week, with the lowest percentage in İzmir and the lowest in Konya. Survey data from five Turkish cities show that 31-37% of all walking trips are made for three to four days, the highest figure being for Eskişehir and the lowest is İzmir. Trips on foot take place most frequently in Konya with 35%, whereas walking trips are less in Ankara with 13% for more than five-day trips. Survey data from five Turkish cities show that 15-35% of cycling trips are made at least five days per week, the highest figure being for Konya and the lowest is Ankara. For less than three days on a week, the share of cycling usage varies from 41% (Eskişehir) to 51% (Ankara).

Figure 5.2 emphasizes that walking is a mode of travelling used mostly for two purposes: education and commuting. On the other hand, there is not too much to carry, sport and leisure trips where the walking is the chief purpose. About 50-75% of all participants walked is for these two purposes, with Eskişehir at the top and Ankara at the bottom.

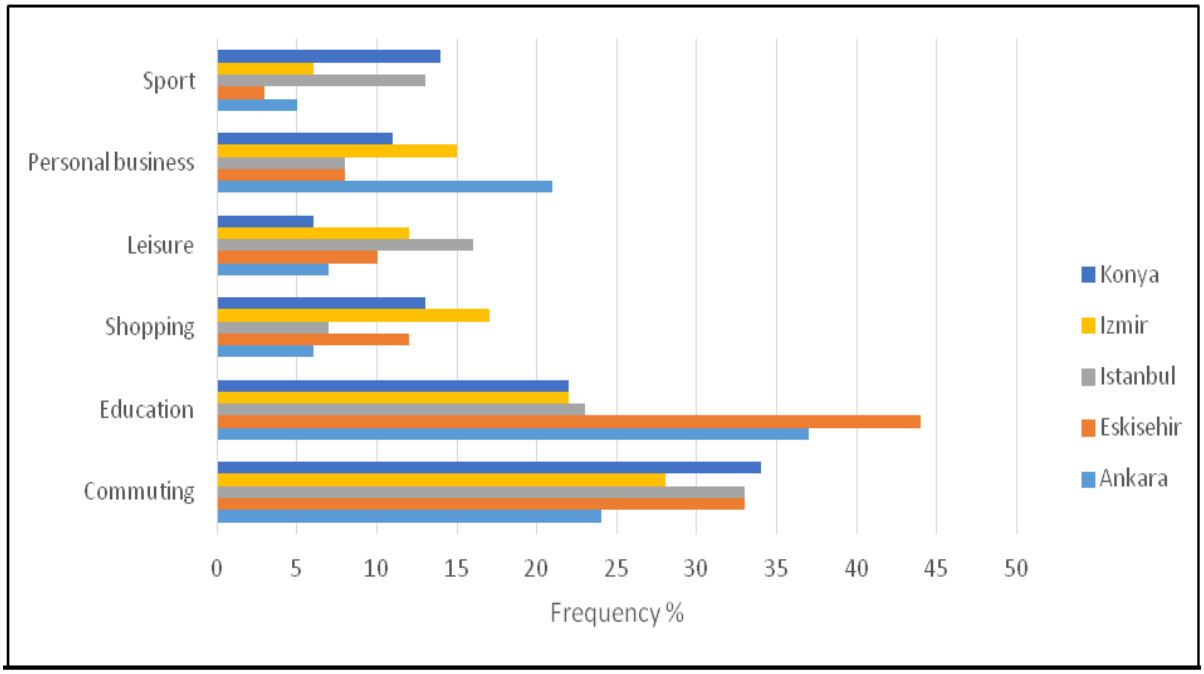


**Figure 5.2.** The trip purpose of pedestrians in Turkey.

One sample t-test was used to understand whether there is a significant relationship between the frequency of pedestrian mode usage in urban areas and travel purposes or not. This test indicates that there is no statistical relationship between the incidence of pedestrian mode usage in five different cities, apart from sports purposes ($p > 0.22$).

Figure 5.3 summarized that the bicycle is less used for trips to shops, mostly for leisure and sports purposes where bicycle-tours possibly are an aim in itself. More people cycled for leisure trips in Ankara (36%) and for sports trips in İstanbul (38%) than in any other selected Turkish cities. However,

cycling is also a common way for travelling to work (and school). 65 % of participants lived in Konya by bicycle is travelled on home-work/school journeys. Eskişehir and Ankara followed, with 48% and 45%, respectively on home-work walking trips, whereas is the lowest in İstanbul with 13%.

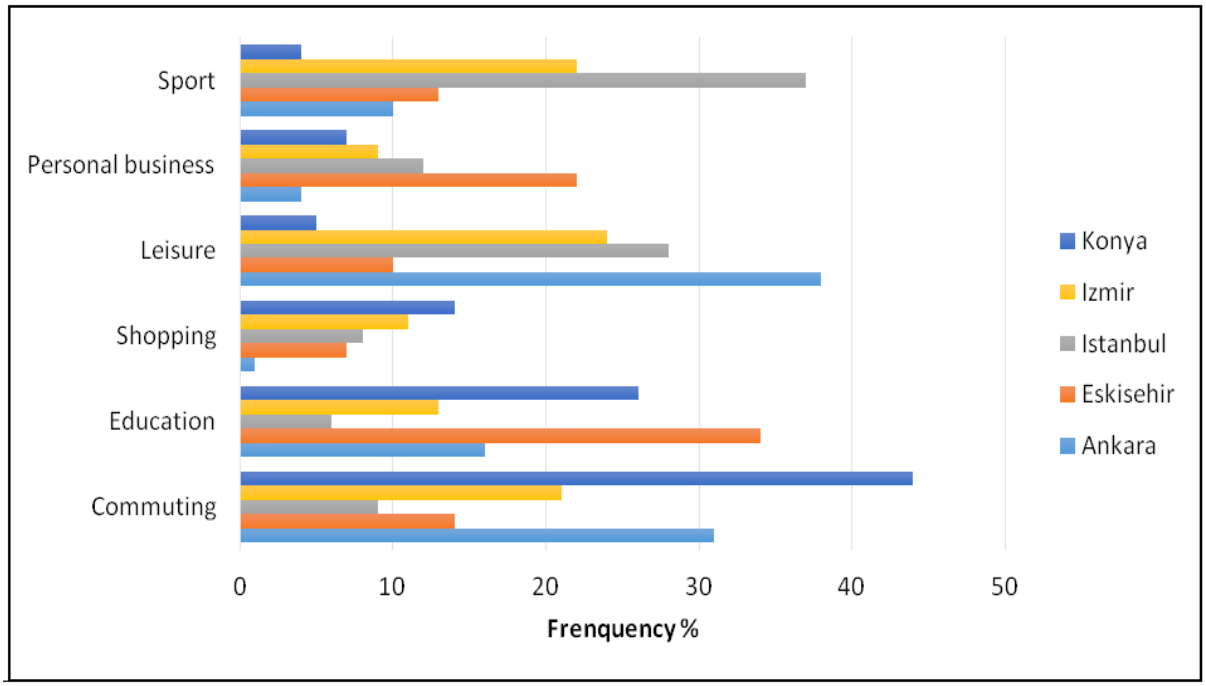


**Figure 5.3.** The trip purpose of cyclists in the selected Turkish cities.

One sample t-test reveals that there are statistical differences between the frequency and purpose of cycling usage. A significant difference exists between the frequency of cycling usage for business or education purposes across various cities ($p < 0.05$). However, there is no statistically significant difference between frequency of cycling usage for other purposes in different cities ($p = 0.22$, shopping; $p = 0.06$, leisure; $p = 0.14$, personal business; $p = 0.22$, sport).

### 5.3.1. Ankara

Box 5.1 summarises the basic problems about sustainable transport systems that the participants in Ankara observed. The participants stated that different public transport systems should be integrated into each other more and only modern public transport systems should be in traffic. One participant advocated that if the bicycle is integrated into affordable public transport systems, two different transport modes may become more widespread. It was understood that the automobile drivers in Ankara do not show due diligence to both other automobile drivers and to people who want to use pedestrian crossings.

| |
|---|
| The right of way should be given to pedestrians. Motor vehicles should wait when necessary. Integrated public transport systems should be established (female, 18 – 25, pedestrian). |
| Complete integration of urban cycling usage to public transport should be ensured and a considerable increase in the usage number through reducing the prices of public transport should be aimed (male, 18 – 25, non-cyclist). |
| Unnecessary minibus and dolmus services should be removed and frequency of bus services should be raised (female, 26 – 35, non-cyclist). |
| Insufficient public transport capacities that cannot meet the population density and current demand and the negativities in the physical conditions of vehicles such as bus and minibus with regard to environment and safety cause the individuals to prefer private cars (male, 36 – 45, pedestrian). |
| Primarily, respect to pedestrians should be increased. In European countries, whole traffic stops for the pedestrians who want to cross a road whereas there are those in our country who drive into the pedestrians who try to cross the pedestrian crossing. If I attempt to stop for a pedestrian who tries to pass the pedestrian crossing, the vehicle behind will hit my car (male, 46 – 55, cyclist). |

**Box 5.1.** Public views about future visions in Ankara.

### 5.3.2. Eskişehir

Box 5.2 shows that the participants' most remarkable comments were about tramway routes. The participants said that the special lines allocated for the tramway systems are frequently violated by vehicle users and this situation leads to chaos in those areas. Moreover, several recommendations were given by the participants to solve the traffic chaos caused by the drivers who violate the tramway road. These recommendations were to prevent the tramway road from being occupied by automobiles by building barriers (such as wire fences) at the side of the road and to prohibit automobile access into areas with tramway systems by making the tramway systems more active in urban transport as a whole. Additionally, several arrangements for traffic signalling should be made for the benefit of pedestrians.

Tramway road is violated implausibly in Eskişehir. Availability of the cars causes the traffic jam to form and life safety of the cyclists to be endangered (female, 36 – 45, cyclist).

Tramway roads should be separated from normal roads (female, 26 – 35, non-cyclist).

Everyone is aware of a serious problem that the drivers have a common attitude to violate the pedestrian crossings in a way that they endanger the lives of pedestrians and cyclists (male, 56 – 65, pedestrian).

I evidenced that no driver gives way to the pedestrians with children or old pedestrians although they see that the tramway is coming. Numerous such negative acts are performed against the pedestrians and cyclists... Unfortunately, the insufficient legal regulations, sanctions and criminal actions are apparent (male, 46 – 55, non-cyclist).

Traffic lights should allow the pedestrians to cross the road within a longer time. Duration of the traffic lights for pedestrians is very short at broad streets. Therefore an old person may be stuck in the middle of the street (male, 18 – 25, non-cyclist).

In my opinion, the most important subject is to cover the sides of tramway road with a wire fence. Similar to the Eskişehir municipality, cycleways and pedestrian ways should be built and the bikers who use the routes of city centre should not be fined (female, 26 – 35, pedestrian).

I would extend the cycleways and pedestrian ways and spread the tramway-like light rail vehicles as much as I can, so I would not allow the other vehicles to access the inner city (male, 36 – 45, cyclist).

**Box 5.2.** Public views about future visions in Eskişehir.

### 5.3.3. İzmir

Box 5.3 describes the improvements that the participants in İzmir desire for their future transport systems. The most salient opinion is that all kinds of activities and organisations that support sustainable transport systems should be diversified and made more frequent. Furthermore, many participants specified that the placement of mechanisms at the districts with numerous slopes in order to ease their use, may facilitate bicycle transportation.

Informative events, meetings, training and seminars about the dissemination of cycling and pedestrian transportation should be held. I would tell the economic, social and health benefits of such activities in terms of the individual, region and country and plan incentives for the people to conduct studies regarding this subject (male, 46 – 55, pedestrian).

Plates such as "Walking 5000 meters/day is beneficial to heart health" may encourage the people to use sustainable transport systems (female, 18 – 25, cyclist).

I would review the whole education process from kindergarten to university so as to raise the observance of traffic rules (female, 26 – 35, pedestrian).

I would organize collective traffic events every month in İzmir if necessary and apply the discount to cyclists (male, 36-45, cyclist).

I used this term as high-technology foot stairs for the cyclists who will go up the slope, because I do not know the term correctly (male, 26 – 35, non-cyclist).

Placement of the mechanisms that will ease going up the slopes, in a city such as İzmir which has steep slopes will affect the pedestrian traffic significantly (female, 36 – 45, cyclist).

I would like to seriously organize the relevant campaigns to prompt the citizens to use a cycle (female, 26 – 35, pedestrian).

I would install devices on the cycle routes which have many slopes and would be generally used by the employees, for the cycles to make them go up the slopes (male, 18 – 25, pedestrian).

At sloped districts, simple precautions can be taken for the cyclists and pedestrians, so that they can go up the slopes easily. Furthermore, safe cycleways that are separated from the vehicles and pedestrian area enable the bicycle to be preferred in transportation. Control, maintenance and marking of these roads are important as well. All kinds of measures should be taken and inspirer advertisements, brochures and events should be organized to make the bicycle usage attractive in urban transport (female, 36 – 45, non-cyclist).

**Box 5.3.** Public views about future visions in İzmir.

### 5.3.4. İstanbul

Similar to Boxes 5.1-5.3, Box 5.4 indicates the views and recommendations of the participants about the sustainable transport visions in their city. Participants in İstanbul mentioned that areas closed to traffic should be formed within the city. A participant said that the city centre should be closed to all motor vehicles, except for ambulances and similar emergency vehicles. Another participant stated that vehicle access to certain points of the city centre should be restricted e.g., their passage should be allowed only at defined hours or with a fee. Moreover, the participants underlined the “megacity" feature of İstanbul and emphasised the importance of improving whole public transport systems, including the marine transit and rail systems. Another participant specified that İstanbul’s transport vision cannot be achieved by improving the bicycle and public transport systems and instead, the medium-sized Turkish cities should be made more attractive by using national policies.

Pedestrian transport to the city centre is impossible for distant neighbourhoods. More areas closed to traffic can be generated in the city centre (male, 26 – 35, cyclist).

City centre would be closed to access for all motor vehicles, except ambulances and similar emergency vehicles (male, 36 – 45, cyclist).

If I would have a voice about the arrangement of urban transport, I would try to close the city centre and the settlements directly connected to the city centre to motor vehicles and to create a transport system based on pedestrians and bicycles (male, 18 – 25, pedestrian).

I might ban the access of private cars to the city centre. I would take the practice applied in the capital of Estonia as a model (male, 26 – 35, pedestrian).

In İstanbul, the most crowded metropolis of Turkey, it is very difficult to apply simple solutions due to its dense population piling on only some part of the total area, the adjacent structuring. Instead of raising the attraction of big cities, their budget should be decreased gradually and the decisions that support the private investments in the other cities with various advantages should be taken (female, 26 – 35, non-cyclist).

Further use of pedestrian and cycling transport and comfortable public transport for reducing the use of private vehicles (male, 18 – 25, pedestrian).

Banning or restricting the vehicle access to a certain point in city centres - their passage should be allowed only at definite hours or with a fee (female, 46 – 55, cyclist).

Metro networks. İstanbul is one of the world's most crowded cities. Obviously, its metro network should be extended remarkably (female, 18 – 25, pedestrian).

An end to megacities. Priority to villages and towns. Fair (non-economic) sanctions and restrictions on the owners of high carbon footprint (male, 18 – 25, cyclist).

Making the city centres free from automobiles. An automobile-centred transport system is the most important hinder for the pedestrians and cyclists (male, 36 – 45, non-cyclist).

I would solve the problem only by designing cities with the compact settlement and creating an entirely new city that has no problem (male, 26 – 35, pedestrian).

Choosing the transport modes which will absolutely promote public transport, and designing the cities accordingly (female, 36 – 45, pedestrian).

Developing marine transportation. Making metro line suitable for the whole city centre and facilitating the transportation from stations to settlements. Using camera system within the pedestrian crossings and ensuring obeying of the pedestrians to rules by increasing the punitive sanctions (female, 18 – 25, cyclist).

Extending the pavements, reducing the vehicle traffic to one lane and putting a speed limit in traffic (female, 26 – 35, non-cyclist).

Restricting the vehicles in traffic. Opening the Bosporus Bridge to cycles (female, 18 – 25, cyclist).

**Box 5.4.** Public views about future visions in İstanbul.

### 5.3.5. Konya

Box 5.5 shows that the clearest urban transportation problem in Konya is the lack of an infrastructure system that promotes the use of non-motorised vehicles, which may make such systems more attractive. Konya participants think that infrastructure systems should be improved and that numerous areas should be greenlit so as to make use of non-motorised vehicles more attractive. It was understood that people can be further motivated towards using non-motorised vehicles if larger green areas replace locations such as petrol stations and commercial entities, which are included in the daily routes of Konya residents.

In my opinion, human factor should be considered in urban planning. Otherwise, when you try to walk 3-5 km, you absolutely pass a petrol station or non-healthy commercial entity anywhere in Konya as a pedestrian. Those who cannot walk in city centre walk for 15-20 km in a trekking. In İzmir, approximately 8000 people perform trekking activities on every Sunday (on the single non-business day). I think that a greener city may raise the pedestrian traffic (male, 46 – 55, cyclist).

Traffic training. No need to construct a separate cycle way. In case of adequate pavements and vehicle roads and sufficient education, it becomes impossible to experience problems in traffic (female, 26 – 35, pedestrian).

Cycling ways should be arranged in a way that motor vehicles will not violate these roads in the streets opened to traffic. Except for the improvement of the physical regulations for pedestrians, persuader legal sanctions that can be applied and monitored easily should be imposed. Of course, all above would be the measures and protective precautions in a society who regard the pedestrians and cyclists as unnecessary, do not consider them, and consist of mostly the unconscious, rude, careless and uncivilized drivers. On the other hand, education, awareness and awakening come first (male, 36 – 45, pedestrian).

Konya is a suitable city for cyclists, but the city centre is open to more developments for them. Many developments are observed in this respect. Applications such as yellow cycling and card-entry cycle are implemented now. Critical points are deprived of overpass structures (male, 46 – 55, cyclist).

The pavement ways are very narrow and the cycle ways nested to pedestrian ways is a very bothersome problem (female, 36 – 45, pedestrian).

My priority is to bring the license to cyclists and to create more accessible, smooth and broad routes for the pedestrians (male, 26 – 35, non-cyclist).

**Box 5.5.** Public views about future visions in Konya.

## 5.4. Public Desire for Future Visions

This part explains the most recommended measures if the participants were given authority to create future sustainable transport visions for their urban areas in ways that they pleased (survey questions 26 and 27). The format of these two questions was designed to allow the participants to express their opinions freely. Some example quotations from the participants that support the recommended strategies were also presented.

Figure 5.4 shows the most highlighted suggestions from 208 different comments towards creating sustainable transport visions in Turkey. Appendix 4 shows how many times strategies were recommended by the participants.

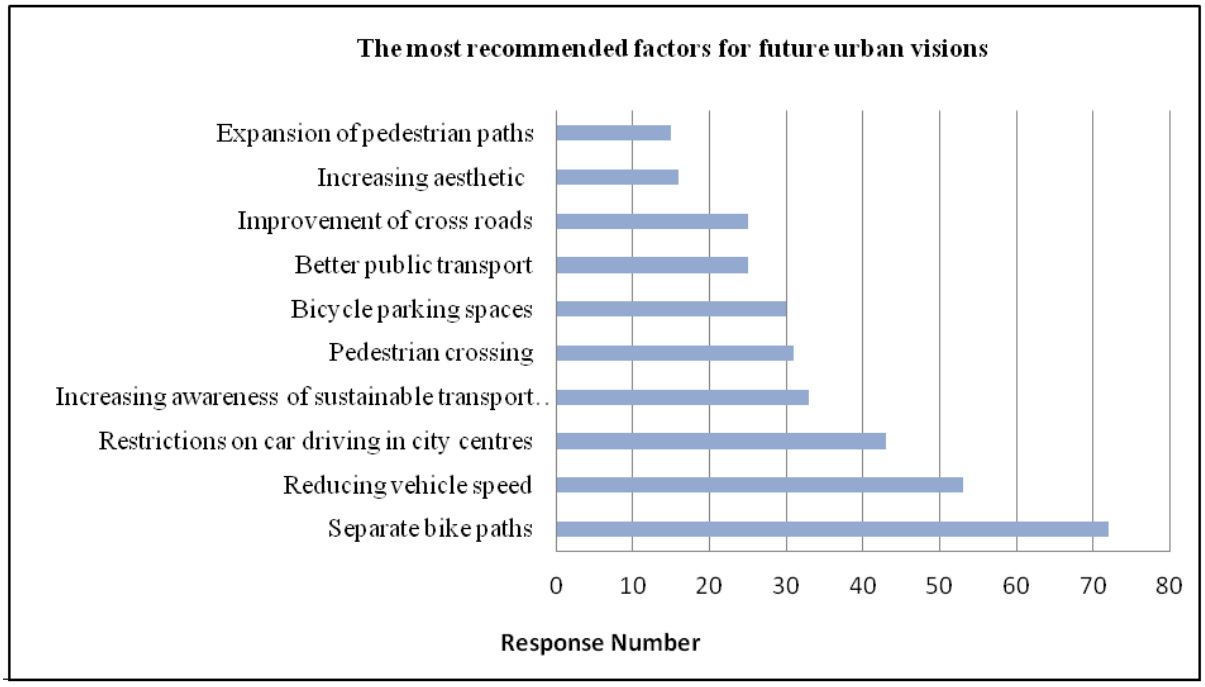


**Figure 5.4.** The most recommended factors for Turkish transport visions.

This figure indicates that the most recommended factor is segregated cycle paths from motor vehicles with 72 participants' proposing this, while the second highest measure was car speed reduction, backed up by 53 people. Many comments from the participants suggested the provision of car restrictions on

some parts of the city centre and increasing public awareness for pedestrians and cyclists. Moreover, some people believed that the development of pedestrian crossings or public transport systems and the establishment of cycling parking areas are essential elements for future sustainable transport visions.

### 5.5. Possible Changes in Lifestyles

An important part of developing an effective transport vision is to understand how different sustainable lifestyles and behaviours can be achieved in future urban transport systems (Devuyst & Van Volsem, 2001; Kearns, 2015).

The researcher analysed the answers of the 28th and 29th question on the survey form (see Appendix3). The responses of the participants to the behaviour and lifestyle changes are separated into diverse categories, and practices that may help to achieve sustainable lifestyles in three different categories are examined.

Nearly, 70 percent of the participants believed that a more sustainable transportation system would have a positive effect on the way of participants' lifestyles. 1 out of 10 participants expressed that it could be partially positive for either themselves or society. On the other hand, 15% of the participants explained that a more sustainable transport system in future would have an adverse, or no effect. A small number of participants said that they were unsure about the answer to the question or did not understand the question's meaning.

Figure 5.5 demonstrates participants' responses that there would be some positive changes on their way of lifestyles and behaviours; 84 participants reported they might feel like a healthier. 15 participants also said that a better lifestyle might be adopted for public health. About 40 participants stated that

they would be happy to live in a place that is more environmentalist, with fewer pollutants and less noise, 35 participants expressed they would feel safer using cycles, and some participants claimed that their lifestyle would be more integrated within the city. One in ten stated that they would use walking, cycling, and public transport modes more, or a new lifestyle would be beneficial to their budget. In the next question, the participants were asked to elaborate on what practices would be effective for providing these changes.

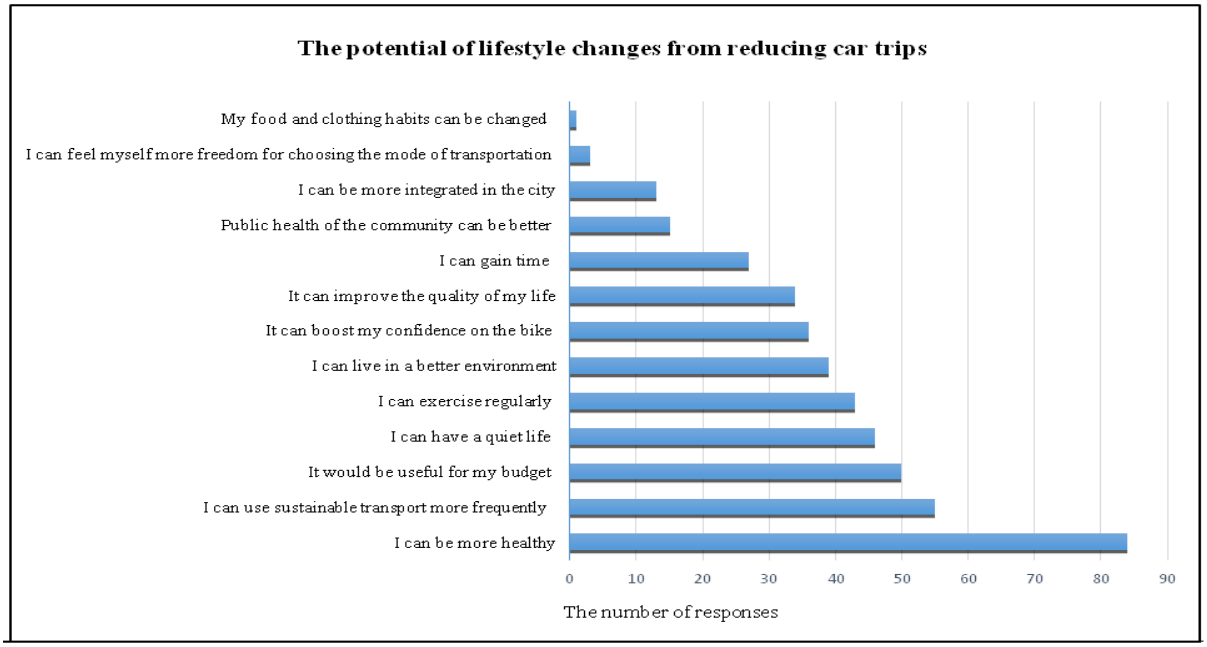


**Figure 5.5.** The potential lifestyle changes from reducing car trips.

### 5.5.1. Positive Lifestyle

Table 5.2a examines the required transport measures, according to participants who thought there would be a positive change in their way of life. The table explains that separate cycling tracks and campaigns may provide a healthier lifestyle. Road safety, cycling campaigns, cheap public transport, good public transportation networks and information systems, cycling rental systems, parking areas, and car parking bans on cycling roads may help participants use sustainable transport systems more. The increasing public transport capacity and

performance, vehicle bans on pavements, creating space for non-motorized transport users, green parks, and electric bicycles may provide individuals with a quiet new lifestyle. Developing cycling networks and public transport systems (frequency and quality) would assist participants to use their journeys to work more efficiently.

**Table 5.2a.** Positive lifestyle and transportation-related measures.

| **If participants are encouraged to use more sustainable transport systems, how might this change affect their lifestyle or behaviour?** | **What matters are required to overcome this behaviour change?** |
|---|---|
| Healthier lifestyle | Increasing separate cycle roads.<br>Respecting cyclists.<br>Cycle route safety.<br>Educating society. |
| Using sustainable transport more frequently | A safe cycling transportation network.<br>Respect for cyclists and improvement of the roads.<br>Public transportation fees to be minimal, and tax-free.<br>Access to public transportation services on cell phones.<br>Spreading the use of cycles.<br>Provide easier access for cyclists.<br>Parking bans on cycling routes.<br>Integrating cycles into public transportation.<br>Low-cost cycling rental.<br>Development of sustainable life culture.<br>Traffic safety and public transportation network.<br>Cycling parking areas.<br>Re-designed pedestrian routes, organised public transportation.<br>Incentives.<br>Awareness training for vehicle drivers during and after license obtaining process. |
| Having a quiet life | Cycling roads.<br>Practical public transportation vehicles, with increased capacity.<br>Planned, systematic public transport solutions.<br>Car parking bans on pavements.<br>Increased planning of local, aesthetically pleasing parks.<br>Electric bicycles.<br>Better bicycle lane and pavement design.<br>Regular, on-time bus arrivals. |
| Saving time | Bicycle roads that enable transportation to every area of the city including park areas.<br>Bicycle network.<br>Increased quality and frequency of the public transportation systems. |
| Better community health | - |

**Table 5.2b.** Positive lifestyle and transportation-related measures.

| **If participants are encouraged to use more sustainable transport systems, how might this change affect their lifestyle or behaviour?** | **What matters are required to overcome this behaviour change?** |
|---|---|
| Improving the participants' quality of life | Improvements to the roads.<br>Providing wider areas for pedestrians and bicyclists.<br>Better roads for bicyclists.<br>Separate bicycle tracks.<br>Bicycle routes.<br>Raising awareness of public transport drivers, and compliance with traffic rules.<br>Stricter traffic rules.<br>Improvement of public transportation vehicles, such as metro, tramways, buses, and public mental perspective guidance.<br>Bicycle training in pre-schools.<br>Trained car drivers towards bicyclists. |
| Increasing confidence of participants on the bicycle | Increasing the number of bicycle roads.<br>Ensuring that driver is more careful.<br>Respectful behaviour towards bicyclists.<br>Passing laws regarding bicyclists.<br>Mayor's official vehicle could be a bicycle.<br>Special roads made for bicyclists.<br>Protecting the rights of bicyclists by security force members. |
| Integrating participants into the city | Bicycle roads and safe bicycle parking areas in central areas.<br>Good bicycle routes.<br>Comfortable bus stops, protecting people from foul weather conditions.<br>Public transportation to be available past midnight.<br>Increased bus rounds. |
| Changing food and clothing habits | - |
| Freedom of choosing the mode of transportation | Ensuring safety.<br>Traffic education classes in schools. |

Table 5.2b revealed that increase security and space for non-motorized transport users, developing public transport systems, educating public transport drivers towards cyclists, cycling campaigns and training, and stricter traffic rules might improve the participants' quality of life. Better and wider cycling networks, cycling campaigns, protecting cyclists' rights through stricter traffic laws and images of politicians' cycling support may boost participants' confidence in cycling. Better cycling infrastructures and parking space, more comfortable bus stops, and reviewing public transport performance (service time and frequency) may provide participants with a more integrated lifestyle in their cities; traffic education and road safety may also help people to think they have more freedom to use sustainable transport systems.

Table 5.2c determines the expectations regarding living with a more environmentalist transportation system. Carrying out lifestyles of daily exercise routines might be facilitated by investing more in pedestrian and public transport systems. Cycling parking areas, tracks in nature, more parks, reasonable transportation fees, and decreasing cycling prices may help to create a better environment for participants. Cycling rental, parking areas, road safety, and preventing car parking on the street help participants do their regular exercise by foot and cycle. Practices, such as cheaper cycling accessories, sustainable transport campaigns, public transportation prices, an increase in car repair, and fuel prices emphasise that participants' lifestyles would be economically more advantageous.

**Table 5.2c.** Positive lifestyle and transportation-related measures.

| If participants are encouraged to use more sustainable transport systems, how might this change affect their lifestyle or behaviour? | What matters are required to overcome this behaviour change? |
|---|---|
| Living in a better environment | Accessible, comfortable, and fast public transport.<br>Public transportation integration with bicyclists.<br>Bicycle parking areas.<br>Bicycle racks in natural areas.<br>More parks, with less concrete.<br>Increased fuel prices.<br>Lower public transportation and bicycle prices.<br>Preventing pedestrian and bicycle roads and vehicle roads from being. Intertwined by proper landscaping.<br>Vehicle parking problems.<br>Making driving license tests harder. |
| Doing regular exercise | Well-designed public transportation.<br>Bicycle rental places.<br>Special areas for riding bicycles.<br>More attentive and careful drivers.<br>Bicycle parking areas.<br>Topography.<br>Safe roads designated for bicyclists, with steady pavements.<br>Construction of multi-storey car parks. |
| Saving money | Raised awareness of vehicle drivers on cyclist and pedestrian rights.<br>Lower prices for cycles and cycling accessories (such as bandanas, eyeglasses, helmets and gloves).<br>Increased the number of pedestrian and bicycle roads.<br>Bicycle roads and park areas.<br>The decreasing vehicle uses by increasing fuel prices.<br>Encouragement by professional bicyclists. |

### 5.5.2. Partially Positive Lifestyle

Table 5.3 presents responses from the participants who thought there would be partially positive changes in their lifestyles. Some participants said they would encourage their friends to use sustainable transportation systems. The suggestions for forming this lifestyle and behaviour included the improvement of public transportation systems, increasing the number of bicycle roads, shower facilities at schools and workplaces for cyclists, reducing traffic density, public transport fees, speeding penalties, secure cycling parking areas, and more training for drivers. Some participants explained that raising awareness of using cycles to work would make users feel better about themselves in public, and these practices may conditionally form a more positive lifestyle for them. Participants who travel with children or babies made different suggestions. The table presents that those participants' suggestions are related with suitable infrastructures for their work journeys.

The most apparent difference between positive and partially positive lifestyle changes is that some participants expressed their suggestions in a negative or conditional way. For instance, Ank 36-45, male: *''…will have a partially positive effect. However, when we look at the environmental problems, sustainable transportation seems like a small problem for my country. I do not think there will be an interaction in environmental problems in the short term, but on a personal level, I do not believe that there will be any adverse effects''*. Esk, 18-25, male: *''I would experience difficulties riding a cycle in the beginning, but later I could adapt to this easily''*. Under the similar conditions, the researcher realised some positive and partially positive responses regarding two different lifestyle changes (''more integrated lifestyle in the city'' and ''living in a more environmentalist urban area''). Those responses were only evaluated in Table 5.2 for avoiding the confusions.

**Table 5.3.** Partially positive lifestyle and associated transport measures.

| If participants are encouraged to use more sustainable transport systems, how might this change affect their lifestyle or behaviour? | What matters are required to overcome this behaviour change? |
|---|---|
| Personal cars are a comfortable means of transportation, yet it may be a good thing to be open to various changes | An increased number of bus rounds.<br>Provide a transport system that is more comfortable.<br>Increased the number of bicycle roads. |
| There could be difficulties for families with children | Ensuring comfortable transitions for baby cars and people with disabilities, to all pavements.<br>Access to bus stops, overpasses, stores and shops should be ensured.<br>There should be opportunities for separate bicycle roads. |
| Bicycle users should feel better about themselves in public | Increasing the number of appropriate settings for bicycle use. |
| There are difficulties for elderly people | Electric bicycles. |
| Transport time would take longer in comparison to private cars | Informing public transportation users about the times buses arrive.<br>Shower facilities available in workplaces. |
| If the conditions of bicycle use within the city improve, they could encourage their friends to use this mode of transportation | Changing rooms and shower facilities available at schools and workplaces for bicycle users.<br>Practices to lower car speeds within the city.<br>Harsher penalties for speeding drivers.<br>Decreasing traffic density.<br>Improvement of bicycle roads.<br>A bicycle system integrated completely within public transport.<br>Secure parking places, especially at transfer stations.<br>Variations in commute hours.<br>Ensuring drivers obey the rules.<br>Lowering public transportation fees. |
| Although cycling may not be highly adopted, it could still cause society to be more active and constructive | Various organisations and campaigns. |
| It could promote the idea that the government cares about society | Transport visions should be for the increased welfare of the public, not for political policies. |

### 5.5.3. Adverse Lifestyle

About 67 participants stated there would be adverse changes regarding their way of life, or there would not be any change. Figure 5.6 presents participants' reasons why a new sustainable transport vision would not affect their way of life. For example, 27 participants explained that it was not possible for them to change their transportation behaviour because they take their children to school or because they travel with other passengers, followed by participants who use their automobiles for out-of-town trips. One member stated that alternative transportation systems would cause time problems for their work journeys.

Nearly 40 participants explained that there would not be any changes regarding their lifestyles. They did not seem to provide clear answers to their situation cannot be determined from the data or their understanding of the question is low, based on the vagueness of their responses.

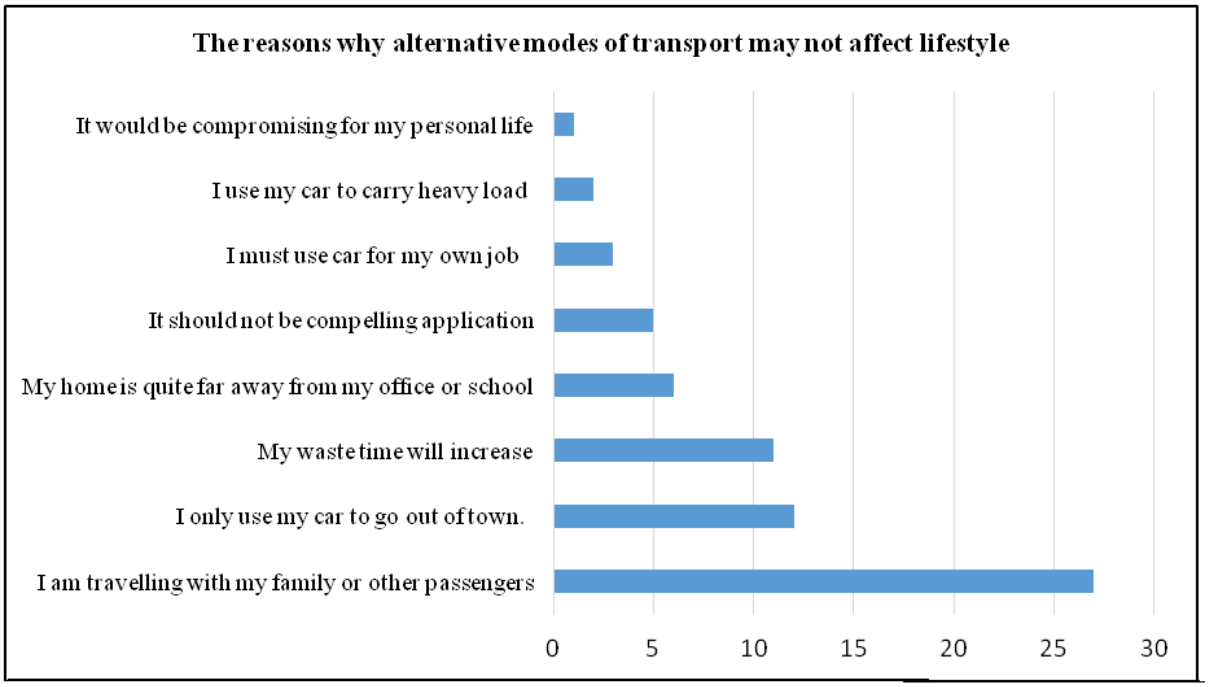


**Figure 5.6.** The reasons why alternative modes of transport may not affect lifestyle.

## 5.6. Statistical Results

### 5.6.1. Survey Instruments

Selected sustainable transport interventions were adopted from three different studies into previous survey research. By drawing on the concept of safety, Scubelek (2007) has shown large items that promote walking and cycling mobility in three Dutch cities. Litman (2005) identified some social practices as major indicators of well-measured factors for comprehensive sustainable transport planning. Jain (2009) discusses the strategies for promoting more environmentally urban transport systems. All the practices from these three papers were adopted to investigate whether any of these strategies may promote different socio-economic groups to use sustainable transport systems more.

### 5.6.2. Perceptions towards Sustainable Transport Interventions

Descriptive statistics in the Statistical Package for the Social Sciences (SPSS) was used to calculate the average scores of potential measures of each vision. The calculations were made according to the satisfaction scores of the participants (5-point scale - Very Satisfied, Satisfied, Neutral/Not Sure, Dissatisfied, Very Dissatisfied). Table 5.4 presents the mean score of safety, social, and environmental practices for the five selected case cities. The table shows that the perceptions of the participants towards different safety, social, and environmental practices were mostly positive and high. On the other hand, participants only disagreed that increasing parking and fuel prices would encourage them to use sustainable travel modes. The outcomes show that the mean score of the various factors was usually consistent across all Turkish urban areas in this study.

Table 5.4 demonstrates that the development of roundabouts (mean= 4.64) and more separate cycle routes (mean= 4.51) were the most

scored safety practices for increasing the level of sustainable transport systems (particularly for active transport users). Traffic light priority for cyclists had the lowest score of safety-based vision development factors with 3.78. They thought that raising public awareness about cycling (mean= 4.43) and wider pavements (mean= 4.41) are the essential practices for a more social transport vision. However, participants do not think that an increase in parking (mean= 2.45) and petrol (mean= 2.28) prices could play a significant role in the future desirable urban areas. Better public transport systems (mean= 4.51) and alternative energy vehicles (mean= 4.45) were the highest scored elements for a more environmentalist transportation system, whereas the lowest score was a car-sharing system with 3.30.

**Table 5.4.** The perceptions of the participants towards sustainable transport modes.

| | Ankara | Eskişehir | İstanbul | İzmir | Konya | Mean |
|---|---|---|---|---|---|---|
| **Safety items** | | | | | | |
| Roundabouts with safe walking and bicycle facilities | 4.64 | 4.56 | 4.66 | 4.62 | 4.7 | 4.64 |
| More bicycle paths separate from road traffic | 4.44 | 4.63 | 4.46 | 4.5 | 4.56 | 4.51 |
| Intersection improvements for cyclists and pedestrians | 4.55 | 4.48 | 4.34 | 4.48 | 4.51 | 4.46 |
| Redesigning some of the road capacity for walking and bicycle priority | 4.42 | 4.33 | 4.46 | 4.39 | 4.35 | 4.40 |
| Speed reduction | 4.03 | 4.05 | 4.23 | 4.27 | 4.21 | 4.17 |
| Pedestrian crossing | 4.15 | 3.98 | 4.05 | 4.22 | 4.31 | 4.13 |
| Good street lighting | 4.11 | 3.98 | 4.02 | 4.15 | 4.14 | 4.08 |
| Traffic light priority for cyclists | 3.93 | 3.83 | 3.81 | 3.7 | 3.59 | 3.78 |
| **Social items** | | | | | | |
| Wider pavements | 4.43 | 4.43 | 4.38 | 4.56 | 4.61 | 4.47 |
| Raising public awareness about bicycle | 4.39 | 4.32 | 4.45 | 4.46 | 4.5 | 4.43 |
| Pedestrianization of urban areas | 4.4 | 4.43 | 4.35 | 4.33 | 4.61 | 4.41 |
| Improved bicycle parking facilities | 4.32 | 4.31 | 4.37 | 4.32 | 4.4 | 4.34 |
| Better walking and bicycle facilities | 4.12 | 4.05 | 4.49 | 4.43 | 4.37 | 4.31 |
| Illegal occupation of sidewalks | 4.38 | 4.41 | 4.01 | 4.2 | 4.39 | 4.24 |
| Public transport links | 4.09 | 3.97 | 4.06 | 4.09 | 4.25 | 4.08 |
| Rest places and seats | 4.15 | 3.96 | 4.01 | 4.03 | 4.21 | 4.06 |
| Better urban design | 3.92 | 4.1 | 3.81 | 3.83 | 4.05 | 3.92 |
| Information on walking routes | 3.98 | 3.9 | 3.75 | 3.81 | 4.05 | 3.87 |
| Increasing parking prices | 3.15 | 3.17 | 2.36 | 2.22 | 1.90 | 2.45 |
| Increasing fuel prices | 2.13 | 2.18 | 2.57 | 2.19 | 2.14 | 2.28 |
| **Environmental items** | | | | | | |
| Better public transport system | 4.51 | 4.34 | 4.52 | 4.59 | 4.58 | 4.51 |
| Alternative energy vehicle | 4.42 | 4.44 | 4.36 | 4.53 | 4.58 | 4.45 |
| Increasing environmental quality and aesthetics | 4.28 | 4.28 | 4.16 | 4.29 | 4.41 | 4.27 |
| Reduction of passenger cars | 4.28 | 4.28 | 4.16 | 4.29 | 4.41 | 4.27 |
| Renewable fuel vehicle | 4.11 | 4.08 | 3.95 | 4.08 | 4.22 | 4.07 |
| Green parks | 3.27 | 3.17 | 4.02 | 4.08 | 4.11 | 3.75 |
| A car-sharing scheme | 3.58 | 3.72 | 3.15 | 3.11 | 2.96 | 3.30 |
| **1= strongly disagree; 3= neutral; 5= strongly agree. Neutral scores are in the range of 2.9 to 3.1** | | | | | | |

### 5.6.3. Safety Factors

A one-way ANOVA was conducted to compare the perceptions of safety items on peoples' travel behaviour for future in urban areas.

There was a statistically significant difference between gender groups as determined by one-way ANOVA for all safety-related transport interventions except for two indicators; more cycling paths separate from road traffic and pedestrian crossing (see Table 5.5). In fact, testing the average of all safety indicators, it appears there is statistical evidence that there is a significant difference between the various safety indicators and gender groups (F= 0.241, p= 0.013). Females were found to be more sensitive than men towards all these safety items. On the other hand, the sub-scale for more cycle paths separate from road vehicles (F= 1.463, p=.227 > .05) and pedestrian crossing sub-scale (F= 2.001, p= .158 > .05) were found to be clearly non-significant at a 5% significance level. Statistically differences were not observed on the mean rating of safety items among age (F= .616, p= .651), education (F= .763, p= .451), and income (F= .733, p= .591) subgroups.

**Table 5.5.** Statistically, all significant safety items based on different groups.

| Items | Gender | Age | Education | Income |
|---|---|---|---|---|
| Reduced vehicle speed | F= 12.238, p= 0.001 | F= 0.979, p= 0.111 | F= 3.035, p= 0.013 | F= 0.775, p= 0.569 |
| Redesigned some of the road capacity to walk and cycle priority | F= 8.443, p= 0.004 | F= 0.681, p= 0.575 | F= 0.773, p= 0.013 | F= 1.295, p= 0.264 |
| Traffic light priority for cyclists | F= 13.385, p= 0.001 | F= 0.596, p= 0.694 | F= 1.133, p= 0.341 | F= 0.747, p= 0.588 |
| Good street lighting | F= 4.908, p= 0.027 | F= 0.880, p= 0.268 | F= 0.588, p= 0.709 | F= 1.349, p= 0.241 |
| Improved multi-lane roundabout design | F= 18.369, p= 0.001 | F= 0.670, p= 0.590 | F= 1.415, p= 0.217 | F= 1.013, p= 0.409 |
| Developed roundabout with safe cycling and walking facilities | F= 8.172, p= 0.004 | F= 0.553, p= 0.758 | F= 1.135, p= .546 | F= 0.937, p= 0.456 |
| More cycling paths separate from road traffic | F= 1.463, p= 0.227 | F= 0.967, p= 0.141 | F= 1.624, p= 0.185 | F= 2.219, p= 0.050 |
| Pedestrian crossing | F= 2.001, p= 0.158 | F= 1.006, p= 0.403 | F= 0.907 p= 0.476 | F= 1.544 p= 0.174 |

### 5.6.4. Social Factors

As seen from Table 5.6, there was a statistically significant difference between gender (F= 4.941, p= .026) and education (F= 2.924, p= 0.013) groups as determined by one-way ANOVA. However, age (F= 1.085, p= .362) or income (F= 2.196, p= .053) differences were not found in the mean score of people's transport perceptions towards implementing social transport interventions in the future.

**Table 5.6.** Statistically, all significant social items based on different groups.

| Items | Gender | Age | Education | Income |
|---|---|---|---|---|
| Transport connectivity | F= 7.450, p= 0.001 | F= 2.231, p= 0.064 | F= 2.549, p= 0.047 | F= 3.990, p= 0.002 |
| Penalize illegal occupation of sidewalks | F= 7.396, p= 0.007 | F= 2.403, p= 0.048 | F= 1.015, p= 0.408 | F= 0.935, p= 0.259 |
| Better cycling and walking facilities | F= 5.693, p= 0.017 | F= 2.901, p= 0.047 | F= 0.729, p= 0.602 | F= 0.887, p= 0.489 |
| Wider pavements | F= 0.770, p= 0.381 | F= 3.383, p= 0.010 | F= 3.815, p= 0.023 | F= 1.367, p= 0.234 |
| Increasing parking price | F= 0.194, p= 0.660 | F= 3.850, p= 0.001 | F= 3.633, p= 0.067 | F= 3.759, p= 0.003 |
| Better urban design | F= 4.433, p= 0.362 | F= 4.141, p= 0.967 | F= 4.469, p= 0.001 | F= 2.618, p= 0.020 |
| Information of walking routes | F= 10.454, p= 0.001 | F= 0.604, p= 0.660 | F= 1.088, p= 0.365 | F= 1.345, p= 0.243 |
| Rest places and seats | F= 4.733, p= 0.030 | F= 0.931, p= 0.445 | F= 0.476, p= 0.795 | F=0.614, p= 0.689 |
| Raising public awareness about cycling | F= 2.248, p= 0.134 | F= 3.381, p= 0.009 | F= 1.674, p= 0.138 | F= 1.005, p= 0.414 |
| Improved bicycle parking facilities | F= 1.834, p= 0.176 | F= 1.834, p= 0.176 | F= 2.989, p= 0.024 | F= 2.076, p= 0.066 |
| Pedestrianization of urban areas | F= 3.325, p= 0.069 | F= 0.025, p= 0.999 | F= 2.400, p= 0.036 | F= 0.865, p= 0.504 |
| Increasing fuel prices | F= 1.559, p= 0.212 | F= 2.162, p= 0.058 | F= 1.448, p= 0.619 | F= 3.448, p= 0.005 |

### 5.6.5. Environmental Factors

Table 5.7 demonstrates that statistical differences were observed between males and females in the average scores toward environmental perceptions (F= 5.203, p= .023<.050). However, age (F= 1.392, p= .432), education (F= 1.437, p= .325), and income (F= 1.267, p= .442) differences were not observed for the average scores of these perception items. Therefore, there are no significant socio-economic differences on the perceptions of environmental practices was only rejected for the gender group.

**Table 5.7.** Statistically, all significant environmental items based on different groups.

| Items | Gender | Age | Education | Income |
|---|---|---|---|---|
| Increasing environmental quality and aesthetics | F= 4.630, p= 0.032 | F= 2.689, p= 0.047 | F= 0.358, p= 0.877 | F= 1.530, p= 0.178 |
| Reduction of passenger cars | F= 9.687, p= 0.002 | F= 0.422, p= 0.793 | F= 2.385, p= 0.037 | F= 0.140, p= 0.983 |
| Alternative energy vehicle | F= 4.468, p= 0.035 | F= 0.980, p= 0.417 | F= 2.586, p= 0.025 | F= 0.451, p= 0.813 |
| A car sharing scheme | F= 12.982, p= 0.001 | F= 0.551, p= 0.698 | F= 0.861, p= 0.507 | F= 2.271, p= 0.046 |
| Better public transport system | F= 0.985, p= 0.000 | F= 1.417, p= 0.106 | F= 2.195, p= 0.034 | F= 1.399, p= 0.223 |
| Renewable fuel vehicle | F= 0.971, p= 0.001 | F= 0.420, p= 0.794 | F= 1.264, p= 0.277 | F= 2.195, p= 0.034 |
| Green parks | F= 3.064, p= 0.080 | F= 1.015, p= 0.398 | F= 1.712, p= 0.129 | F= 2.434, p= 0.033 |

## 5.7. Scenario Modifications

This part shows how the vision development studies shown in Chapter 4 were modified for this project using data obtained from the participants in line with the first foresight study in Turkey, which was performed on the "*Megacities on the Move*" project by Gazibara et al. 2010 (see Chapter 2).

The data acquired from the participants were based on the first three objectives of this research (see Chapter 1). First, the opinions of the participants regarding the future transportation visions were revealed (participant opinions). Secondly, the opportunities to ensure sustainability in the lifestyles of society in

order to generate sustainable transportation visions in urban areas were sought (lifestyle changes). As part of the third objective, various strategies were tested to see if they would encourage different socio-economic groups to use more non-motorised vehicles or not (statistical results).

The data obtained from the participants were integrated into the descriptions of four different visions (Planned-opolis, Sprawl-ville, Renew-abad, Communi-city) in Chapter 2 that were designed for urban areas in Turkey.

### 5.7.1. Avoid Vision

Tables 5.8a and 5.8b indicate how the opinions of the participants and the foresight project in Turkey were modified to create the Avoid Vision.

For example, as shown in Table 5.8a, meeting numerous basic needs of the people about transportation, online access (Megacities on the Move, Planned-opolis) is promoted to reduce their demand for transportation. Car dependence could be decreased less than in the other visions; therefore the automotive industry gives priority to innovations related to developing safe vehicle usage options in new automobiles (participant opinion, public transport). Besides, several studies on energy efficiency have been conducted so as to make new vehicles more environmentally conscious. Various government and municipality funds contain primarily safety elements, which causes the automotive industry's environmental innovations to be more superficial than safety elements (statistical results, environmental factors).

On the other hand, the automotive industry's innovations in vehicle safety options fail to remove people's safety concerns regarding urban transportation. Particularly, punitive sanctions for the drivers who violate traffic rules are toughened to overcome the safety concerns of cyclists (lifestyle changes, partially positive lifestyles).

Table 5.8a. Modification of the Avoid Vision accordance with survey data and literature.

| Key factors | Scenario modification | Sources | Section | Sub-section |
|---|---|---|---|---|
| Environmental solutions | Growth in the country's economy is making automobile use more appealing for many people. | Megacities on the Move | Communi-city | Economy |
| | People are being encouraged to meet their basic needs online to decrease the length of automobile travel in urban areas. | Megacities on the Move | Planned-opolis | Technology |
| | Various conveniences and promotion coupons are being provided for online shopping and bill payments. | Megacities on the Move | Planned-opolis | Technology |
| | The car industry is continuing to develop the efficiency of new vehicles, which would operate on petrol or electric engines. | Statistical results | Environmental | Alternative energy vehicle. |
| | Although big improvements are happening in battery technology, electric vehicles are not going to push people to use them very efficiently. | Megacities on the Move | Renew-abad | Technology |
| | Passenger capacities in public transportation are increasing. | Lifestyle changes | Positive lifestyle | Saving time |
| | The central government keeps the work hours of its officials flexible to solve the high exhaust emission rates due to traffic jams. | Megacities on the Move | Renew-abad | Human values |
| Technology | Technological innovations will be most improved to decrease possible accidents in road transportation and to develop a more environmentally friendly transportation system. | Participant opinions | Public transport | Technology advancements in public transport. |
| | The automotive industries would improve their safe vehicle driving systems. | Participant opinions | Public transport | Safer transport systems |
| | Through the use of new security systems integrated into private and public transportation vehicles, the risk of motor vehicles hitting cyclists and pedestrians is being minimised. | Participant opinions | Ensuring security in the streets. | Urban features |
| | | | Providing safety for child and young cyclists. | Special groups |
| | Intelligent Speed Adaptation (ISA) would be installed in new vehicles, which uses Global Positioning System (GPS) combined with a digital map of speed limits to ensure that drivers comply with speed limits at all times. | Megacities on the Move | Communi-city | Mobility |
| | Intelligent transportation systems inform drivers of traffic congestions on their route with the estimated waiting time. | Megacities on the Move | Communi-city | Mobility |
| | Drivers who break the law by speeding are penalised. | Lifestyle changes | Partially positive lifestyle | If the conditions of bicycle use within the city improve, they could encourage their friends to use this mode of transportation |
| Digital technology | Digital technology is viewed as a meaningful solution to reduce road accidents. | Megacities on the Move | Planned–opolis | Digital technology |
| | People would do major activities and pay their bills via state online programmes. | Megacities on the Move | Renew-abad | Social structures |
| | Some meetings would be carried out from home by work platforms. | Megacities on the Move | Renew-abad | Social structures |
| Energy | There would be significant increases in the fuel prices. | Statistical results | Social | Increasing fuel prices |
| | Higher energy prices would encourage certain sections of society to increase their digital technology use, causing new lifestyles to form in the community. | Megacities on the Move | Planned-opolis | Human values |
| | High energy prices are not effective in decreasing automobile dependency because the price of public transportation would also go up. | Megacities on the Move | Renew-abad | Energy supply |
| Urban structure | There are no significant changes taking place in the physical structure of cities. | Megacities on the Move | Renew-abad | Urban form |
| | House prices in the city centre going up would make it harder to form compact cities. | Megacities on the Move | Renew-abad | Urban form |
| | In the new settlement areas, walking would become more convenient, more comfortable, and safer for the needs of physically challenged people. | Participant opinions | Walking | Comfortable pedestrian paths |
| | | | Special groups | Better systems for disabled people |

Table 5.8b shows that innovations in digital technology influence reducing transportation demands (Megacities on the Move, Communi-city). In future urban environments, it is frequently seen that children and young people go to school on foot or by bicycle (lifestyle changes, partially positive lifestyle). This situation results in the slow creation of perception that new transport systems are more comfortable and safer (participant opinions, public awareness). Hence transportation engineers review new planning works at crossroads where traffic accidents are highly observed, for the purpose of ensuring the continuity of such perception (statistical results, safety factors).

Table 5.8b. Modification of the Avoid Vision accordance with survey data and literature.

| Key factors | Scenario modification | Sources | Section | Sub-section |
|---|---|---|---|---|
| Infrastructure improvements | Local traffic is becoming more limited with vehicles only being used for essential communication and transportation needs. | Megacities on the Move | Sprawl-ville | Mobility |
| | Strategies to either provide good street lighting or physically separate cyclists from vehicle traffic would be expected to improve road safety significantly. | Statistical results | Safety | Good street lighting |
| | A new type of low-speed, multi-lane roundabout is planned specifically to increase safety for pedestrians and cyclists. | Statistical results | Safety | Improved multi-lane roundabout design |
| | The crossing would spur a change of culture, in which car drivers think of child pedestrians and cyclists first. | Lifestyle changes | Positive lifestyle | Saving money |
| | Implementing physical measures, such as roundabouts, speed humps, dedicated lanes for pedestrians and cyclists would also reduce the risks to child cyclists and pedestrians from road traffic crashes and increase the comforts of families with babies. | Participant opinions | Cycling | Safety strips. |
| | | | Walking | Safe pedestrian paths. |
| | | | Special groups | Convenience for families with babies. |
| | Strengthening road infrastructure with a concern for safety and penalising drivers for not giving priority to pedestrians. | Participant opinions | Walking | Protecting all rights of pedestrians |
| | | | Walking | Penalising car drivers who do not give way to pedestrians |
| Mode share | Active transportation systems would be more comfortable and safer than in the present situation. | Participant opinions | Public awareness | Dissemination on cycling awareness. |
| | | | Walking | Better pedestrian infrastructures in suburban areas. |
| | Widespread use of digital technology would cause a significant decrease in transport demand. | Megacities on the Move | Communi-city | Social structures |
| | Some improvements would be made regarding the use of public transportation systems, but there would be a little increment from the current user. | Lifestyle changes | Positive lifestyle | Using sustainable transport more frequently |
| Special groups | Decreasing motor vehicle speeding limits would encourage children and women to cycle and walk more. | Lifestyle changes | Partially positive lifestyle | If the conditions of bicycle use within the city improve, they could encourage their friends to use this mode of transportation |
| | Improvements in pedestrian infrastructure systems (lighting systems, improvements at crossroads and turns, increasing the comfort of crossing at multi-turn roads). | Statistical results | Safety | Developed roundabout with safe cycling and walking facilities |
| | Dedicated walking and cycling lanes would promote more children young people to use non-motorised systems to go to school. | Lifestyle changes | Positive lifestyle | Improving the participants' quality of life |
| Safety | Traffic and driver education programs become an integral part of the National Curriculum, to create a safe and responsible manner either as a driver, cyclist, or pedestrian. | Participant opinions | Public awareness | Increasing awareness of sustainable transport issues. |
| | | | Public awareness | Training of people. |
| | Improvement in regulations regarding school services will ease parents' concerns about their children's safe arrival to schools. | Participant opinions | Public transport | Development of traffic laws. |
| | | | Incentives | Public transport |
| | There would be more traffic signs visible around schools and shopping malls. | Participant opinions | Cycling | Warning signs at the junction. |
| | | | Sustainable transport strategies | Ensure the observance of traffic signs. |
| | Drivers will be prohibited from driving over 30 km/h on the busiest streets in the urban areas. | Participant opinions | Preventing car use | Speed control |
| | Integrated sensors would enhance motor vehicle safety, and ID chips would be attached to new cars, significantly reducing accident risks. | Megacities on the Move | Sprawl-ville | Mobility |
| | Lowering the speed limits for cars would decrease the risk of accidents in the city centres. | Statistical results | Safety | Reducing vehicle speed |
| | The scope of driving license exams would be expanded, and it would become harder to pass the exams. | Participant opinions | Preventing car use | Making harder to get a car license. |
| Policy co-ordination | The national government would make big investments in road transportation infrastructures in urban areas to be safer and for digital technologies to be activated. | Megacities on the Move | Communi-city | Social structures |
| | Local administrations would receive funding for making cycling and walking transportation safer and more attractive by implementing calming traffic measures. | Statistical results | Environmental | Reduction of vehicle density |

### 5.7.2. Shift Vision

Tables 5.9a and 5.9b show how the data acquired from the participants were integrated into the national literature and were modified to form the Shift Vision.

Table 5.9a describes the increased number of pedestrianised areas that decreased vehicle dependence, thereby eliminating vehicle-based air pollution problem (Statistical results, social factors). To promote making new pedestrian areas more attractive, digital maps which help people to find the locations they seek and to get informed about the urban activities are used (participant opinions, walking). Innovations in digital technologies cause people’s shopping behaviours to change (Megacities on the Move, Communi-city). On the other side, it is understood that the most remarkable changes in people's lifestyles develop based on social awareness. For instance, the vehicle owners who are aware of non-motorised vehicles are attentive to parking their cars in a way that will not violate the lanes separated for other users (lifestyle changes, positive lifestyle).

Table 5.9a. Modification of the Shift Vision accordance with survey data and literature.

| Key factors | Scenario modification | Sources | Section | Sub-section |
|---|---|---|---|---|
| Environmental solutions | The public transportation infrastructure systems will be drastically improved to manage travel demand. | Statistical results | Environmental | Better public transport system |
| | With the development of newly pedestrianised locations, a decrease will be expected in the car dependency. | Statistical results | Social | Pedestrianization of urban areas |
| | Local administrations would encourage the public to use non-motorised transport modes more due to air pollution problems. | Statistical results | Social | Better cycling and walking facilities |
| | The key issues are: reducing forecast fuel use for private vehicles and ensuring higher quality and affordable services in public transport systems. | Lifestyle changes | Positive lifestyle | Living in a better environment |
| Technology | Weather reports, events, health measurement equipment, public transportation stops and routes information will be easily accessible. | Participant opinions | Public transport systems | Technology advancements in public transport. |
| Digital technology | People do not want to change their mode of shopping and so transport decision to work. | Megacities on the Move | Communi-city | Human values |
| | There will be many digital maps for pedestrians and different digital platforms for public use in the city centres. | Participant opinions | Walking | Walking maps |
| Energy | Growing petrol prices would increase employment densities and so lead to denser urban areas. | Statistical results | Social | Increasing petrol prices |
| | People tend to move through some part of the locations closer to workplaces. | Participant opinions | Urban features | More social and business places |
| | The changes of urban form tend to happen very slowly because the increase in urban density is constrained by local land use strategies. | Megacities on the Move | Communi-city | Urban form |
| Urban structure | Compact, mixed-use areas would be developed. | Participant opinions | Urban features | More compact cities |
| | Multi-storey car parks would be constructed in some areas of the city. | Lifestyle changes | Positive lifestyle | Doing regular exercise |
| | Municipalities warn the residents to park their automobiles in a way that would not block pavements and cycle lanes. | Lifestyle changes | Positive lifestyle | Having a quiet life |
| | The formation of these cultural areas also causes cycling events and campaigns to increase and, therefore, respect for cyclists also growing. | Statistical results | Social | Raising public awareness about cycling |
| | High parking prices and cycling awareness events encourage people to utilise cycling modes. | Lifestyle changes | Partially Positive Lifestyle | Although cycling may not be highly adopted, it could still cause society to be more active and constructive |
| | Individuals would rent cycles for a nominal fee from mobility hubs situated at transfer stations. | Lifestyle changes | Partially Positive Lifestyle | If the conditions of bicycle use within the city improve, they could encourage their friends to use this mode of transportation |
| | The kerb fewer lanes make cycling and walking quick and comfortable. | Participant opinions | Walking | Designing more direct routes |

Table 5.9b indicates how infrastructure systems were modified under the topics of mode sharing, special groups, safety, and politic coordination in line with the data obtained from the Shift Vision. For example, the government gives financial support to form new locations for pedestrians (participant opinions, incentives). The municipalities who are aware of such policies develop strategies enabling the integration of bicycles into public transport (statistical results, social factors); several private and public corporations construct shower cabins for their employees who go to work by bicycle (lifestyle changes, partially positive lifestyle). Electric bicycles have become popular as people with different cultural levels adopt bicycle transportation (Megacities on the Move, Communi-city).

Table 5.9b. Modification of the Shift Vision accordance with survey data and literature.

| Key factors | Scenario modification | Sources | Section | Sub-section |
|---|---|---|---|---|
| Infrastructure improvements | There would be more walking maps and seating places on the extended routes. | Participant opinions | Walking | Seat benches |
| | | | Walking | Walking maps |
| | Hybrid cars would be more widespread than the present situation, but the use of hybrid vehicles are limited by the inadequacy of the infrastructure systems. | Statistical results | Environmental | Renewable fuel vehicle |
| | Cycling and the integration of cycles with the public transportation system at transfer stations would make cycling transportation more appealing for different income groups. | Statistical results | Social | Integration of cycling with public transport systems. |
| | Some private and governmental establishments would provide shower facilities for cyclists. | Lifestyle changes | Partially Positive lifestyle | Transport time would take longer in comparison to private cars |
| | Wider areas are assigned to cyclists and pedestrians. | Statistical results | Social | Wider pavements |
| | Pedestrianisation projects and running parks are becoming more common to increase people's physical activity. | Participant opinions | Walking | Running parks |
| | | | Walking | Increasing pedestrian paths |
| Mode share | Organised cycling cultural events, reduced tax and prices of cycles and their accessories make non-motorised vehicle use more attractive. | Lifestyle changes | Positive lifestyle | Living in a better environment |
| | Many of the local governments would start to boast a strong walking and cycling culture. | Lifestyle changes | Positive lifestyle | Using sustainable transport more frequently |
| Special groups | New settlement areas close to the city centre decrease car dependency and make a much wider range to use non-motorised transport modes. | Participant opinions | Sustainable transport strategies | Shifting investments to small towns |
| | The government would offer incentives for the purchase of electric bicycles. | Megacities on the Move | Communi-city | Mobility |
| | The tax incentives would mainly promote adults to go to city centres by cycling more. | Lifestyle changes | Positive lifestyle | Using sustainable transport more frequently |
| | Public buses are becoming cheaper and more comfortable than the current situation would enable different income groups to access town centres with more ease. | Participant opinions | Public transport systems | Increasing public transport comfort |
| | | | Public transport systems | More accessible public transport systems |
| Safety | The pedestrianisation of some locations in town centres offers big advantages for the safe transport mode of cyclists and pedestrians. | Statistical results | Social | Pedestrianization of urban areas |
| | More dense urban areas would require automobiles to go slower, which in return helps to significantly decrease possible accident risks in urban areas. | Participant opinions | Urban features | More compact cities |
| Policy co-ordination | Local administrations are encouraging cities to become more compact and multi-purpose. | Participant opinions | Urban features | More compact cities |
| | The government will finance local administrations on public transportation systems to become developed pedestrianisation projects. | Participant opinions | Incentives | Public transport |
| | | | Incentives | Walking |

### 5.7.3. Improve Vision

As presented in Table 5.10, the survey data shows how the vision development study in this project was modified. Similar to the Shift Vision, a large majority of consumers still prefer to do their shopping in physical stores (Megacities on the Move, Communi-city). Even though the continuance of several old lifestyles does not reduce the transportation demand in this vision, all-purpose environmental breakthroughs are performed to diminish transportation-based air pollution significantly. For instance, car drivers are encouraged to use public transport systems or to use the services of the companies that they work for (participant opinions, public transport systems). Besides this, new public transport systems are made more accessible for the people who live outside of the city (statistical results, environmental factors). The most important reason for implementing these strategies easily is that the government takes decisions on making significant investments in urban public transport so as to raise society's interest in sustainable energy trends (lifestyle changes, positive lifestyle).

Table 5.10a. Modification of the Improve Vision accordance with survey data and literature.

| Key factors | Scenario modification | Sources | Section | Sub-section |
|---|---|---|---|---|
| Environmental solutions | Car drivers are encouraged to use their institutions' service buses or public transportation for their commutes. | Participant opinions | Preventing car use | Complicating car purchase |
| | | | Public transport systems | Public transport management service |
| | Renewable fuels' efficiency and energy prices are going up simultaneously. | Participant opinions | Public transport systems | Increasing the share of renewable energy in public transport services |
| | Private cars would become smaller, and they would use fuel more efficiently than the present situation. | Participant opinions | Preventing car use | Designing small cars |
| | Extra charges would be applied to limit vehicle use during rush hours. | Megacities on the Move | Sprawl-ville | Mobility |
| Technology | A significant proportion of technological development consists of innovations regarding the improvement of fuel performance and economy. | Participant opinions | Public awareness | Improving people attitudes towards less polluting public vehicles |
| | The new vehicles would operate on renewable energy that produces fewer emissions, or on electrical power. | Participant opinions | Public awareness | Raise awareness about sustainable energy trends |
| | Hybrid buses that would also operate on electricity function with lower energy costs. | Participant opinions | Public transport systems | Alternative systems |
| | Solar panels in some bus stops would store energy, which would be used later to illuminate its surroundings. | Participant opinions | Public transport systems | Technology advancements in public transport |
| | | | Public awareness | Raise awareness about sustainable energy trends |
| | Automobile manufacturers are working on the development of alternative fuels to protect their economies. | Megacities on the Move | Renew-abad | Business landscape |
| | New vehicles are now operating on biodiesel and hydrogen energies. | Megacities on the Move | Renew-abad | Energy supply |
| | Cyclists would use tricycles to carry their heavier loads. | Megacities on the Move | Communi-city | Mobility |
| | City centres would be reachable through small cars that operate on renewable energy systems and would be integrated with cycles. | Participant opinions | Preventing car use | Designing small cars |
| Digital technology | Free-of-charge Wi-Fi systems spearhead public transportation systems, which are becoming a more practical transportation mode. | Megacities on the Move | Communi-city | Mobility |
| | People would prefer to access shopkeepers and other people by face-to-face. | Megacities on the Move | Communi-city | Human values |
| Energy | Global unrest will cause frequent fluctuations in the energy market. With the fast growth of Asian and Latin countries, procuring energy will become harder. | Megacities on the Move | Renew-abad | Economy |
| | The scarcity of energy resources will cause the price of fossil fuels to go up. | Megacities on the Move | Renew-abad | Resource use |
| | The government needs to overcome the difficulty of procuring energy by investing in public transportation systems and by increasing awareness about sustainable energy trends. | Lifestyle changes | Positive lifestyle | Having a quiet life |
| Urban structure | The number of green fields is being increased. | Lifestyle changes | Positive lifestyle | Living in a better environment |
| | Due to a significant decrease in car dependency, traffic jams would be significantly rarer than the current state. | Statistical results | Environmental | Reduction of passenger cars |
| | The accessibility and comfort of public transportation systems will be drastically improved, and public transportation systems would be integrated with cycles as well. | Statistical results | Environmental | Better public transport system |
| | Public transportation systems would become faster, more comfortable. | Participant opinions | Public transport systems | Increasing public transport comfort |
| | | | Public transport systems | Systematic road transportation systems |
| | The development of public transport would make new social and business settlement formation on the outer parts of the city more appealing. | Participant opinions | Urban features | More social and business places in residential areas |
| | Residential areas will be available close to peoples' homes, and land use changes will be very similar to the current pattern. | Megacities on the Move | Communi-city | Urban form |
| | Local administrations are reserving areas like parks or forest land to prevent the rapid population growth from quickly spreading in the outer parts of the city. | Lifestyle changes | Positive lifestyle | Having a quiet life |
| | There are more bicycle tracks for mainly recreational purposes in outer, natural areas of the city. | Megacities on the Move | Communi-city | Mobility |

Table 5.10b indicates how the vision development study conducted for the other main elements (infrastructure systems, mode sharing, special groups, safety, and politic coordination) was modified based on the survey results and the Megacities on the Move report. Government financial aid for public transport systems enables the community to easily adopt such systems (lifestyle changes, partially positive lifestyles) and leads the drive to price the systems for the people (participant opinions, public transport systems). Moreover, investments made in the infrastructure systems which support bicycle use and pedestrian transportation in new urban areas, (statistical results, social factors). Various events and seminars are held to raise the awareness of bus drivers about the rights of cyclists in traffic, as part of the vision in which public transport systems are developed primarily (Megacities on the Move, Communi-city).

Table 5.10b. Modification of the Improve Vision accordance with survey data and literature.

| Key factors | Scenario modification | Sources | Section | Sub-section |
|---|---|---|---|---|
| Infrastructure improvements | With the public transportation systems, accessing city centres faster and cheaper, automobile dependency would significantly decrease. | Participant opinions | Public transport | Increasing the frequency of time |
| | The government would collect high taxes from drivers to make more infrastructure investments in public transportation systems. | Participant opinions | Public transport | Upgrading public transport vehicles. |
| | People would be provided with better public transport journeys via integrated, easy-to-use ticketing systems. | Megacities on the Move | Planned-opolis | Mobility |
| | The increase in the number of rounds in public transport will provide significant advantages for the comfort of passengers. | Lifestyle changes | Positive lifestyles | Living in a better environment |
| | People will have access to information regarding which bus is coming at what time, and which stops it is going to make. | Lifestyle changes | Partially Positive Lifestyle | Transport time would take longer in comparison to private cars |
| | More public transport terminals would be located in essential parts of rural areas. | Participant opinions | Public transport | More accessible public transport systems. |
| | A significant decrease in traffic jams will play a major role in cities becoming more aesthetically pleasing. | Participant opinions | Preventing car use | Decreasing vehicle reduction. |
| | | | Urban features | Increasing aesthetic. |
| | Drivers will be encouraged to use vehicle-sharing systems that operate on alternative energy. | Megacities on the Move | Renew-abad | Technology |
| | Many people on the edge of the city centre will be expected to use car-sharing systems, would bring social and environmental benefits to society as it leads to the reduction of car ownership and parking space demand. | Megacities on the Move | Renew-abad | Technology |
| Mode share | Local authorities will make massive investments in improving the quality and frequency of public transport systems. | Lifestyle changes | Positive lifestyle | Integrating participants into the city |
| | Most car users will be encouraged to use public transportation systems. | Participant opinions | Incentives | Public transport |
| | Offering incentives to encourage individuals' use of existing public transport options will decrease the individual cost for such transport. | Participant opinions | Public transport systems | Reduced fare program |
| | Public transport systems, school buses, and institutions' service buses will cover 50 percent of the traffic in urban areas. | Megacities on the Move | Renew-abad | Technology |
| Special groups | Cheaper, more affordable housing now tends to be situated in some part of the residential areas with strong transport connectivity and strong service provision, so it becomes increasingly comfortable for those on lower incomes and without an automobile to access jobs. | Lifestyle changes | Positive lifestyle | Using sustainable transport more frequently |
| Safety | There would be a significant decrease in the number of fatal accidents as drivers are encouraged to use public transportation services or non-motorised transport systems. | Megacities on the Move | Planned-opolis | Mobility |
| | Local authorities would also undertake a range of off-street trials of innovative cycling improvements. | Lifestyle changes | Partially Positive Lifestyle | Increasing confidence of participants on the bicycle |
| | Protected cycling lanes will be implemented to improve everyone's safety; for example, route marking and sign-posting will become more familiar and dedicated cycling lanes will pass behind bus stops, enabling cyclists to continue past a stationary bus, away from the traffic lane. | Lifestyle changes | Positive lifestyle | Improving the participants' quality of life |
| | Public transport users will be trained for interaction with cyclists as part of their driver training when applying for their driving licence. | Megacities on the Move | Communi-city | Economy |
| Policy co-ordination | The market agencies would make substantial investments for renewable and electric vehicles to become more widespread. | Megacities on the Move | Renew-abad | Technology |
| | The central and local administrations will implicate a series of important strategies regarding public transportation systems and complicate car purchase. | Participant opinions | Preventing car use | Complicating car purchase. |
| | The local governments are beginning to work towards strengthening the infrastructure of these systems in their cities. | Statistical results | Social | Better walking and cycling facilities |

## 5.8. Summary

This chapter shows how the survey outcomes obtained from the participation of the volunteer people were established and integrated with the Megacities on the Move Project for this study. The survey outcomes were intended to research for the first three objectives of the study (see Chapter 1). What is gained from the participants includes their views on future visions, strategies to sustain sustainability in their lifestyles, and practices that encourage different socio-economic groups to use non-motorized vehicles.

In this study, it is realised men and young people are the principal users of cycling and walking. This also matches the general demographic features of active travel user profiles in Turkey at the same time (see Section 2.6). This finding underlines the importance of highlighting the needs of different groups further in the vision development study.

Nearly 70 car driver participants (20 percent of all driver participants) mentioned that they would never change their transport modes for a variety of different reasons, in particular: the quality of their lifestyles will decrease, they need to carry heavy items in their vehicles, they use automobiles as part of their business activities, the visions should not be compelling, the distance between home and the workplace is too great, using sustainable transport systems will increase waste of time, automobile is required for the out of the city and they wish to travel with their families or friends.

The online survey results were analysed to test the research hypothesis that there are no socioeconomic differences in perceptions towards developing safety/social/environmental practices in Turkish cities**.** This was done using a one-way ANOVA test, and the average scores for safety, social, and environmental factors were only significantly different only for different genders. On the other hand, transportation measures that show significant

differences among one of these groups were also considered in the vision development work.

The outcomes confirm and support many of the findings of previous researchers (Parkin *et al.,* 2007; Garrard *et al.,* 2008; Emond *et al.,* 2009; Owen *et al.,* 2010) who found a significant difference between males and females towards different walking and cycling strategies. These authors noted that differences between the futuristic expectations of different gender groups regarding many safety, social and environmental factors, female participants are more sensitive.

However, several papers reveal that there are significant age differences in perceived perceptions (for example Lorenc *et al.,* 2008; Bernhoft & Carstensen, 2008; Shigematsu *et al.,* 2009). A wide variety of literature demonstrates that the perception of active transport mode frequently varies by gender and age, while different results were found for education and income groups (Lovasi *et al.,* 2009; Bruijn, 2009; Litman, 2009; Walton & Sunseri, 2010; Sallis *et al.*, 2011; Trapp *et al.*, 2012; Van Dyck *et al.,* 2012; Reis *et al.,* 2013; Heesch *et al.,* 2014). These different outcomes might be due to differences in measures, in perceptions of the participants investigated, or in adjustments for covariates.

On the other hand, with the exception of older participants' stronger tendency to support raising public awareness about cycling and penalizing illegal occupation of sidewalks, the results do not support previous research (e.g., Bernhoft & Carstensen, 2008; Shigematsu *et al.,* 2009) that observed strong age differences in attitudes towards pedestrian and cyclist safety.

Where education and income differences were identified, the survey results revealed no significant differences in safety, social, and environmental expectations. This means that although participants have different educational backgrounds or financial statuses, this was not reflected in their safety, social,

and environmental attitudes and expectations towards ensuring a future sustainable transport vision. A possible explanation for this may be that participants in different groups are exposed to the same urban environment.

# CHAPTER SIX: PUBLIC OPINIONS ABOUT THE VISIONS

## 6.0. Overview

This chapter aims to understand public opinion about the imaginary future travel scenarios presented in Chapter 4 in vision development and compare the arguments expressed by different transport users for testing the fourth research objective. The study area consists of three archetypal locations that reflect the characteristic features of Turkish urban streets as indicated in Section 3.3.2. The details of the future visions are given in Section 4.3 - 4.4.

The chapter firstly reveals the common participant views regarding the survey questions about the reliability of the visions in Section 9.3. This chapter then provides a more detailed overview of visions from the perspectives of each different travel user (pedestrian, cyclist, public transport user, car driver, and shop-owner) in Section 9.4. Finally, the different arguments put forward on imaginary travel scenarios are compared and justified in terms of the future desires of different travel users.

### 6.1. Public Opinions about the Visions

Participants from the public (pedestrians, cyclists, public transport users, car drivers, and shop owners) were recruited from three urban streets, where these illustrations were described. The imaginary pictures and their scenarios narratives were primarily explained in detail to the participants.

Participants stated on all three visions that due to the expansion of the non-motorised transportation modes, the core requirements for having active transport systems were provided.

It was observed that the first comments of the participants were much more focused on the Avoid and the Improve Vision. They said that due to excess vehicle traffic in the city centre in the Avoid Vision, and cycling lanes for motor vehicles, it would be essential to ensure the safety of cyclists, and that cycle path should be separated from cars with the most convincing arrangement (e.g., a steel barrier). The participants shared their opinions that in the Improve Vision, the development of public transportation systems should be arranged under the hegemony of the rail transport system and that there should be fluid transitions between the vision because the development and design of a sustainable transport system does not just depend on the planning factors, and so that the Improve and the Shift Vision are not mutually exclusive.

It was also observed that, because of the greater reduction of motor vehicles in the Shift Vision than in the others, a few cyclists indicated this vision was the most desirable transportation system. These participants have argued that due to less traffic in the suburbs, closing the road to traffic is not compulsory but cars entering the city centre should be more restricted.

### 6.1.1. What Are the Views of the Participants about the Visions?

The participants stated that they were uncomfortable with burning fossil fuels for public transport, and they believed designing the Improve Vision, with more alternative energy systems, is more important at a time when the effects of global warming are emerging, and it would help to increase awareness in future urban transport systems (see Q1 for participants in Appendix 7).

Some participants desired a combination of common features from the Shift and the Improve Vision for future Turkish urban transportation system. Because traffic in city centres paralyses daily life, lowers the quality of life and threatens the environment, they said that they wanted these places to be social, and they wanted some areas where access to the public transport system would be easy for the individuals who are not able to cycle. Many participants who commented on the Avoid Vision have expresssed they desire barriers between the cycling path and motor vehicles in city centres.

### 6.1.2. Are These Visions Desirable?

The participants' comments on the second survey question in Appendix 7 were divided into two groups based on the applicability of the visions for Turkish urban futures. A significant proportion of the participants believed that these visions would be perceived as a utopian concept imposed by the Turkish local government. They thought that there would be a high possibility of conflict with other transport mode users, where cycle paths are built, and some shopkeepers would be worried that the cycle paths would disrupt their businesses.

The participants with a favourable opinion expressed that similar projects are working in many European countries and that putting the visions into practice would work alongside the interests and relevance of the competent authority to realise these ideas, improving the perceptions of society towards using cycles for

transport and the development of policies. It was also observed that these participants agreed with the participants who held negative thoughts on the imposition of the planning of these visions by the local and central government, without developing the community's awareness.

The vast majority of the participants stated that many of the Turkish municipalities could approve the Avoid Vision because it provides the fundamental infrastructure for the security of cyclists and pedestrians, and has fewer reforms which reduce the number of vehicles.

Some participants felt that the visions might be more achievable if they were restricted to areas close to university campuses rather than city centres and suburbs. They thought the implementation of more sustainable transport visions is not initially related to the financial capability of local authorities. Local authorities can create new economic resources if they have greater enhancement and are willing to build such a vision. They also mentioned that the arguments on why the Improve Vision is necessary and rational appear to be questionable and that it is possible to implement strategies that require less radical decisions.

### 6.1.3. Do Participants Think the Visions Are Consistent with Their Internal Expectations?

Although the participants mentioned if these visions were applied in practice, they could make a great difference to the current situation, they also stressed that in the planning stages of these visions, they could not distinguish clearly between the specific conditions, economic conflicts and the ideal state of public opinion (see Q1 for both participants and experts in Appendix 7). Trends can cause confusion and even inconsistency for these types of visions, and this should be seen as normal.

A few participants stressed that these generic pictures would not be easily possible in tightly curving streets, narrow streets, and unplanned settlement areas due to the physical conditions of the environment. It was also mentioned that cycle paths should not be limited to the main road; there must be a transportation network that comprises all the streets.

It was advocated that the Improve Vision would encourage more people to use cycles and public transport and to walk in an area of reduced carbon monoxide emissions from cars. It was also felt that space sharing between cycles and buses in the city centre of the Improve Vision may create deadly consequences due to the attitudes of bus drivers towards cyclists in Turkey.

For some people, the Shift Vision could provoke negative reactions; for example, for people from upper socio-economic levels, the sharp decrease in the number of cars in the vision would be utopian, due to both the insufficient public transport and its lack of comfort. It was specified that this vision might be a better alternative for the middle-income group.

### 6.1.4. What Differences Would Participants like to see Regarding These Systems?

The participants emphasised that especially in urban centres, it would be ideal to separate the cycling paths from the motor vehicle lanes with solid barriers in all three visions (see Q3 for participants in Appendix 7).

Many participants explained that cycle could be more easily and comfortably integrated with rail systems rather than other forms of public transport. Some participants expressed that reducing the number of vehicles in the Shift and the Improve Vision could be done, with more green spaces. Also in the Shift Vision, the awareness panels on the use of cycles would be an important

step, but a more important intervention would be to train younger children the use of walking, cycles, and public transport.

### 6.1.5. Which Motivations Are Needed for Different Lifestyles?

Many participants felt that the visions would have positive impacts regarding health for the answer of Q2 for both participants and experts (see Appendix 7). They added that there would be a positive reflection of clothing style, the environment, and the perspectives and dialogues of people who use a cycle. It was also felt that increased use of non-motorised vehicles would lead to economic savings for individuals. The visions would result in the creation of more green areas, a reduction of carbon dioxide emissions, healthier lifestyles, and significant reductions in air pollution levels. It emphasised the creation of more green areas in the Improve Vision could create a lifestyle in which individuals live healthier, and a family can spend more time in areas remote from exhaust fumes.

It was stressed that the Avoid and the Shift Vision would be better applications as they divide the transportation of cyclists from pedestrians and vehicle traffic. Some participants said the difficulties they experienced in the Shift and the Improve Vision as anti-cyclist feelings increased by some car drivers and they feel safe cycling routes would not still be sufficient. It was observed that these negative feelings could be reduced by growing awareness and more responsible individuals.

In the Avoid Vision, the participants would use transportation more easily, and they thought it would be a moderate, calmer, and positive impact than the other visions for physical behaviour and morals. Especially about giving priority to pedestrians by vehicles, it was said that the transition would contribute to a feeling of equality in society. Also, they stressed that the use of

transport modes in a more balanced way could avoid chaos and confusion in their personal lives, and would be a positive move.

In the Shift Vision, the participants reported on lifestyles with more revitalised social life and a more culturally diverse society in which a reduction in transport increased cohesion between people using motorised traffic. Participants believed that in this vision, where the return of the cycle and pedestrian accessibility is improved, over time there could be an improvement in society's perception of the vision as well as in public health and socialisation. They said the Shift Vision, compared to the other visions, would also be important regarding reducing tobacco use because the sharing living spaces are covered with more social reinforcements, and the streets are restricted from motorised transport vehicles more. Participants thought cyclists would suffer less verbal abuse by pedestrians and motor vehicles in such a space.

Another important intervention in the formation of this lifestyle is to restrict the entry of cars into the city centre, widening the pedestrian pavement, people using secure cycling parking and lanes.

### 6.1.6. What Should Central and Local Governments Do?

According to the participants' comments on Q3 for both public and experts (see Appendix 7), non-governmental organisations should try to convince the Ministry of Health that cycling transportation can reduce treatment and hospital costs. The participants thought the central and local relevant departments should have a budget that they have to use consistently, and if they can turn it into a presentation that benefits the local economy by creating a financial advantage, they can reach a better conclusion. At the same time, it was stated that the population of the municipality is strengthening regarding powers and budgets of local government in the creation of the sustainable transportation

system. People who found the Shift Vision a more utopian vision compared to the others said that the most critical intervention is that politicians use local sustainable transport rather than the authorities' luxury vehicles.

At the same time, some of the most prominent proposals given by participants on the question of what kind of incentives would be more useful, are improving public transport, parking for people using cycles, the provision of privileges in food and beverage expenses, and in housing purchases, lower taxes on the prices of high-quality cycles. Also, one participant stated that some cyclists need to raise awareness of using cycles seriously and for this reason, it could be a condition of receiving the driving licence document. They said such an application would also be applicable, as it would bring commercial revenue to the central government.

The participants were finally asked to estimate which vision would be more cost-effective in the creation of sustainable lifestyles. It was observed that participants understood that these visions would be financially costly but would be profitable in the long-term. In line with the estimates they have made, and considering the cost of the Avoid Vision would be less but will bring clear benefits for lifestyles and the economy, the participants suggested that as Turkey is a country that has no oil reserves, if the current system is supported by developments in public transport and alternative energy supplies, it will contribute substantially to the national economic, ecological, and community health targets.

## 6.2. The Requirements of Different Groups

### 6.2.1. Pedestrians

Participants preferring pedestrian transportation stated that if other users show adequate attention to traffic rules, the Avoid Vision would be a more

alternative future for the Ataköy settlement area. However, some participants argued that even though they liked the fact that in this vision, infrastructure systems were developed to support pedestrians' safety, the vision was more designed for motor vehicle users.

Ataköy15, male, 26-35: *"In the Avoid Vision, a design more directed at cars were made. Here, the quality of pedestrian transportation is also critical because the distance between houses is large because there are green spaces and walking sidewalks."*

Some pedestrians stated this in Shift and Improve Vision, but on the other hand, there is adequate space for pedestrians.

Box 6.1 shows that pedestrians have significant difficulties in comfortable transportation on the University campus. It was determined that in the Avoid Vision, infrastructure systems were designed for pedestrians could be effective in providing for convenient transportation. However, car park arrangements would reduce pedestrians' movement capability. It has been expressed that, rather than having car park arrangements on the main road, with each school having their car park area independent of the main road, wider pavements could be allocated for pedestrians. Additionally, it was stated that the creation of a more people-oriented urban environment in the vicinity of the university would be easier compared to any location in the city centre. A vast majority of the participants said universities have a young, student population, and traffic designs that are more social and people-oriented, as in Shift Vision, would be reasonable.

Additionally, pedestrian participants stated that the Shift Vision could create a better campus environment and could increase people's physical activities. Participants have expressed that, in the Improve Vision, there are wide pedestrian pavements and that cars are adequately restricted.

*“On some streets, I have difficulty in walking because the pavement width is narrow. In the university, there are comfortable transport problems for pedestrians and cyclists. In the Avoid Vision, having a safer and more comfortable lane for bicycles and pedestrians could be more reasonable.”* (Yıldız22, female, 36-45).

*‘‘The Shift Vision could increase people's physical activities to a significant extent but still, could it be implemented? I am not sure. İstanbul's winter is not very cold. Before, all the car-park problems need to be solved.’’* (Yıldız29, male, 18-25).

*‘‘The Improve Vision has brought a solution to the needs of all transportation users. Especially there are wide pavements for pedestrians.’’* (Yıldız33, female, 18-25).

*‘‘No need for vehicles inside the campus. 1 and 2 of every 100 people coming to the university provide for their transportation with their cars. In other areas, there should not be any need for a car. In the inner sections, the pavements need to be wide. University is especially a place where young people and studies are plenty; therefore, as well as walking will not pose a significant difficulty, it would also enable carrying out physical activities.’’* (Yıldız 19, male, 26-35).

*‘‘In the Avoid Vision, with making car-parking on the roadside, a less comfortable area was created for pedestrians. Instead of that, by setting up a car park arrangement within each school, wider pavements for the pedestrians should be created. For example, people want to walk when going to the cafeteria and in the Avoid Vision, instead of the place allocated for the car park, widening the pavement could be more reasonable.’’* (Yıldız22, male, 36-45).

*‘‘It should not be a system supporting automobile users, as in the Avoid Vision. Universities need to be made into more social areas. It could be easier to convert these places to a human-oriented urban environment, compared to the city centres.’’*
(Yıldız24, male, 18-25).

*‘‘I think a single-lane system reserved for public transportation systems could be ideal. But if the Improve Vision happens in this manner, automobiles would park on the pedestrian way; there is no guarantee for that. What is important here is to prevent this bus road being used by cars. For example, there have to be systems opening and closing at the entries and exits of this path. If no such application exists, automobiles will violate the pedestrian ways.’’* (Yıldız28, male, 46-55).

**Box 6.1.** The views of pedestrians on the visions at the University.

A participant using pedestrian transportation in the city centre explained the most important reason is preventing the comfort of pedestrian transportation is that cars invade the pavements. One participant said that the barriers in between the cycling and motor road in the Avoid Vision were significant for both ensuring the safety of cyclists and giving pedestrians more comfortable transportation in the narrow streets.

Nuhkuyusu37, male, 36-45: *"The reason that traffic gets congested is that cars violate the pavement. To solve the parking difficulty, preparing pockets at specific distances are required. Here the pavements are very narrow. The barriers would prevent automobiles parking on the pedestrian pavement. The obstacles in the Avoid Vision can provide for the comfort of both the pedestrians and the cyclists"*.

Another participant stated that developing a public transportation system could create a more environmentally friendly and less noisy urban space for pedestrians.

### 6.2.2. Cyclists

In Box 6.2, Ataköy cyclists stated that in the Avoid Vision, crossovers were shown more clearly and that in the Shift Vision, conflicts between cyclists and pedestrians could happen. At the same time, the participants expressed that for one of these two visions to be implemented, society needs to become more aware. It was said, for example, that the large equipment for non-motor vehicle users in the Avoid Vision could be abused by automobile users and for the Shift Vision to achieve its objective, in turn, people's awareness and understanding for different transportation users needed to be developed.

*‘‘In the Avoid Vision, it is clearer on which side of the road bicycles and pedestrians can go across. In the Shift Vision, it is not very clear, in particular through where the bicycle path could go. For example, two different bicycle paths intersect at the midpoint of the road, and the bicycle path is provided over a single alternative track. It looks like at some points on the road; traffic confusion can arise between the bicycles and pedestrians. In the Avoid Vision, providing a means for the bicycle and pedestrian ways to cross the road in a parallel way made it logical.’’* (Ataköy13, male, 26-35).

*‘‘In our country, if we design intersections as in the Avoid Vision with infrastructure systems in this manner, it would create sociological problems. A vast majority of people do not have the adequate capacity to practice and comprehend this. These systems could be easily abused.’’* (Ataköy11, male, 46-55).

*‘‘There are many people using bicycles, skateboards, and skates in Ataköy. In some places, there are bicycle tracks in Ataköy. For the Shift Vision to have practicability requires people's education levels to reach an adequate level.’’* (Ataköy3, female, 26-35).

**Box 9.2.** The views of cyclists on the visions in Ataköy.

Box 6.3 explained that for users who access the university by cycle, all three visions offered desirable transportation systems. It was stated that because the university is an isolated system and that cycling integration into public transportation systems was poor, sharing systems with cycles, such as in the Shift Vision could encourage more users towards this type of urban transportation.

*‘‘Bicycle tracks at the university are straight and an ideal place for bicycle transportation but because there are no bicycle tracks, we are using the pavements utilised by the pedestrians. In all three visions, separate bicycle tracks have been thought of; therefore, all visions can be ideal for the cyclists.’’* (Yıldız19, male, 18-25).

*‘‘I am a bicycle user, too but at the university, the bicycle track ends at the metro entrance. The bicycle path needs to be designed as in the Avoid Vision; in a manner with an elevated difference from the automobiles. Also, after the passage of cyclists across the road, again bicycle tracks with an elevation different from motor vehicles are needed.’’*
(Yıldız25, male, 26-35).

*‘‘It is almost impossible to reach the university in a manner integrated with the metro. Bicycle sharing systems within the school as in the Shift Vision could encourage more people to use bicycles.’’* (Yıldız31, female, 36-45).

**Box 6.3.** The views of cyclists on the visions at the University.

In Box 6.4, cyclists stated that in the Improve Vision, bicycle tracks being in between the public transportation system and the cars was a design error. The participants emphasised that for public transportation, the single lane road separation on the right-hand side of the path was correct; however, developing cycling tracks on the right-hand side of the public transport lane was essential for the safety of the cyclists. These participants expressed that different types of public transportation in İstanbul (minibuses, taxis, and public buses) could make more frequent lane changes to take more passengers, and could particularly violate the cycle lane. In that case, the Improve Vision could pose a threat to the safety of the cyclists.

*‘‘Having the bus being able to go on the right lane over the main artery is an excellent project, but the bicycle track needs to be closed on both sides with barrier-bands. Pedestrian and bicycle transportation could be more compatible. As both are slow transportation modes, it is better for them to go from the same place. And also, the barriers within prevent automobiles violating the pavements, and the public transportation vehicles would not strike bicycles in the right and left turns.’’* (Nuhkuyu41, male, 36-45).

*‘‘It is nice to reserve a separate lane for public transportation systems in İstanbul. The Improve Vision is an ideal system. In my opinion, it is a system that should be in our country because the bicycle culture does not exist much. In traffic, automobiles and buses changing lanes by violating this track will become a very ordinary situation; therefore, there will have been no bicycle path that existed.’’* (Nuhkuyusu43, male, 56-65).

*‘‘The bicycle tracks needs to be not in the middle. In Rome, the bus moves along a single lane, but for us, because the public transportation systems are under different companies, minibus drivers entering into competition with municipality buses to take more passengers is very possible. Therefore, the Improve Vision can pose an accident risk for cyclists. The bicycle track needs to be taken inside both for safety and to prevent violations.’’*
(Nuhkuyusu51, male, 36-45).

**Box 6.4.** The views of cyclists on the visions around the city centre.

### 6.2.3. Public Transport Users

In Box 6.5, public transportation users in Ataköy said that the Avoid Vision would be inadequate regarding a more environmentally friendly transportation system and would also not offer a solution for the noise in this area. The participants stated that because Ataköy's largest taxi stand in the vicinity of the metro station is in this area, it would not be possible to entirely close the road to motor vehicles as in the Shift Vision. These participants stated that the restriction of this vision on motor vehicle use in most settled areas of the main cities like İstanbul would not be possible. Additionally, it was said that to be able to design roads with separate lanes for buses in the Improve Vision, firstly, these systems needed to become more comfortable and affordable. It was

said that the Improve Vision, with the reservation of a separate road for public transportation, both public transport types could be encouraged, and by keeping transfer congestion to a minimal level, vehicle use could be prevented.

*‘‘I believe that existing infrastructure systems are not adequate for helping people to use public transportation systems. I first go to the metro by taxi in order not to get mixed up in the vehicle traffic in İstanbul, and from the metro, I reach the workplace. So as not to lose time in traffic. This infrastructure system should be made adequately prevalent so that then the conditions can arise for people to use public transportation systems rather than their cars.’’* (Ataköy2, male, 36-45).

*‘‘The Improve Vision has allocated single lanes and separate roads for public transportation; therefore, there also will be no chaos among the motor vehicles. For example, buses stopping at the bus stops to take in embarking passengers will not reduce the automobile's speed. At the same time, there will be less vehicle traffic in this area.’’*
(Ataköy7, male, 26-35).

*‘‘In a city like İstanbul, where 15 million people live, I think a joint vision bringing the best solution to everybody's transportation problem would be more desirable. I believe the Shift Vision limits freedom of travel for motor vehicle users too much. The Improve Vision, on the other hand, both provide a faster transportation system by allocating separate roads for buses and offers a better urban area for bicycle and pedestrian transportation users.’’*
(Ataköy14, female, 26-35).

*‘‘Many people have cars, and even though they know about the traffic congestion, they do not want to use public transportation systems. That's because these systems cannot provide for comfortable transportation in the present situation. Instead of that, they prefer to travel with their cars even though they know of the traffic congestion. To the extent, public transportation systems are accessible, comfortable and cheap; people would quit using automobiles.’’* (Ataköy10, female, 45-55).

*‘‘In this area (Atrium) there is Ataköy's biggest taxi stand. Many people are using the taxi there. Closing off the road as in the Shift Vision seems very problematic.’’*
(Ataköy4, male, 26-35).

**Box 6.5.** The views of public transport users around the city centre.

*‘‘Even three minutes is necessary for the condition of students being late for class in the morning. The Improve Vision can offer fast transportation, and everyone can drop off at his or her faculty. In the Shift Vision, with the closing off of the areas, walking distances will increase too much and will cause a stressful situation, especially for students.’’*
(Yıldız20, female, 18-25).

*‘‘There may be difficulty in the implementation part of the Improve Vision. That's because of minibuses and municipality buses race among themselves to take on passengers at the university. It would be difficult reserving a single lane for buses, especially in the implementation part. In the meantime, a very dense pedestrian way is not being used.’’*
(Yıldız26, male, 18-25).

*‘‘Many of my friends and I do not have a car. I also think those with a car can walk this distance. I think the Shift Vision can create a campus atmosphere more.’’*
(Yıldız32, male, 18-25).

*‘‘In the Shift Vision, not having any vehicles would create problems. It does not seem possible that this could be implemented. As there will not be too much traffic in the university, having the single-lane road of the Improve Vision could be adequate. In the existing campus, there needs to be a road line surrounding the university on the outside.’’*
(Yıldız30, male, 18-25).

*‘‘In the summer term, it is nice to have social areas. In winter, public transportation and automobile transportation will be more. Therefore, the single-lane road will be a bit problematic. Especially in the winter term, it would be problematic.’’*
(Yıldız21, male, 18-25).

**Box 6.6.** The views of public transport users at the University.

Box 6.6 summarises the opinions of public transportation users on different alternative visions designed at the Yıldız Technical University. Even though the participants thought that, especially in the early hours of the day, there is a need for more efficient and fast public transportation systems within the campus, and therefore, even though the Improve Vision would create a better campus atmosphere, the vision would create a much more stressful situation by increasing walking distances, particularly for the students. One participant stated that different public transportation companies within the

university are in competition among themselves, even when in traffic, to take more students and therefore, the single-lane public transport road could create difficulties in its implementation. On the other hand, another participant maintained that because there is not much traffic at the university, a single-lane bus road could be adequate.

Public transportation users said that the Nuhkuyusu Street location is critical because links to many main arteries and they thought one lane should be reserved only for public transportation systems, along with all the main arteries.

Nuhkuyusu39, male, 46-55: *"The location of this street is very critical. There is serious traffic congestion here; therefore, there is a grave need for public transportation. It is very close to Kadıköy and Üsküdar. It is very close to absolutely essential locations, such as the Bosphorus Bridge, Ümraniye and Ataşehir; therefore, reserving a lane for public transportation is needed."*

A small number of participants stated that because the public transport lane on the right-hand lane gives the impression that it goes in a similar manner to the Metrobus systems along the main artery, both sides of the cycling road need to be closed with iron barriers to motor vehicles. A large number of participants stated that in the Improve Vision, shifting the location of the bus lane with the cycle lane would be essential to ensure the safety of cyclists; otherwise, public transportation vehicles could create dangerous situations.

Nuhkuyusu51, male, 36-45: *"In the Improve Vision, having the bicycle track in this manner seems very risky. In the Avoid Vision, the left-turn is problematic. Not having a circular intersection will reduce movement capability and may cause traffic congestion."*

On the other hand, a few participants stated that having the bus lane on the right-most lane in the Improve Vision gave the impression that these systems, like the Metrobus systems, went only along the main artery. They

recommended, therefore, that only the cyclists needed to be closed off with iron barriers on both sides.

### 6.2.4. Drivers

Box 6.7 explains that car drivers consider the Avoid Vision as a more acceptable transportation vision over the next 20 years in Ataköy and its vicinity. These participants think that Ataköy is a transit region for accessing the coastal road and therefore, in the event of the road being closed off as in the Shift Vision, traffic problems could arise in other streets. The participants argued that the majority of the people living in this area are within the high-income group, who prefer to use automobiles and therefore, a reformist approach, which does not diminish vehicle use, would be ideal. Some participants have stated that because public transportation systems are not prevalent in this area, a single-lane, as in the Improve Vision, would be difficult, but speed limits, such as in the Improve Vision could be more useful because there are more families with children in this area.

*‘‘Closing off the road in Ataköy is difficult. A highway system needs to be designed by which procedure can directly go to their homes. There also is not too much public transportation in Ataköy. Two different bus lines come into Ataköy. The Avoid Vision looks like the most functional system. It’s hard to make public transportation systems prevalent in Ataköy because people living here are the upper-crust. A part of the people living here use the vehicles their companies give [them]; therefore, I don’t think the Avoid Vision which public transportation systems become dominant will be practical.’’*
(Ataköy4, male, 26-35).

*‘‘Also, because families with children are many in this area, reducing the speed limit is important in my opinion. The Avoid Vision nice regarding children's safety.’’*
(Ataköy8, female, 36-45).

*‘‘Some automobile drivers use it as a transit pass, extending their way in order not to get jammed in traffic. Especially not to get jammed in the traffic in Sefaköy-Küçükçemece. They go to E5 from Florya; therefore, the single-lane, one-way vehicle traffic in the Improve Vision could create congestion in other roads.’’* (Ataköy12, male, 26-35).

*‘‘It seems traffic should also not be closed off too much. That's because the roads closed off here create even more traffic congestion in other areas.’’* (Ataköy5, male, 36-45).

*‘‘The Avoid Vision seemed more logical as Ataköy is on the sides of various accesses. Ataköy is not a very isolated neighbourhood. Many vehicles use this area as a transit. It is close to the Metrobus and metro lines. If we are to address the southern parts of Ataköy, there is again the coastal road. For example, if it were Bahçeşehir, it has an approximate population of 150 thousand, but because there is not too much vehicle traffic, the Improve Vision could be more appropriate but for Ataköy. The Avoid Vision could be better.’’*
(Ataköy9, male, 46-55).

**Box 6.7.** The views of drivers on the visions in Ataköy.

Box 6.8 shows the opinions of car drivers regarding the alternative transportation visions around the university. The participants have firstly prioritised solving parking problems, as creating solutions for the transportation needs of car users around the university could be harder than those of cyclists, pedestrians, and public transportation users. The participants said that the

Improve and the Shift Vision could create car parking problems and that in such an implementation, it would be inevitable for cars to park on pavements or the cycle track. Additionally, some participants have said that there are adequate society spaces within the university and therefore, it would not be logical to close the roads reserved for motor vehicles and create a bigger social area because there is a significant distance between the many centres within the university. On the other hand, these participants emphasised that even when such a social area application is to be designed, then it should be in alternative areas, which do not prevent motor vehicle passage.

*‘‘There will be car park problem in the Shift and the Improve Vision. These visions will cause some problems for automobile users.’’* (Yıldız18, male, 26-35).

*‘‘Having a good public transportation system is required. Lacking parking is a great difficulty; therefore, vehicles will park on the pavements after some time. But, the application of the Avoid Vision could be very expensive; therefore, it could also not be closed off to vehicle traffic. In a place like this by designing areas like in the Shift Vision, small parking areas can be designed. Vehicle passage should be presented because this cannot be prevented; it could be in theory but it could not in practice. The vehicles should be more presented because there are significant distances inside the university.’’* (Yıldız23, male, 26-35).

*‘‘The Avoid Vision is more ideal. I am someone coming from the outside with my vehicle. I do not know the routes of bus transport. Perhaps it does not pass from the road I will go or passes less frequently. I am not sure. The Avoid Vision provides at the same time, adequate areas for the cyclists and pedestrians as well. Within the university, providing for transportation for the students with ring trips could not pose a problem, but for those who are coming to the university for the techno-city, like mentioned, or those coming to meet their various needs, the Improve Vision could cause problems.’’* (Yıldız34, male, 46-55).

*‘‘In the Shift Vision, instead of closing off a particular section of the road and creating a social area, such areas could be formed in different areas where the road does not pass.’’* (Yıldız21, female, 26-35).

*‘‘There are adequate society areas in the university. Thus I think if we narrow down the roads and close them to traffic this could then pose problems.’’* (Yıldız27, male, 18-25).

*‘‘In the Improve Vision, there would be difficulties due to the road being a single-lane. This school has a very serious car park problem. This would have been met too. Car park lines should be arranged horizontally; for example, instead of vertical lines, drawing with 45-degree lines is better.’’* (Yıldız35, male, 46-55).

**Box 6.8.** The views of drivers on the visions at the University.

Participants who drive on Nuhkuyusu Street stated that this street does not support the traffic demand and at the same time, is a narrow street. They have said that since the hospital's access is also on this street, closing it to vehicle traffic as in the Shift Vision would be difficult.

Nuhkuyusu38, male, 36-45: *"This road cannot support the traffic load. At the same time, this street is a narrow street. Because it is the hospital road traffic is also needed, it should be a mass-transportation dominant road. It is the main artery road with Kadıköy. Narrowing the road is tough. In the Shift Vision, if a car or a bus stop, the traffic would get suddenly jammed in a moment."*

Nuhkuyusu42, male, 26-35: *"This street gets crowded even when there is a funeral. There is an obligation to have a car park when erecting a building, but the municipalities turn a blind eye to this obligation. According to the construction code, there is the requirement to have a car park on every building, but it does not happen much in practice. I do not look favourably on behalf of narrowing the street, especially for vehicle users.''*

### 6.2.5. Shop Owners

Shop owners have stated that because Ataköy is a regional area, different transportation visions would not constitute an advantage or disadvantage for them.

Ataköy5, male, 36-45: *"Not having vehicles would adversely affect the people. As Ataköy is a local place, I do not think it would make much difference for us, but it could be a more peaceful place for those living here. Everyone is moving in the areas they are in. They do not much use public transportation either. This area has an impassive street. In many places, there are no signs for pedestrians."*

Another participant, in turn, has expressed that the public transportation predominant vision could bring more customers to the shops in this region.

Ataköy9, female, 26-35: *‘‘Not enough public transportation is used in Ataköy. A vision that public transportation system is greater may cause more customers to visit our store.”*

Box 6.9 summarises that for shop owners, for freight transport operations to become easier, having at least a single-lane road is essential. These participants have said that in the Shift Vision, the freedom of motor vehicles is restricted too much.

*‘‘In the Shift Vision, passages for vehicles have been limited too much. When coming to the university, I continuously have to bring in and take away things. There could be a one-way road as in the Improve Vision, and more attractive social areas could be created within the university. It is a field in which students are dense, so the Shift Vision could be more ideal, but still, a need for a road lane for the vehicles would arise.’’* (Yıldız17, male, 26-35).

*‘‘Sometimes there can be a situation of having to reach a place in the university; therefore, I may need the car. The bags I need to carry are heavy, and our campus is large, so carrying them can be tough for me. It would also not be possible for me to bring in from the university entrance; therefore, there should be lanes for the vehicles. If the drivers want to make an interim stop, a problem can arise. Still, it looks like having a two-lane road is essential. Otherwise, there would be transportation problems.’’* (Yıldız16, female, 26-35).

**Box 6.9.** The views of shop owners on the visions at the University.

In Box 6.10, all the store owners expressed that narrowing the road on the Nuhkuyusu Street for car users would create great disadvantages for them. It has been observed that the participants, with their customers being car users and public transportation users, on the other hand, use this street in transit and

therefore they would prefer to the Avoid Vision such a manner that car users could still pull by their shops.

*‘‘If the road becomes a single-lane, it would create significant problems for the tradesmen. I do not think it's appropriate to reserve this much pavement for the pedestrians. That's because if vehicle traffic is not adequate, the vehicles could not park and if they want something from the tradesmen, they cannot buy it. This road still needs to be two lanes. I mean it has to be two-way and two-lanes. For this system to be realised, car parks need to be made underground, or pockets will be done here. If it is single-lane, when the cars stop, the cars behind will wait.’’* (Nuhkuyusu46, male, 36-45).

*‘‘The cars not being able to park means our business also being impacted to a significant level. That's because our customers are vehicle-using customers. Public transportation users use this road in transit. Our customers are car drivers, meaning not flowing customers (public transport users).’’* (Nuhkuyusu53, male, 46-55).

*‘‘For the tradesmen, they do not lend themselves to any project as long as there is no parking. As there is not much pedestrian traffic here, I do not find it appropriate to reserve this much huge area. There are hundreds of people do retail along the Nuhkuyusu Street. If automobile drivers cannot stop where they want to stop in a manner not to cause a traffic jam, it is definite that the businesses of the tradesmen will be very seriously impacted. Because of the renovation on this side, I have a daily €150 loss. No vehicle driver can pull up by retail area. It would not be important even if there is a car park two kilometres away, what's important is that the vehicle can pull up in front of the tradesman. 80 percent of the retailers' customers here consist of vehicle drivers.’’* (Nuhkuyusu47, male, 46-55).

**Box 6.10.** The views of shop owners on the visions around the city centre.

## 6.3. Justification of the Visions

Table 6.1 summarises the fundamental views of participants for different transportation modes (pedestrians, cyclists, public transportation users, and car drivers) on the three alternative futures created for different hypothetical Turkish urban streets. This table reveals the positive and negative aspects of participant opinions and appraises the visions alongside each other regarding their scores. During the evaluations, according to the effect, values for the positive opinions of the participants (0.5 or 1) were added to the neutral value score, which is 3. For example, while 0.5 was added as pedestrian participants preferred the presence of infrastructure systems supporting pedestrian safety in the settlement area compared to other visions as a more ordinary approach, in the opinion of pedestrian participants in city centre, cycle barriers would offer more comfortable pedestrian transportation as it would prevent automobiles parking on the pavements, so a value of 1 was added. Likewise, while 0.5 points were deducted from the pedestrians' opinion that the settlement area in the Avoid Vision was designed for motor vehicle users, and for the opinion that car park arrangements in the university would reduce the pedestrians' walking comfort, 1 point was taken from the neutral score.

**Table 6.1.** Summary of the different groups' opinions about the visions.

| | | Avoid Vision | Shift Vision | Improve Vision |
|---|---|---|---|---|
| **Pedestrians** | Suburban area | Developed infrastructure systems support the safety of pedestrians. (+0.5)<br>Gives the impression that it was made for motor vehicle users. (-0.5) | Has an adequate area for pedestrians. (+1) | |
| | University | Car park arrangements reduce pedestrians' capacity of movement. (-0.5)<br>In inner sections, pavements should be wider. (-1) | Creating a more pedestrian-oriented area around the university is essential and easy. (+1)<br>Increases peoples' physical activities. (+0.5) | Has wide pavements. (+0.5)<br>The possibility of automobiles parking on the pavements is high. (-1) |
| | City centre | The barriers between the bicycles and motor vehicles also prevent automobiles from parking on the pavements, offering more comfortable transport. (+1) | The possibility of pavements being violated by cars is high. (-1) | A more environmentalist and less noisy urban area. (+0.5) |
| **Overall scores** | | **2.5** | **4.5** | **3** |
| **Cyclists** | Suburban area | Cyclists' passage across is shown more clearly. (+0.5)<br>Safety systems designed for pedestrians being highly abused by automobile users. (-1) | The possibility of having conflicts between cyclists and pedestrians is high. (-1)<br>The route through which the bicycle track can go is not very clear. (-0.5)<br>Society's level of awareness is low for being able to implement these systems. (-1) | |
| | University | The bicycle rack is designed to have an elevated difference from the automobiles. (+0.5) | As the university is an isolated system, creating bike sharing systems is easier. (+1) | The bicycle path is adequately thought out. (+0.5) |
| | City centre | Pedestrian and bicycle transportation is more in harmony. (+0.5) | Pedestrian and bicycle transportation is more in harmony. (+1) | The possibility of bicycle tracks being violated by different public transportation types is high. (-0.5)<br>High risk of deadly accidents for cyclists. (-1) |
| **Overall scores** | | **3.5** | **2.5** | **2** |
| **Transport users** | Suburban area | | Because of Ataköy's large taxi stand, closing off the road entirely would be tough. (-1) | More comfortable and cheaper public transportation. (+0.5)<br>By keeping traffic congestion to a minimum, vehicle use can be prevented. (+0.5)<br>With allocating a separate lane for mass transit, a more efficient and faster system is created. (+0.5)<br>As public transportation systems are not adequately prevalent, this application cannot be easily introduced. (-0.5) |
| | University | Inadequate offer towards an environmentalist campus system. (-0.5)<br>A more efficient and fast public transportation systems are needed within the campus in the early hours of the day. (+0.5) | The possibility of creating a more stressful situation in the initial hours of the day. (-0.5)<br>In the existing campus, there needs to be a road line surrounding the university on the outside. (-0.5) | A more efficient and quick public transportation system is needed within the campus in the early hours of the day. (+0.5)<br>Difficulties in the implementation of the single-lane mass transit road. (-1)<br>The possibility of implementation exists due to the lack of large vehicle traffic and dense student potential. (+0.5)<br>The need for public transportation and automobiles increases in the winter. (+0.5) |
| | City centre | Lacking around the intersection may reduce the capability of movement and cause traffic congestion. (-0.5) | | As the street is the main artery, it is necessary for public transportation. (+0.5)<br>Can offer a better solution for traffic congestion. (+0.5) |
| **Overall scores** | | **2.5** | **1** | **5** |
| **Drives** | Suburban area | A predominantly high-income segment. (+1)<br>Speed limit practices reduce concerns for families with children. (+1) | The closing off of the road presents the possibility of causing traffic problems in other streets. (-0.5) | |
| | University | | Ambiguities in the solution to the car park problem. (-0.5)<br>Long distances in between many central points. (-0.5)<br>There is the possibility of designing aims for social areas, not restricting motor vehicle traffic. (-0.5) | Ambiguities in the solution to the car park problem. (-0.5) |
| | City centre | Difficulties in narrowing the road. (-0.5)<br>Difficulties in turning to the other side of the road. (-0.5)<br>A single-lane road can cause shortstop problems. (-0.5) | Difficulties in narrowing the road. (-0.5) | Can offer an easier solution for traffic congestion. (+0.5) |
| **Overall scores** | | **3.5** | **0.5** | **3** |
| **Shop owners** | Suburban area | | Does not affect them adversely as it is a local place. (+0.5) | Public transportation-heavy systems could bring in more customers. (+1) |
| | University | | Difficulties in carrying cargo and goods. (-1) | The need for at least a single-lane road. (-0.5)<br>Possible problems with shortstops. (-0.5) |
| | City centre | Will affect shop owners economically. (-0.5)<br>Car park problems. (-0.5) | Actual customers are automobile drivers. (-1)<br>The need for at least a two-lane road. (+0.5) | Public transportation users only use the street for transit. (-0.5) |
| **Overall scores** | | **2** | **2** | **3.5** |
| **Average scores** | | **2.8** | **2.1** | **3.3** |

Table 6.1 shows participants believed that it was necessary to create a more human-focused urban area, especially in the vicinity of the university and in such an approach, in a place where the student population is large, it enables pedestrians to do their physical activities. The participants stated that the Shift Vision is a more desirable vision for the pedestrians. On the other hand, in this vision, they also emphasised that the possibility of cars violating the pavements in the city centre was also significant.

Table 6.1 explains that cyclists expressed the reason why the Avoid Vision is an ideal transportation system for them is that the relationship between the cyclists and the pedestrian is shown in a clearer manner. The participants said that in the Shift Vision, the connections between cyclists and pedestrians were not clear and accidents among non-motor vehicle users were probable. Many participants emphasised that there is a design error in the Improve Vision, and because cyclists and pedestrians are more in harmony, the cycle track and the bus lane should trade places. The participants also said that in this vision, it was otherwise inevitable that cyclists would be exposed to higher accident risks.

This table clearly shows that public transportation users preferred the Improve Vision in all locations compared to the other visions. These participants said that a cheap and comfortable transportation system in the settlement area would encourage more people to use public transportation and that no conflicts would occur between the motor vehicle roads. The participants stated that on the university campus, traffic congestion was not great as the student population is dominant, and a system based more on public transportation systems could be workable. At the same time, public transportation users stated that it was important for students to go to their schools in the early hours of the day, and to that end, an efficient and fast public transportation system was essential for the university.

In Table 6.1, the conflicting opinions of car users regarding the Shift Vision come to the forefront, in which particularly non-motor vehicle use would

be developed to the utmost. Among such opinions were that with the closure of the settlement area to traffic, traffic congestion in other streets and roads would increase; in universities, social spaces could be designed in a manner that did not alter the traffic lanes; and attention was drawn to the difficulties in reducing lanes, as the street in the city centre is the main artery. The same participants stated that in the Avoid Vision, the reduction of lanes in the city centre was problematic and that in a single-lane city centre, the traffic could become jammed in the event a car stopping or turning left. On the other hand, the participants found the Avoid Vision more acceptable, as vehicle use is restricted less in the settlement area.

According to the opinions of shop owners, they expressed in turn that because that settlement area is a local place, it would not pose a distinct advantage or disadvantage for them; however, developing public transportation in the Improve Vision could attract more customers to the area. These participants also said that in the university, there had to be at least one lane to carry goods and cargo and therefore, closing off the campus to motor vehicles, as with Vision, would be a disadvantage for them. All of the shop owners located in the city centre said the ideal vision for them would be Avoid Vision which automobiles could access their shop front. These participants said that in the Avoid Vision, car users could not pull up in front of their shops because the road would be a single-lane, and in the Improve Vision, public transportation users would use this street in transit and would not be their real customers. Therefore, they underline that in the city centre, the Improve Vision is an ideal future compared to the other visions; however, additional spaces needed to be opened into the inner parts to provide ease of parking.

## 6.4. Summary

In this chapter, the locations reflecting the transportation characteristics of the settlement areas in Turkish urban areas were first described. Then, each vision for these selected areas was drawn via a 3-D computer program, given the reference data tables in Chapter 5. In the second part of the study, the face-to-face street interviews were conducted with approximately 50 participants at the selected three locations where the generic pictures were conducted.

The main argument of the participants is that these visions represent desirable transportation futures for Turkish urban areas and that if these kinds of future exercises could not be accomplished, Turkish cities will become less liveable places. In general, the pedestrians argued that the Shift Vision could be more desirable vision because wider spaces for their needs may be easily supplied, especially in the vicinity of the university campuses. The cyclists expressed the reason why the Avoid Vision is an ideal transportation system for them is that the traffic rules between the cycling and walking are shown in a clearer manner. The public transportation users found the Improve Vision as a more essential future in all locations compared to the other visions. This is because fast and comfortable public transport systems are crucial for people to go to their works (or schools) in the early hours of the day. The car drivers thought that future visions should not be compelling because the closure of some settlement area to traffic would increase traffic congestion in other streets. Therefore, they found the Avoid Vision is more reliable to implement as private car is restricted less in the settlement area. The shop owners oppose any future visions where private car users could not pull up in front of their stores because they see the car drives as their main customers. Therefore, they advised that the Shift Vision is more ideal compared to the other visions; however, additional pockets needed to be opened into the inner parts to provide ease of parking.

# CHAPTER SEVEN: EXPERT OPINIONS ABOUT THE VISIONS

## 7.0. Overview

The goal of this chapter is to obtain expert opinions to justify different alternative visions developed for the urban areas of Turkey. The chapter contains firstly the major comments of the experts about the visions and the steps to be taken to implement these visions in Turkey. This chapter is conducted to examine the fourth research objective of this project, as designed in the previous Chapter 6. The experts were asked to disclose their views on the driver changes of each vision as adopted from Section 2.6.1 for the vision development of this study in Chapter 4. Experts from different professions were able to be recruited from only two major Turkish cities where more potential experts who might be involved for this part of the study (see Section 3.3.3). The opinions of the volunteer experts are summarised in several boxes and tables in line with the main variables of each vision. The consistency of three different visions is compared and evaluated according to their opinions.

## 7.1. Expert Opinions about the Visions

In this part, the experts' opinions about alternative transportation visions are sought. The primary views of the experts in the study indicate that such futures are essential transportation needs for Turkey, but these also contain several uncertainties. It was noted that the negative views of the experts regarding the visions are focused on the present transport infrastructure systems, social challenges, and the actions to be taken to implement the visions including social, institutional, and political strategies.

Box 7.1 shows the significant need for sustainable transportation visions that the number of registered vehicles in traffic continuously rises and it leads to significant traffic jams. It was implied that even small cities would shortly become large parking areas if the increase in vehicle traffic is not prevented.

The experts reported that the general situation was mentioned, as the ideas about the development of the alternative transportation visions were acknowledged and visualised. Furthermore, it was explained that the requirements of different transportation users were clearly considered and the universal approach was used for reducing the lanes of cars for the development of sustainable transport.

*“About 450 new automobiles join the traffic in İstanbul every day, which produces a new traffic jam of approximately 3 km.”* (Ist07, female, lecturer, urban regional planning).

*“We need to adopt this alternative transportation system anyway. It looks more and more like we cannot live. If we do not emphasise public transportation or bicycle transportation more, İstanbul will become a giant car park. Small cities are developing similar demands as well.”* (Ist01, male, transportation engineer, civil society organisation).

*“I have many acquaintances that love cycling but do not use bicycles because of safety concerns.”* (Ist06, male, urban planner, civil society organisation).

*“I think there would be positive changes in the society’s lifestyle. As a result of walking and cycling more, there would be more healthy individuals both physically and psychologically. Walking, cycling and public transportation use that are more economically advantageous as well would also create more environment-friendly societies. I think more livable cities that are more appropriate for human scales will form. At the beginning of lifestyle changes, there can be negative situations, such as objections and displeasure.’’* (Ist04, female, research assistant, city and regional planning).

*"First of all, there is not any problem about the acknowledgements and pictures. The way can be different, but it describes the situation sufficiently."*
(Ist05, female, urban planner, private company).
*’’The widths of the pavements in all visions (especially for the Shift Vision) are a point that I like especially. When we put a strip of parkland, we like to do this for pavements. Or, while a bicycle path is made, the bicycle path is gotten from the pavements. These pictures are from roads and pavements, and bicycle paths are made.’’*
(Ist02, male, urban planner, county municipality).

*’’A plan not having been made only for cyclists or only on bus transport system. All transportation modes have been considered in a way to be balanced in different visions at the same time. One of the most neglected issues in our country is this. For example, if the bicycle path is made, the place from where the vehicles can go is not considered, or if one lane is removed, the places where the cars will be parked are not taken into consideration. That’s why important issues have been mentioned in these three pictures.’’* (Ist 03, male, lecturer, civil engineering).

**Box 7.1.** Requirements for such futures in Turkey.

Box 7.2 indicates the views of the experts regarding the visions which cannot be clearly understood or seem conflicting. The experts said that similar visions are practically applied in different countries, but it is hard to mention a clear idea about which vision would be better for which region since the natural and social features of the regions are not known and differ. It was recommended that focusing on realistic locations rather than subjects, such as technology would have become better. The experts approved an approach which synthesises subjects, such as safety, society, and environment. While reviewing the visions, a few expert explained that they confused about how the parking problem was solved.

*“When looking at urban area use, one should consider both the natural and the social borders. In this sense, it is hard to say which vision would be better for which place.”*
(Ist 03, male, lecturer, civil engineering).

*“Is the grey building in the residential area a school and are there any roads for a service bus carrying supplies here?”* (Ist05, female, urban planner, private company).

*“I could not understand how the parking space problem is solved in any of the three visions.”* (Ist 04, female, research assistant, city and regional planning).

*"The effect of the external factors is ignored, should it be? For example, the changes brought by the place and social texture."* (Ist06, male, urban planner, civil society organisation).

*“I think that not technological developments but different focus points in the city could be better for urban area use.”* (Ist01, male, transportation engineer, civil society organisation).

*"I think visions are meaningful when they overlay each other. In other words, safety measures should be included in both the Improve and the Shift Vision. The specific criteria of the other vision should be found in the others. I think it will be rational if my above suggestion is applied and you create a synthesis which reflects the ideal situation. Otherwise, the place and region will be discussed within an imperfect perspective."*
(Ank03, male, transportation planner, private company).

*"The only problem is why you cannot fictionalise the condition after 20 years classified into three (safety, society and environment) as a single 'climate-friendly scenario'. This is not a compulsory, but social transportation planning (Shift Vision) and environmental scenario (Improve Vision) can be combined. Simply, a climate-friendly scenario is affordable and should not lead to other social problems.’’* (Ist07, female, lecturer, urban regional planning).

*"Primarily, the topic should not be regarded as a 'vision' or 'utopia'. The information I read contains the systems which I applied directly to my career and are run smoothly in other countries. The first two visions are evaluated as part of transportation demand management (TDM). Society and Safety are two main titles, and we cannot claim that safety is not included in the community. Moreover, the community is involved in safety. So in my opinion, main titles should be changed.’’* (Ist02, male, urban planner, county municipality).

**Box 7.2.** Uncertainties in the visions.

Box 7.3 summarises the most current infrastructure conditions about the sustainable transportation systems in the characteristic of Turkish urban areas. It was understood that insufficient improvements in existing infrastructure influence the travelling comfort of various transportation users (pedestrian, cyclist, public transport user, and car driver). It was stated that arrangements of pavements are the most important issue that affects pedestrian transportation, and these should be designed to restrict vehicle flow rather than to raise the comfort of pedestrians. The experts suggested that the construction of pedestrian pavements are not considered sufficiently during the construction of buildings in the past, so rehabilitating the existing pavements is more important initially than expanding them. This suggestion comes from the impossibility of restricting a road for vehicles in a narrow street. Moreover, it was understood that several barriers, such as trees and lampposts, which complicate walking on the pavements, disrupt the function of pedestrian transportation.

In addition, the experts mentioned the difficulty of constructing separate cycling roads on narrow roads and that vehicle might easily violate the cycle roads if they are built. It was claimed that preventing such violations will be impossible due to current transportation policies because local governments are not directly or indirectly authorised to punish. Since rapid urbanisation does not progress together with the transportation plans, unsustainable transport means, such as shared taxis and minibuses have significantly emerged.

*"I do not believe that the arrangements in the pavements are made for the pedestrians. It seems more like a practice to limit vehicle roads. Many electric poles and tiny trees on a 1 m sidewalk. It's a pity for the plant. It is unfortunate for the people. The system is faulty from the start even if you implement systems for the visually impaired on a 1 m sidewalk. The aesthetic tree is beautiful but not satisfied. Only the physical states of the pavements can be partially improved; that's it."* (Ist07, female, lecturer, urban regional planning).

*"Some streets are too narrow. The vehicles can barely fit because it is not so possible for buildings built 40 years ago to be demolished to widen the streets, there needs to be more pedestrianisation in the centre."* (Ank01, female, lecturer, city and region planning).

*"The roads are unplanned. It is a big problem to open up space in these routes. Bicycles were not considered in any way."*
(Ist 04, female, research assistant, city and regional planning).

*''Public transportation systems aren't taken into consideration too much while making urbanisation plans in suburb areas. That's why the transportation systems like vans and minibuses rather than buses have been considered quite a lot since the 1970s.''*
(Ist02, male, urban planner, county municipality).

*"There are bicycle roads, but the cyclists cannot use many. The traffic police can only give the tickets. There are problems regarding the organisation."*
(Ist 03, male, lecturer, civil engineering).

*"On the main arteries of the roads, there are one or two rows of illegal parking. It is a problem to remove them because there is no inspection. There are no tickets because traffic police also think they are right. They do not ticket because there aren't any car parks or because the car park is not close by. They believe that there is nothing the drivers can do. For this reason, only one lane of a two-lane road is functional.''*
(Ist 04, female, research assistant, city and regional planning).

**Box 7.3.** Existing infrastructural problems that prevent the realisation of the visions.

In Box 7.4, the social barriers to the development of sustainable transportation systems in Turkey are depicted, which include the negative attitudes of car drivers towards cycling users, and that users of larger transport vehicles regard themselves stronger than the users of smaller modes. One of the negative lifestyles prevalently observed in society is the desire of car drivers to reach their destinations as quickly as possible. It was emphasised that such drivers have never walked some part of the way to destinations in their lives. Another common social problem is that several drivers exceed the speed limit, even in the areas with speed limits. The use of non-motorised vehicles, especially cycles, is not prevalent enough; thus, it was noted that local administrations could not take action quickly enough to support those systems.

*"Bicycle transportation in İstanbul 's hard. I think the real problem is the way motor vehicle drivers treat cyclists. Many motor vehicle drivers are harassing cyclists. This is why I think the biggest challenges in İstanbul are motor vehicle drivers' behaviour towards cyclists and intermittent bicycle roads."* (Ist 03, male, lecturer, civil engineering).

*"While vehicle drivers should obey the speeding limits, when they think I speeded, so how can I get the ticket erased?"* (Ist 04, female, research assistant, city and regional planning).

*"We have a societal habit. People want to get in their cars from in front of their house and go to wherever they will get to by car. They do not have a habit of let's say leaving their car somewhere and walking 500 m. Even if you show them somewhere to park and tell them they can walk everywhere from that point, they do not. They will complain. That kind of culture is formed in our cities. The biggest problem is tearing this culture down. They will leave their cars in the car park and walk to their house."*
(Ist02, male, urban planner, county municipality).

*"I think it is always like the strong one oppresses the weak one. Sometimes there can be a perception that the car driver crashes into the cyclist, the cyclist does the pedestrian. We never value pedestrians much. All roads are made to suit cars. This discounts pedestrian in the policies; thus, the cyclists are also seen to be discounted."*
(Ist06, male, urban planner, civil society organisation)

*"The mayor of Antalya lost the following election because he said he had invested in pedestrian and bicycle transportation. This project took a very long time when the investments were being made. A road was closed to traffic. It caused him to lose the election. It was done to the right of the citizens. It took 2-3 years. As it just ended, it caused the election to be lost. He later won again. Political power is necessary; if a politician puts it into practice, he runs the chance of losing the election."*
(Ank03, male, transportation planner, private company).

*"On Kadıköy Street, a bicycle road was built separated from automobiles by barriers, but due to intense complaints of the shopkeepers to the municipality, the bicycle lanes were finally removed."* (Ist07, female, lecturer, urban regional planning).

**Box 7.4.** Existing social issues that prevent the realisation of the visions.

Box 7.5 gives recommendations about the social and political breakthroughs for the development of transportation culture. The experts explained the necessity for developing social culture as well as a personal culture through mass media by giving examples. It was advised that rigorous approaches which limit vehicle use are used to design transportation policies, and higher fines are imposed to hinder parking violations.

*"Traffic culture should be formed from childhood ages. When this can be realised, all scenarios can be desired. The important thing is for the society to be integrated into these scenarios. Turkish citizens make mistakes in Turkey, but in Europe, they do not. As much as personal culture, societal culture should also be developed."*
(Ank01, female, lecturer, city and region planning).

*"This can be especially linked with the development of traffic culture. If a person does not bother his conscience, punishments will not matter. It is very hard to see such a situation in Europe. Punishment and prevention will not be deterring. After these practices are put in action, this can be achieved by cyclists' reactions, press, and punishment factors. Traffic culture must be formed. We are following Europe and America from a bit of a distance behind."* (Ist 03, male, lecturer, civil engineering).

*"There needs to be policies and practices that would discourage people from using their cars, and encourage public transportation and not car use. Decisive action is required, and precautions need to be taken to limit private car use. Of course, these practices need to be inspected rigorously, and punishments need to be applied when necessary."* (Ank02, female, lecturer, city and region planning).

"*For these visions to be realised, traffic fines should be increased significantly. They park randomly. As long as the penalties are not adjusted, it is hard to be achieved. As long as there are no fines, they keep doing it, knowing it is an offence."*
(Ist05, female, urban planner, private company).

**Box 7.5.** Social approaches that need to be taken for the visions.

Box 7.6 summarises the institutional approaches for implementing these futures. The work of local administrations, in coordination with the universities and non-governmental organisations, was recommended. On the other hand, the experts said that there are central policies about the sustainable transportation systems in Turkey, but each local administration has to prepare its transportation strategy because such policies cannot reach local departments. The experts asserted that the inclusion of transportation engineering in undergraduate courses might increase the number of qualified specialists in local administrations.

*"Municipalities should provide concrete suggestions about the alternatives they will form when decreasing vehicle traffic."*
(Ist 04, female, research assistant, city and regional planning).

*"Municipalities have jurisdiction to make their plans. In that case, local government qualified employee numbers should be increased. There are no traffic engineers. Rail systems are getting in the picture too. There are no undergraduate programs in transportation engineering."* (Ank03, male, transportation planner, private company).

*"Politicians and local authorities are needed, who will implement sustainable transportation policies and prioritise them knowing their importance. In addition to this, the financial aspect also appears as an obstacle, especially in our country."*
(Ist06, male, urban planner, civil society organisation).

*"Radical decisions made by municipalities can be evaluated by getting together with their residents every two to three months to assess the projects made."*
(Ist 03, male, lecturer, civil engineering).

*"For the visions to be put in action, many shareholders, such as local governments, non-governmental agencies, universities, the private sector, and city-dwellers should work together. So, the public sector or private sector should not work alone; they should manage the process together."* (Ist05, female, urban planner, private company).

*"Universities should support the process with the research they carry out, projects, and informational resources"* (Ist06, male, urban planner, civil society organisation).

*''Non-governmental agencies seem to have a lot of responsibility. Academics and industrial organisations have a big responsibility. In grant projects, there are European Union grants and local organisations as well."*
(Ist01, male, transportation engineer, civil society organisation).

*"Urban transportation topics do not have an owner. It creates a big void. Every local authority is doing something, according to their vision. The central government has more policies and documents, but they are not related to the local authorities. In the UK, central government relays policy guidance, policy statement, and planning policy guidelines to general local authorities."* (Ank02, female, lecturer, city and region planning).

**Box 7.6.** Institutional approaches that need to be taken for the visions.

## 7.2. Avoid Vision

Box 7.7 shows the summarised opinions of the experts regarding the Avoid Vision. The experts said that it would be easy to implement this vision in urban areas relatively quickly since the lanes are reduced with a less reformist perspective. The view of the experts was observed to depict that the Avoid Vision as a transition vision.

| |
|---|
| "In the Avoid Vision, automobile numbers do not decrease so much; this vision looks like a transition point. It can be a transition point for urban areas in Turkey as well." (Ank02, female, lecturer, city and region planning). |
| "The Avoid Vision is a method that can be used in the short term, but I would not agree with a perspective that suggests that in Turkey, the Avoid Vision is a softer vision so we should not consider the other ones." (Ist02, male, urban planner, county municipality). |
| "The Avoid Vision might be more realistic because it decreases the automobile dependency less. There is a more consistent lane reduction in the Avoid Vision, and there isn't far-reaching reduction in the decreasing of traffic. It seems more reasonable since there is not as much lane reduction as the Avoid Vision and the Shift Vision." (Ist01, male, transportation engineer, civil society organisation). |

**Box 7.7.** The general views of the Avoid Vision.

Table 7.1 reveals the opinions of the experts about the key variables in the Avoid Vision. It was stated that many positive physical changes regarding infrastructure improvements and urban structure were made. The experts approve the following enhancements to the infrastructure and urban structure in this vision: placement of pedestrian crossings, putting the road signs and special purpose lanes on undefined broad crossroads, imposing a speed limit on the road, and the sharpening of turning curves to decrease the traffic speed of motorised vehicles. Furthermore, the creation of separate cycle lanes by narrowing the motor road rather than using green areas is in accord with the urban structural changes.

The experts suggested that clean alternative energy should be discussed under the Environment title of this vision. It was specified that except in several big cities, it is hard to launch practices which will encourage performing office work at home through telecommunication and such change will weaken communication between individuals. The necessity for smart transportation and technologies was discussed. The experts estimated about the infrastructure systems that there is no crossway or cycle road, which interrupts the traffic road and in addition to speed limits, zebra crossings, particularly in central areas, are required for the safety of non-motorised vehicles. The experts claimed that the improvement of infrastructure safety would further encourage the public to move to the city centre. It was also mentioned that when the improvements supporting the safety systems in this vision are extended widely, the further investments in the car industry will not be required, and that the administrative coordination between the municipalities and police units cannot be achieved in Turkey as both departments are not working coordinately to prevent illegal car parking on pedestrian or cycling routes. Instead, dissuasion from vehicle use by fuel taxes is advised.

**Table 7.1.** The experts' comments about the key factors of the Avoid Vision.

| Key factors | Experts' comments |
|---|---|
| Environmental solutions | "Clean, sustainable, and alternative energies could be discussed under the environment topic." (Ist07, female, lecturer, urban regional planning). |
| Technology | "There are office works, but these sectors could be smart transport or smart technology" (Ist01, male, transportation engineer, civil society organisation).<br>"To prevent the cars that pass at the last minute from being stranded in the middle area, they should be ticketed." (Ist02, male, urban planner, county municipality). |
| Digital technology | "You mentioned especially a scenario in which office works etc. will be performed remotely. Is this an assumption? Is this an estimate? I wondered because of the subject in Turkey. It is likely for our cities, such as İstanbul and Ankara. Is it possible for the whole Turkey?'' (Ist 04, female, research assistant, city and regional planning).<br>"Life gets easier with increased information gathering opportunities by use of technology, online services cut down travels, but it would not be wrong to foresee a decrease in human and one-to-one interactions?" (Ist05, female, urban planner, private company). |
| Energy | "It's not correct. Personal vehicle use can be deterred with fuel taxes, and public transport can be encouraged." (Ist07, female, lecturer, urban regional planning). |
| Urban structure | "Taking measures for traffic safety particularly in the cities and settlements, which are dominated by motorised transportation, will make them more attractive and useful. The escape to suburban areas with dense traffic will be stopped." (Ank03, male, transportation planner, private company). |
| Infrastructure improvements | "Pedestrian crossings could be more frequent, and the roads for pedestrians could be wider." (Ank01, female, lecturer, city and region planning).<br>"In Turkey, regarding bicycles, it is suggested that barriers separate bicycle and motor vehicle roads at the first stage." (Ist01, male, transportation engineer, civil society organisation).<br>"There are numerous physical changes on the images. They comply with either "Infrastructure Improvements" or "Urban Structural Changes." They can be varied, such as bicycle parking areas, bicycle signals, signalisation primarily for public transport, increasing the frequency of public transport trips to reduce excess traffic density, raising the comfort level of the public transport vehicles, integration between the public transport types, transfer discounts, urban bicycle which can be hired with coins or ID.'' (Ist02, male, urban planner, county municipality).<br>"Creating separate bicycle roads by narrowing the road for motor vehicles rather than by using green areas is an excellent approach." (Ist07, female, lecturer, urban regional planning).<br>"No crosswalk intersects with the motor road." (Ank02, female, lecturer, city and region planning).<br>"Placement of road signs for crosswalks and plates." (Ist 03, male, lecturer, civil engineering).<br>"Road signs about speed are very frequent. The speed of the road does not change on the same path. It may be sufficient to put those signs in the entry of the road." (Ist05, female, urban planner, private company).<br>"Placement of road signs, construction of special purpose lanes, and imposing a speed limit on undefined broad crossroads." (Ank03, male, transportation planner, private company). |
| Mode share | "Decreasing the number of lanes on motor roads." (Ist02, male, urban planner, county municipality). |
| Special groups | "Public transport systems in which bicycles and wheelchairs are transported could be added" (Ist07, female, lecturer, urban regional planning). |
| Safety | "If the parking areas on the right of the road are turned into 90-degree parks, the capacity of parking area rises. Increasing the number of parking areas raises the demand for them. Traffic increase will affect the safety adversely. Besides, the vehicles which exit from 90-degree parks on the right of the road will risk the traffic safety. So 30- or 45-degree parks should be designed at least." (Ist 03, male, lecturer, civil engineering).<br>"If we talk about the speed bumps, they are extremely frequent and putting them in the exit of the parking areas is not proper." (Ank03, male, transportation planner, private company).<br>"Traffic calming techniques could have been used." (Ank01, female, lecturer, city and region planning).<br>"Sharpening of the turning curves to decrease the traffic speed of motorised vehicles." (Ist 04, female, research assistant, city and regional planning).<br>"The areas on the left and right of the road separated with white lines will allow short-time waiting and getting out going in, and such actions will occupy the traffic road so that it will endanger the traffic of motorised vehicles." (Ist06, male, urban planner, civil society organisation).<br>"There is no crosswalk or bicycle way on the traffic road from the left bottom corner to right upper corner. Although the signs determine the speed limit, zebra crossings are required for the safety of bikers and pedestrians, especially in central locations." (Ist02, male, urban planner, county municipality). |
| Policy co-ordination | "As long as speeding limits are decreased, the number of accidents will decrease. Death tolls in collision accidents will also decrease. No speeding. When there is no speeding, the driver can manage his safety. There are comfortable cars too. There is a new technology too. There are human-less drivers, sensitive pedestrian systems, but it seems like the automotive sector will not have to make these investments in this scenario." (Ist 04, female, research assistant, city and regional planning).<br>"Co-ordination between the municipality and police unit! In Turkey, both have different voices in urban transportation. The municipality does not have the right to speak about speed limit control and fines.'' (Ank01, female, lecturer, city and region planning). |

### 7.3. Shift Vision

Box 7.8 included the views of the experts about the Shift Vision. The experts emphasised that all the visions of this project can be implemented in different parts of Turkish urban areas, but the Shift Vision can be deployed in more limited locations. They said that it would be easier to achieve this vision, especially in narrow streets, campus areas, historical places, or the locations in which the use of non-motorised vehicles is common.

"There are places where the Shift Vision can be utilised. It can be especially beautiful in narrower areas. It can be in sub-centres of the major cities and campus areas, and landscape parks."
(Ist07, female, lecturer, urban regional planning).

"Some areas might be said that vehicles should get out, and just pedestrians and cyclists should be allowed. It could especially be historical urban centres. So, all three visions may have different application areas. For example, the Shift Vision can be considered in some regions of the city where there are more bicycle and pedestrian transportation, and where some motor vehicles cannot enter some streets. It can be applied in city centres and university campuses, but it is not a vision that could be implemented to every location of Turkish urban areas." (Ank01, female, lecturer, city and region planning).

"There should be more pedestrianisation in historical places. Automobiles should not be parked on bicycle roads." (Ank02, female, lecturer, city and region planning).

**Box 7.8.** The general views of the Shift Vision.

Table 7.2 indicates the opinions of the experts about the Shift Vision. The experts stated that if commercial, cultural, and social activities are expanded in the city centre within the approach of a compact city, the local economy will get stronger and communication between individuals will increase. In this vision, the specific key factor is mostly underlined by the experts is urban structure. The experts specified that designing more compact urban areas will be completed over a very long time. In addition, they emphasised that the economic strategy of Turkey is dependent on unearned, income-driven, urban development and the construction industry, so it is impossible to form compact urban structures in future Turkish cities.

The experts asserted that pedestrianising several areas and using them for non-motorised vehicles in the Shift Vision is non-functional and meaningless. It was mentioned that raising the areas for non-motorised vehicle users will not increase socialisation; instead, they should contain more facilities which are necessary for pedestrians and cyclists (e.g., the placement of benches for the elderly people and activity infrastructure for children).

**Table 7.2.** The experts' comments about the key factors of the Shift Vision.

| Key factors | Experts' comments |
|---|---|
| Environmental solutions | |
| Technology | |
| Digital technology | "City centre develops commercial, cultural, and social activities in rouse." (Ist01, male, transportation engineer, civil society organisation). |
| Energy | "The definition of the view is limited. When fuel prices increase, people prefer the public transport or bicycle firstly, if available. In the case of no travelling option, they move to the city centre." (Ist07, female, lecturer, urban regional planning). |
| Urban structure | "The building density at the city centres should be decreased. If they move to outer counties and suburbs and the accessibility of these places are increased, and people choose to live there, the traffic density, car park need and motor vehicle traffic in the city centre will decrease. We will have an increased chance of finding a different solution. The presence of dense areas is preferred. What we have is not compactness; it is an unplanned density. Bicycle transportation, to be improved has come down to such a compact area level that it is a problem in itself." (Ist07, female, lecturer, urban regional planning).<br>"The pedestrianised area is vast and undefined. In pedestrianised areas, the area excluding the areas for pedestrian traffic should contain trees, shady locations, landscape applications, street furniture, and park benches." (Ist02, male, urban planner, county municipality).<br>"Increasing the square metres of the pedestrian area does not enhance socialising. Vast, empty, and non-functional areas are not perfect!" (Ank03, male, transportation planner, private company).<br>"Creating a compact city is possible with these improvements only for a very extended period. Since the growth of Turkish cities is dependent on unearned income." (Ank01, female, lecturer, city and region planning). |
| Infrastructure improvements | "Is there a metro access in the Shift vision; only bicycles and pedestrians are visible? However, more emphasis on the presence of public transportation could have been right. Integration of public transportation and accessibility could have been made more visible." (Ist 04, female, research assistant, city and regional planning).<br>"Using different road pavements in the pedestrianised area will be beneficial." (Ist 03, male, lecturer, civil engineering). |
| Mode share | "In the major cities of Turkey, the greatest competitor of public transport is private service vehicles. The administration's grant necessary privileges to them. They do not have particular routes or stops. In taxis, the route varies, according to the customers. They increase the traffic jam, particularly at peak hours. For example, in Ankara, their number is more than the number of public transport vehicles. There could be incentives for transferring them to public transport." (Ist 03, male, lecturer, civil engineering). |
| Special groups | "Sitting benches and playing tools should be placed for elderly people and children, respectively." (Ist05, female, urban planner, private company). |
| Safety | "Vehicle drivers usually react negatively to bicycle roads. In V2, the decrease in vehicles can cause a negative reaction from car drivers. When you get a person out of their car, you have to form a healthy transportation system for that person." (Ist 03, male, lecturer, civil engineering). |
| Policy co-ordination | "Economy policies of the central government should be changed significantly. Urban development and construction have been driven by the economic strategy of Turkey for years." (Ist07, female, lecturer, urban regional planning). |

## 7.4. Improve Vision

In Box 7.9, the experts described that the Improve Vision could play a vital role in solving many transportation problems in daily life. Since this vision has more certain features about decreasing the use of motorised vehicles and improving public transport systems, the experts regard it as a more complex vision. Some of the experts explained that this vision could be more influential, especially in the city centres, and estimated the need for this vision would increase in the coming decades.

*"For the three visions, I think the Improve Vision is more applicable in central areas. Improve Vision seems like it could decrease traffic jams. I believe that it looks like a vision that can please everyone."* (Ist07, female, lecturer, urban regional planning).

*"All three visions are meaningful but the vision that prioritises public transportation includes the other visions more, and that's why it seems more logical. Especially three types of sustainable transportation futures are brought together. It shows it includes public transportation."* (Ist 04, female, research assistant, city and regional planning).

*''In my opinion, the Improve Vision seems an ideal vision since you suggest more complex transportation in the city centre as well. The Improve Vision can also promote people to mass transport and can decrease the problems they live in daily transport. The Improve Vision seems that it will reduce traffic jams. Otherwise, if we do not give more importance to public and active transport systems, İstanbul will be transformed into a big car park area.''*
(Ist01, male, transportation engineer, civil society organisation).

*"In the Improve Vision, the absence of practices to support sustainability draws the attention as a shortcoming."* (Ist05, female, urban planner, private company).

**Box 7.9.** The general views of the Improve Vision.

As shown in Table 7.3, the experts stated that big cars are more advantageous regarding fuel consumption and other operating costs, operating conditions, traffic safety, and traffic jams, so smaller cars are in contrast with the environmental objectives due to their decreased carrying capacity.

The experts suggested that green fuel-powered vehicles are not clearly seen under the energy section; therefore, it led to a perception that the visions of this project make further comparisons between sustainable transportation systems. Furthermore, they said that including light rail systems under the Improve Vision might provide the integration between the cycle and public transport systems, considerably. It is seen that several experts pointed out the design defects in the infrastructure systems within this vision. The experts think that if the cycle road is between the bus lanes, which are open to motorised vehicle traffic, it may pose serious accident risks and lead to increasing intersections of bus lanes and cycle roads. On the other hand, a few expert argued that if drivers' awareness of cycle users are raised and trained, particular bus routes would be assigned. In addition, it was proposed that when the pedestrian crossings are not included on the bus routes, how the pedestrians coming from the other side of the road to reach the bus stops should be shown.

**Table 7.3.** The experts' comments about the key factors of the Improve Vision.

| Key factors | Experts' comments |
|---|---|
| Environmental solutions | "Base stations can be converted to fibre-optic cables and can make a positive impact on the environment. It is not an expensive investment either. Fibre cables are spreading through the city. Wireless systems too. They should be formed underground with cables. There should be cable systems underground. I will use information systems on the bus. I can make SIM cards." (Ist 04, female, research assistant, city and regional planning). |
| Technology | "Popularity of smaller cars with lower carrying capacity is in contrast with the environmental objectives. It is wrong. Big cars are more advantageous about fuel consumption, operating costs and conditions, traffic safety and traffic jam." (Ist07, female, lecturer, urban regional planning). |
| Digital technology | "For long distances, double-deckers in which Wi-Fi is available, or express lines with limited stops" (Ist 03, male, lecturer, civil engineering). |
| Energy | "These visions seem like a comparison of sustainable transportation systems among themselves. For this reason, automobiles that operate on clean energy are not very visible; it should have been emphasised more here." (Ank02, female, lecturer, city and region planning). |
| Urban structure | "If it is required to mention an ideal one, in addition to the bus lanes left in Improve Vision, the light rail systems or the systems like tramway can be added to these. A parallel rail line for the bicycle path can be integrated more easily with a bicycle. Maybe it requires increasing the integration of buses with a bicycle." (Ist01, male, transportation engineer, civil society organisation). |
| Infrastructure improvements | "Bicycle roads and public transport roads could be changed. If it means physical separation, it could be a better situation," (Ank01, female, lecturer, city and region planning).<br>"There is no crossway on the busy road. How do the people on the left of the road cross the road and get on the bus?" (Ist 03, male, lecturer, civil engineering).<br>"Removal of the pedestrian pavements on one side restricts the activities on the left. Besides, the pedestrian way on the right is gigantic and undefined. It should be divided in two." (Ank03, male, transportation planner, private company).<br>"What is the function of the dotted area in the middle of the crossroad?" (Ist 04, female, research assistant, city and regional planning).<br>"I think that for both V2 and V3, bicycle roads should be separated from motor vehicles. For now, it seems hard to construct a bicycle road just by colourful painting. Maybe for the Improve Vision, cyclists should use different routes, or bus drivers' awareness needs to be raised more." (Ist06, male, urban planner, civil society organisation). |
| Mode share | "If the number of vehicles falls, the number of motorbikes does not necessarily increase. Public transport rises. The user groups are very different." (Ist02, male, urban planner, county municipality). |
| Special groups | "Even high-income groups who can travel privately prefer comfortable and reliable public transport services. It can be better. Such groups will prefer the public transportation services if a new luxury service segment is created." (Ist02, male, urban planner, county municipality). |
| Safety | "Bicycle roads also need rest areas. In V2 and V3, cyclists should have separate safety barriers from motor vehicles. Bicycle and bus crash in V3 would be common." (Ist06, male, urban planner, civil society organisation).<br>''I think that it will be dangerous unless bus drivers pass serious training. Since the bus drivers spend there all day by using the bus, they sometimes become aggressive.''<br>(Ist01, male, transportation engineer, civil society organisation).<br>"Those who behave badly to the cyclists are bus drivers. Bicycle accidents have occurred with buses in Turkish cities. The bicycle accidents which occurred out of the city happen mostly with trucks." (Ist07, female, lecturer, urban regional planning).<br>"If the bicycle roads are out of the assigned bus routes, it raises the intersection of the bus routes. Moreover, motorised vehicle traffic running on both sides of the bicycle is not safe for the bicyclists. In the case of a fall or accident, the bicyclists will fall on the motorised road. It passes around the stops." (Ist 03, male, lecturer, civil engineering). |
| Policy co-ordination | "Central administration can include a budget item to be spent only for public transport services, in a share given to municipalities from the general budget." (Ist01, male, transportation engineer, civil society organisation). |

## 7.5. The Justification of the Visions

In this part, the consistency of the primary variables found in different visions was compared and evaluated with the opinions of the experts. In Table 7.4, the negative and positive opinions of the experts about the main factors of the visions, and undetermined variables are marked with (-), (+), and (o), respectively.

**Table 7.4.** The evaluation of the future transport visions by experts' views.

| Key factors | Avoid Vision | Shift Vision | Improve Vision |
|---|---|---|---|
| Environmental solutions | - | o | + |
| Technology | - | o | - |
| Digital technology | - | + | + |
| Energy | - | - | - |
| Urban structure | - | - | + |
| Infrastructure improvements | + | - | - |
| Mode share | + | - | + |
| Special groups | - | - | + |
| Safety | - | - | - |
| Policy co-ordination | - | - | + |

The opinions about the infrastructure systems and mode sharing within the Avoid Vision are positive in this table. The experts specified that the following actions are positive improvements for the infrastructure systems: the creation of cycling roads separate from the motorised vehicle traffic by narrowing the traffic road rather than by using green areas, constructing pedestrian crossings and speed bumps on the road, and putting in speed signs. The opinions of the experts regarding mode sharing are positive due to narrowing the lane for motorised vehicles for cyclists or pedestrians.

On the other hand, the experts stated that the vehicles powered by clean alternative energies should be one of the steps to reduce environmental problems, and although the home office approach is only possible in a few Turkish cities, creating smart technologies for such systems will be difficult.

Besides this, it was underlined that the spread of digital technology would lead to a decrease in communication between people. The experts disagreed that the apparent increase in energy prices will not sufficiently result in reducing dependency on vehicles and raising public transport use. It was described that vehicle use would be discouraged and public transport will be supported if fuel taxes are imposed on personal vehicles. The experts asserted that the practices which improve the safety of people using different transport means would cause them to move to city centres rather than to suburban areas. Additionally, it was commented that speed control without parking areas by the road and crossways on the road might lead to problems with traffic safety. It was advised that the public transport systems in which cycles and wheelchairs are transported should be added to the Avoid Vision under the subject of particular groups. In line with the experts' opinions, this vision was understood to contain contradictions regarding the assumptions on political co-ordination. Such contradictions are as follows: it is not necessary for the car industry to invest more on safety in the presence of the improvements made to reduce accident risks, and there is no coordination between the municipalities and police units about speed control and fines due to a lack of inspection.

Table 7.4 shows that the experts approved the improvements to digital technologies which strengthen urban culture and human relations, especially in the city centres. On the other hand, it was noticed that the experts' opinions in the Shift Vision contain the most unwarrantable key factors; for example, the experts were of the view that people will move to city centres after the increase in fuel prices, as very unlikely. The experts discussed that moving to the city centre would be possible if the accessibility to transportation is restricted, and rising fuel prices will encourage people to use public transport or cycle.

In the Shift Vision, it was indicated that the variables created by the urban form could not be applied in Turkish cities because the growth of Turkish cities is dependent on unearned income in the construction industry. Furthermore, the experts advocated that radically reducing lanes is undefined as part of limiting the motorised vehicle traffic, and expanding the areas for non-motorised vehicles will not increase socialisation. It was specified that the integration between cycles and public transport in the infrastructure systems, and the accessibility to public transport were not clearly explained. The use of different road pavements in the large pedestrianised area was suggested. It was said that the vast and undefined areas allocated for the users of non-motorised vehicles should contain several facilities, especially for elderly people and children. On mode sharing, it was underlined that compact urban forms would lead to increased traffic jams in Turkish cities, particularly at peak hours with their excessive number of private service vehicles and taxis. The experts stated that encouraging the drivers of private service vehicles, which do not use certain routes and stops, to use public transport is more reasonable than encouraging the drivers to use non-motorised vehicles in a compact city vision. It was emphasised that decreasing the lanes for car drivers in a draconian fashion may make the reactions between the cyclists and drivers of private vehicles more negative. Lastly, it was mentioned that the administrative co-ordination approach is not suitable for Turkish urban areas since the economic structure of the country is based on the rent-oriented construction sector. Thus, it is unlikely to prevent the expansion of urban areas into wider suburban areas.

In Table 7.4., it is seen that the Improve Vision received the highest positive feedback from the experts about the consistency of the primary variables compared to other visions. The experts said that the judgments made under only four main titles (technology, energy, infrastructure, and safety) are inconsistent for the Improve Vision. They specified under the title of technology

that producing smaller cars and lowering their carrying capacity is in contrast with the environmental objectives and this approach can create disadvantages regarding fuel consumption, operating costs and conditions, traffic safety, and traffic jams. It was claimed that the motorised vehicles powered by renewable energy are not clearly depicted, but this study is regarded as a comparison of very distinct sustainable transportation systems. It was noticed that the experts focused on further infrastructure improvements and safety issues. It was said that the roads for cycles and public transport should be changed and the bus routes should show obvious pedestrian crossing. The experts discussed the safety issue, in which they stated that cycle accidents occurring in Turkish urban transportation are caused mostly by buses, so bus drivers' awareness of cycle users must be raised, but if this is not achieved, this vision may pose high accident risks. Some of the experts remarked that the cycle users and pedestrians are more similar compared to other groups, so the cycle road has to be on the far right. It was emphasised that even though the bus road should be along the main arterial road, the road should be designed in such a way that the intersection of the cycle roads and bus roads will be minimised, and iron barriers should be used to separate these two active transport modes.

## 7.6. Summary

This chapter contains the views of experts on the different transport futures. The experts estimated that all three visions could be desired in the urban areas of Turkey and if such visions can not implemented, it would be more difficult to live in our cities because of the growing traffic. In the Avoid Vision, the experts characterised the changes in improving the safety of non-motorised vehicle use and reducing the traffic lanes of motorised vehicles as ideal. In the Shift Vision, the view of the experts is that the vision might be implicated at very restricted locations. Most of the experts have more positive views about the content of the Improve Vision, and they think this vision proposes a more complex transportation system, it was determined that the necessary central and local policies should be sought to achieve the objectives of the Improve Vision.

# CHAPTER EIGHT: POLICY DEVELOPMENT

## 8.0. Overview

The main aim of this chapter is to explore which policy pathways could be constructed for achieving the goals of the specific vision. See Section 3.2.4 for the details of the fifth research objective). Further interviews were conducted with national and local transportation experts across five selected urban areas, as presented in Appendix 8. Policy makers were asked to map out the details for their city and to construct a timeline for the implementation of measures (from the present day to 2035) to achieve the Improve Vision (see Section 6.4 and 7.6). The chapter first summarises the description of the key factors of the Improve Vision and sets out policy number for each target of the specific vision. Then, the chapter demonstrates the outcomes from the selected urban areas regarding macro (actions that a particular local government is not the main organization) and micro (includes the developments of specific local governments) generated policy pathways.

## 8.1. Main features of Improve Vision

Table 8.1 shows the descriptions of the main headings of the pathway narratives created in Chapter 4 (along with their designated policy numbers). In subsequent sections, the central and local policies required to realise these policy numbers and their descriptions are investigated.

**Table 8.1.** The main features of the Improve Vision.

| Key factors | Policy number | Description |
|---|---|---|
| Environmental | 1.1. | Private cars will become smaller and consume fuel more efficiently than the current models. |
| | 1.2. | Extra charges will be applied to limit vehicle use during rush hours. |
| Technology | 2.1. | New vehicles would operate on renewable energies. |
| | 2.2. | New, smaller and more energy-efficient public buses would be designed. |
| | 2.3. | Solar panels on the top of some bus stops would store energy, which will be then used to illuminate its surroundings. |
| Digital technology | 3.1. | Free-of-charge Wi-Fi systems would spearhead public transportation systems, and many more applications would be available on public buses (Internet, e-mail, radio, television, music, event pages, etc.) |
| Energy | 4.1. | High energy demand would pose enormous hardships for private and public agencies in Turkey. |
| | 4.2. | The government needs to overcome the difficulty of procuring energy by investing in public transportation systems and would increase awareness about sustainable energy trends. |
| Urban structure | 5.1. | The number of green fields would be increased, and local administrations would reserve areas like parks or forestland to prevent rapid population growth from quickly spreading into the outer parts of the city. |
| | 5.2. | New social and business settlement formation on the outer parts of the city would be more appealing. |
| | 5.3. | Public transportation systems will be integrated with cycles. |
| Infrastructure improvements | 6.1. | Better public transport journeys become integrated by easy-to-use ticketing systems. |
| | 6.2. | Municipalities would begin to work towards strengthening the infrastructure of non-motorised transport systems. |
| Mode share | 7.1. | Public transport systems, school buses and institutions' service buses would cover 50% of the daily journeys in urban areas. |
| Special groups | 8.1. | Improvement of public transportation systems for low-income groups. |
| Safety | 9.1. | Public transport drivers will be trained on the presence of cyclists as part of their driver training. |
| Policy co-ordination | 10.1. | Central and local administrations will implicate a series of important strategies to complicate car purchase. |

## 8.2. Macro Policy Development

Table 8.2 shows the distribution of sustainable transportation policies by the responsible organisations for the Improve Vision to be realised.

**Table 8.2.** The distribution of national policy pathways by different institutions.

| | **Policy numbers** | | |
|---|---|---|---|
| **Institutions** | **Responsible institutions** | **Related institutions** | **Total number of policies** |
| **Central governments** | | | |
| Customs and Trade Ministry | | 1.1, 2.2., 4.1. | 3 |
| Development Ministry | | 5.3. | 1 |
| Energy and Natural Resources Ministry | | 2.3., 4.2. | 2 |
| Environment and Urban Ministry | | 1.1., 2.2., 4.2., 5.1., 6.2. | 5 |
| Finance Ministry | 1.1., 4.1., 10.1. | | 3 |
| General Directorate of Highways | 2.3. | | 1 |
| General Directorate of Security | | 1.2., 6.2. | 2 |
| Governorates | | 6.1., 9.1., 10.1. | 3 |
| Interior Ministry | | 1.2., 5.2., 6.1., 9.1., 10.1. | 5 |
| Science, Industry and Technology Ministry | 2.1., 2.2., 3.1., 4.2. | 1.1. | 5 |
| Public Works and Housing Ministry | 5.1., 5.2. | | 2 |
| The Republic of Turkey State Railways | | 5.3. | 1 |
| Transport Ministry | 2.3. | 1.1., 1.2., 2.2., 3.1., 6.1., 6.2., 7.1., 8.1., 9.1., 10.1. | 11 |
| **Local governments** | | | |
| Municipalities | 1.2., 3.1., 5.1., 5.2., 5.3., 6.1., 6.2., 7.1., 8.1., 9.1., 10.1. | 2.2., 2.3., 4.1., 4.2., | 15 |
| **Other institutions** | | | |
| Automotive Industrialists Association | | 2.1. | 1 |
| Banking Regulation and Supervision Agency | 10.1. | | 1 |
| Civil society organisations | | 1.1., 2.2., 5.3., 7.1., 8.1. | 5 |
| Disability Administration | | 5.3. | 1 |
| European Conference of Ministers of Transportation | | 4.1., 5.3. | 2 |
| Private sectors | | 5.3. | 1 |
| Scientific and Technological Research Council | | 4.1. | 1 |
| Small and Medium Enterprises Development and Support Administration | | 4.2. | 1 |
| The Scientific and Technological Research Council | | 3.1. | 1 |
| Trade Associations | | 5.1., 5.2. | 2 |
| Turkish Standardisation Institute | | 4.2., 5.1., 6.2. | 3 |
| Universities | | 2.1., 3.1., 5.1., 5.2. | 4 |

Table 8.2 shows thirteen different public sectors, twelve private and government institutions, and local governments are directly or indirectly responsible for achieving the key targets of the Improve Vision. For local administrations, on the other hand, it has been determined that their jurisdiction relating to environmental and technological policies are more limited and are also supporting organisations in the implementation of energy policies. Other organisations also have been shown to be relevant for the Improve Vision to achieve its target, but the Banking Regulation and Supervision Agency is the main responsible organisation for the implementation of the policy related to reducing cars ownership.

### 8.2.1. Environmental Solutions

Strategies that are required for the Improve Vision to achieve its environmental targets ensure that new private cars and public buses release less air pollution emissions are on the urban roads and that the entry of cars into important city centres during intense business hours are subject to a traffic congestion fee.

Included in the realisation of these targets are, along with firstly, tax arrangements, which the Ministry of Treasury and some other ministries shall jointly make between the years 2015-2020, ensuring that new cars in traffic consist of vehicles with low emissions.

In subsequent time slices, the importance of the necessary coordination between local administrations and the Ministry of Transport stand out. With this cooperation and coordinated efforts, the implementation of Intelligent Transportation Systems needs to be initiated, which are directed at limiting the entry of cars into the city centres that have dense traffic. With this application, optimum additional revenues will be obtained for municipalities charging cars are entering city centres.

**Table 8.3.** The environmental policy pathways.

| Policy number | Policy actions | Relevant target | Timescale |
|---|---|---|---|
| 1.1 | Creation of a tax system that limits emissions in motor vehicles. | Executing tax differentiations to popularise a new generation of automobiles with low emission levels. | 2015– 2020 |
| 1.2. | Limiting the entry of automobiles into city centres during dense business hours. | Initiating the implementation of a pilot Intelligent Transportation Systems in the main cities, which charges vehicle entry into city centres. | 2015 – 2020 |

### 8.2.2. Technology

Technological developments include applications in which the energy efficiency of new-generation cars and public transportation vehicles are improved, and there are innovations for bus stops which operate on solar power. In enabling the realisation of these applications, the responsible organisations are the Ministry of Science, Industry and Technology and the Ministry of Transportation.

Between 2020 and 2025, the Association of Automotive Producers and Universities need to work in coordination with the central government to produce cars that operate on biodiesel and hydrogen energy. In the same time interval, the Ministry of Environment and Urbanisation, Ministry of Customs and Trade and the Ministry of Transportation, in coordination with the Ministry of Science Industry and Technology need to produce the mechanisms necessary for the creation of energy-efficient vehicle fleets for public transportation and organisation services.

After 2020, the Ministry of Transportation, together with the Ministry of Energy and Natural Resources and the municipalities, need to take steps to create innovative infra- and super-structures operating on solar energy at bus stops.

### 8.2.3. Digital Technology

Prior to the period when public transportation systems and organisations services start to consist of vehicle fleets operating on more efficient fuels, in order to achieve the target on developing digital technological on these vehicles. On public buses journeys, many people go to work can easily follow mass communication gadgets, such as radio, newspaper and television, thanks to the large internet service provider by the efforts of the Ministry of Science Industry and Commerce and the municipalities.

**Table 8.4.** Improvements in technologies and digital technologies.

| Policy number | Policy actions | Relevant target | Timescale |
|---|---|---|---|
| 2.1. | Increasing energy efficiency in automobiles. | Ensuring the production of cars operating on biodiesel and hydrogen energy. | 2020 – 2025 |
| 2.2. | Development of methods and mechanisms encouraging the creation of high-efficiency vehicle fleets for public transportation systems. | Ensuring public organisation services and public transportation systems consist of energy-efficient vehicle fleets. | 2020 – 2025 |
| 2.3. | Ensuring energy efficiency in the systems used in transportation sub- super-structures. | LED signal systems, solar energy-operated mass transit stops, and station equipment becoming widespread. | 2020 – 2025 |
| 3.1. | Equipping public transportation systems and organisation services with digital technologies. | Providing public transportation systems with free digital technologies, such as the Internet, radio, and television, to make them a more attractive system. | 2030 – 2035 |

### 8.2.4. Energy

In order to eliminate the problems encountered by the supply of energy in transportation, legal arrangements encouraging the use of alternative fuels need to be rapidly made, and the task of creating awareness and convincing society

on the subjects desired to draw attention to the importance of energy efficiency needs to be undertaken.

Table 8.5 shows the policies also related to achieving the targets on energy in transportation and their descriptions, along with the intervals they need to be implemented. To apply these policies, the Ministry of Treasury needs to create a tax and pricing system based on limiting greenhouse gas emissions in motor vehicles within the first 5-year time slot.

Also during the same interval, the Ministry of Science Industry and Commerce is expected to execute the strategies directed at creating public awareness in matters, such as energy saving in transportation, using public transportation and non-motor vehicles through different brochures, guidance, documents, public engagement, etc.

**Table 8.5.** The energy policy pathways.

| Policy number | Policy actions | Relevant target | Timescale |
|---|---|---|---|
| 4.1 | Making legal arrangements directed at increasing alternative fuel and clean vehicle use and enhancing capacity. | Creation of a taxing and pricing system which bases on limiting greenhouse gases emissions in motor vehicles. | 2015 – 2020 |
| 4.2 | Creating awareness in the society in the matters of increasing energy efficiency in transportation. | Via brochure, guidance document, public engagement, etc. tools; ensuring awareness is created in the society in matters, such as energy saving in transportation, use of public transportation and non-motor vehicles. | 2015 – 2020 |

### 8.2.5. Urban Structure

On the spatial development proposals for cities in Turkey, the Ministry of Public Works and Settlement need to realise a series of regulations in the long term, as of 2030. Table 8.6 shows it is necessary that such regulations protect the existing parks and green areas in urban areas and spatial arrangements are made, which will give more areas towards the city's growth axes.

**Table 8.6.** The urban policy pathways.

| Policy number | Policy actions | Relevant target | Timescale |
|---|---|---|---|
| 5.1. | In spatial plans developing open and green areas in a system integration. | Making arrangements which protect the existing green area in settlements and proposing open and green areas system in spatial plans. | 2030 – 2035 |
| 5.2. | Ensuring sub-centres and neighbourhood centres are developed and enlivened with sustainable policies. | Developing approaches based on local adoption for sub-centres and neighbourhood centres, preparing guidelines directed at enlivening the centres and determining service standards. | 2030 – 2035 |
| 5.3. | Developing integration of public transportation and cycles. | Integrating public transportation systems with one another and other urban transportation types. | 2030 – 2035 |

Another arrangement that the Ministry of Public Works and Settlement needs to undertake in coordination with the municipalities is to carry out comprehensive efforts directed at strengthening local cultures in suburb and neighbourhood centres. In line with such efforts, preparation and implementation of sustainability reports are needed which would encourage social and business areas to intensify in these regions.

Additionally, municipalities, various ministries, and civil society organisations should start executing efforts in between 2030 and 2035 to integrate public transportation and bicycle transportation.

### 8.2.6. Infrastructure Improvements

Certain strategies that municipalities need to implement in the long term to meet the targets relating to the development of infrastructure systems for in-city transportation are specified in Table 8.7. For example, in between 2015 and 2020, integrations need to be assured regarding the physical and pricing matters among public transportation types. Municipalities should rapidly start to construct cycle tracks and park areas on routes with the suitable topographical structure, according to the criteria determined by the Turkish Standards

Institute, and to take steps to make pedestrian transportation networks continuous, and ensure it is ergonomic.

Starting from 2015, on the other hand, with the establishment of Transportation Control Centers in cities, it should be ensured that information regarding the mobility of public transportation vehicles is easily accessed over the Internet.

### 8.2.7. Mode Share

In order to encourage a large segment of society to use sustainable public transportation systems, in addition to the strategies above, municipalities, together with the Ministry of Transportation and various civil society organisations, should review the capacities of existing public transportation and organisation of service vehicles between the years 2025 and 2030, and ensure high-capacity vehicles are used where possible.

**Table 8.7.** The infrastructure, mode share, and special group pathways.

| Policy number | Policy actions | Relevant target | Timescale |
|---|---|---|---|
| 6.1. | Ensuring integration of public transportation systems. | Providing physical integration between mass transport types and integrating the pricing among different transportation types. | 2015 - 2025 |
| 6.2. | Enhancing non-motor vehicle use. | Developing standards for the design and construction of cycle tracks, constructing cycle lanes and parks on routes with suitable topographical structure.<br>Making pedestrian transportation networks continuous, ensuring pedestrian walkways passes, and pavements are ergonomic, sustainable, and accessible. | 2015 - 2025 |
| 7.1. | Ensuring public transportation and services are used more prevalently in work- and school-related travel. | Region-evaluating service vehicles regarding capacity and route.<br>Directing passengers in building places, universities, and schools to high-capacity public transportation systems, and taking measures to that end. | 2025 – 2030 |
| 8.1 | Encouraging low-income groups to use public transportation. | Giving public transportation tickets and cards free of charge to users of service vehicles. | 2025 – 2030 |

### 8.2.8. Special Groups

For public transportation systems to become widespread among low-income groups as well, it should be guaranteed that individuals are encouraged to first use organisation service vehicles for their work and school commute. For people to access organisation service vehicles, in turn, their travelling needs should be solved by providing public transportation systems at a discount or free of charge.

### 8.2.9. Safety

To achieve this project's regarding security in sustainable transportation systems, municipalities, together with the Ministries of Transportation and Internal Affairs, need to ensure the creation of social measures directed at preventing possible accident risks to cyclists through various seminars, conferences, and activities. With such social rules, it could create more awareness in public transportation drivers regarding the presence and rights of cycling users in traffic.

**Table 8.8.** The safety and policy co-ordination pathways.

| Policy number | Policy actions | Relevant target | Timescale |
|---|---|---|---|
| 9.1. | Ensuring awareness is created in bus drivers. | Ensuring bus users are made aware of the safety of cyclists in traffic via miscellaneous activities, seminars and conferences. | 2020 – 2025 |
| 10.1. | Reducing automobile ownership. | Implementing the options of banning and charging road-side parking.<br>Preventing people from becoming car owners with bank loans. | 2015 - 2025 |

8.2.10. Policy Co-ordination

For car dependency to be reduced in inner city transportation, policies need to be created by central and local administrations. To that end, as a principle, local authorities should start high increasing the cost of parking as of 2015 to prevent car parking along lanes in the central parts of the city.

On the other hand, in order to avoid car ownership, particularly in the lower and medium income group, changes are needed under the leadership of the Ministry of Treasury regarding the regulation of financial loans for car purchases. With such rules, in turn, legislation related to the limitation of these income groups taking bank loans and easily becoming car owners, needs to be reviewed together with the Council of Banking and Regulation and Supervision.

## 8.3. Micro-Policy Development

SWOT analysis (Strengths, Weaknesses Opportunities, and Threats) is a valuable tool used in strategic planning processes for sustainable transportation systems. This analysis is a vital technique used for determining the vigorous and weaker aspects of the examined process or situation, and the opportunities and threats arising from the external environment (Gretzky, 2010).

In this section, first SWOT analyses are revealed for sample urban areas in Turkey to reach specific vision targets and subsequently, with the help of these analyses, the policies that need to be implemented over the next 20 years are designed for the Improve Vision to reach its targets in each of the sampled urban areas. Micro-policies are the urban transport developments of specific local governments in response to the contexts provided in Table 8.1. These actions are only relevant to each case areas. These analyses and policy designs are based on the findings obtained in the interview work with appropriate

specialists of the Transportation Planning Directorate in the selected urban areas.

### 8.3.1. Ankara

Table 8.9 analyses the strong and weak aspects of urban transportation systems in Ankara and the means and opportunities the city face. The most prominent strong aspect of existing urban transportation systems in Ankara is the increasing accessibility of public transportation systems in parts of the edge of the city, by making municipal buses more integrated with the metro systems. It has one of Europe's most environmentally friendly bus fleets, operating on 70% Compressed Natural Gas (CNG). Ankara has a socially rich structure due to its presence in Turkey's top quality universities. The various activities organized by the university students contributes to the social and cultural wealth of the city. Ankara’s lack of a rail or metro system on the road going from the city centre to the airport, in turn, is seen as the most conspicuous disadvantage.

The table summarises that Ankara has access to more financial support from the central government in high-cost projects, such as the metro and the rail system due to the advantages brought about by it being the capital city. With such funding opportunity, the project development stage has started for new rail systems from the city centre to the airport. Ankara's other significant opportunity is that there are efforts to improve the integration between different public transportation systems with intelligent travel card systems. The intelligent card systems are aimed at facilitating the modernization and the use of public transport systems by offering an advanced fee collection validator. At this point, all the system would be recorded and all losses would be avoided by ensuring effective and secure traceability. These intelligent systems will also provide the convenience of transferring at reasonable pricing among different public transportation systems.

The most critical threats towards developing sustainable transportation systems are that the public's expectation relating to the quality and price of public transportation systems are high; to the extent, the city could not meet the costs of such regimes. The lifestyle of car use within the city is becoming increasingly more acceptable, and there are uncontrolled growths in the great districts connected to the city centre.

**Table 8.9.** SWOT analysis of urban transport systems in Ankara.

| **Strengths** | **Weakness** |
|---|---|
| - The 3.5 km long ropeway project was constructed.<br>- The bus shuttles were integrated with the metro systems.<br>- It has the most environmentalist bus fleet in Europe, using 70% CNG in its vehicles.<br>- The subways system is 52 km in total length.<br>- A developed socio-cultural structure in the city.<br>- The density of elite universities. | - The integration between the airport and the city centre is weak.<br>- Poor integration between different public transportation systems.<br>- Some residential places have difficulties inaccessibility.<br>- Smart card application still does not exist in the urban transport systems.<br>- It has the highest minibus mode share in all selected cities. |
| **Opportunities** | **Threats** |
| - 2023 Ankara Transportation Master Plan work has started, and Ankara Smart Card system would be introduced.<br>- Capital city.<br>- Access to national financial support.<br>- The line optimisation and transportation integration work to complete Ankara are under process.<br>- The 30 km airport railway system project is being worked on. | - Difficulties in administrations from opposition parties.<br>- Higher expectations from public transportation.<br>- Social habits on urban transportation.<br>- The resistance of people against changing their usual lives and mobility.<br>- Having a separate city structure. |

As seen in Table 8.10, the first phase of the policy package for Ankara is to improve the capacity of the metro and public transportation systems (especially in the direction of Çayyolu) and investigate new financial support for the construction of new metro lines (Keçiören and Airport). The second phase is to support campus cycling projects (e.g., new cycling roads and sharing systems, events, etc.) and produce new rights for minibus drivers before the

integration of all public transport systems. The third phase of the policy package is to integrate cycling with metro and public transport, mainly for university students, and to operate a new smart card system that incorporates some public transport systems. The last phase is to create a more comfortable pedestrianisation area around some parts of the city centre by using high car parking charges.

**Table 8.10.** Micro-policy pathways of the Improve Vision in Ankara.

| **Policy number** | **Ankara** | **Timescale** |
|---|---|---|
| 7.1. | ➢ Improvement of metro and public transportation systems. | 2015-2020 |
| 7.1. | ➢ Increasing the capacity of the metro in the direction of M2 Çayyolu Line. | |
| 8.1. | ➢ Finding additional resources for new metro investments. | |
| 7.1. | ➢ Free car parks around metro stations. | 2020-2025 |
| 7.1.,8.1. | ➢ Start-up of Kecioren and airport metro lines. | |
| 6.2. | ➢ The realisation of bicycle projects at universities. | |
| 5.3. | ➢ The presence of bicycle sharing systems in university campuses. | |
| 5.3. | ➢ Construction of bicycle parking in metro stations. | |
| 6.1. | ➢ Formation of new rights for minibus drivers. | |
| 6.2. | ➢ Construction of new bicycle roads. | 2025-2030 |
| 5.3. | ➢ Integrating the metro with bicycles. | |
| 10.1. | ➢ Increasing car park charges. | |
| 6.1. | ➢ Improvement of smart card systems. | |
| 5.3., 6.1 | ➢ Developing the integration of all urban transportation systems | |
| 6.2 | ➢ Designing the main centres of the city (like Ataturk Avenue, Kavaklidere, Sihhiye, and Ulus) to provide priority to pedestrians. | 2030-2035 |
| 6.2. | ➢ Construction of bicycle roads in the city centre | |

For public transportation systems in Ankara to become integrated with cycles, firstly, cycling sharing systems in universities need to be activated between the years 2020 and 2025. There need to be cycling parking areas, especially in the metro stations by the universities.

In the next 5-year time slice, in turn, it needs to be ensured that cyclists, especially in their commute to the university, can travel in a manner that is integrated with the metro.

In order to ensure the integration of public transportation systems, on the other hand, dolmuş (shared taxi) and minibus drivers need to be informed about the physical and price integration of the public transportation systems, and strategies need to be implemented directed at minimising all the disadvantages they may face, foremost the economic.

As of the year 2015, there should be aims to increase the number of public transportation users with the improvement of price and physical integrations in all the public transportation systems (stop stations, transfer stations, etc.) through intelligent card systems.

The local administration needs to take steps to operate cycling projects in universities as a priority, to support the gain in the prevalence of non-motor vehicle use. In the following stage, in turn, new cycle tracks need to be made on appropriate routes.

As of the year 2030, it needs to be ensured that pedestrian paths, pedestrian crossings, and pavements in important centres of the city are ergonomic, sustainable, and accessible, and the construction of new cycling tracks need to be started in some appropriate sections of the city according to design criteria.

To increase the use of public transportation systems is going to work to a significant degree, firstly, the comfort and the capacity of transportation of these systems in some metro lines need to be increased with additional vehicles or carriages. To improve accessibility to existing metro systems, car parks in such places need to be expanded and allocated to metro users free of charge.

For public transportation systems to become more widespread in inner city transportation by 2020, the construction of two separate metro lines, being Keçiören and the Airport, need to be started. Due to the fact that Keçiören, with its nearly 900 thousand population, is one of the largest districts in Turkey and

that a significant proportion of those residing in this area is from low and medium income groups, it also carries great importance from the aspect of encouraging these income groups to use public transportation.

To prevent car use for inner city transportation between the years 2025 and 2030, car park fees in the important centres of the city need to be high.

### 8.3.2. Eskişehir

Eskişehir local administration carries the speciality behind the first municipality in Turkey, which has completed its transportation master plan according to Sustainable Urban Mobility Plan (SUMP). The distinct differences of the local administration from other cities in practice which support sustainable transportation systems in existing urban areas, are that it has more comprehensive and practical activities relating to increasing green areas per person, that the city centre has been closed to motor vehicle traffic, that rail systems have been met with greater acceptance by the public, and that it has a wide vehicle fleet in proportion to its population (see Table 8.11). In addition, the fact that the city is in development in social and cultural aspects brings more mobility in the inner city transportation.

Eskişehir's strong points in urban road transportation system also offer significant opportunities for the stated specific vision in this project to achieve its targets. Leading among those opportunities is the fact that there is a predominantly student population in the city, and the efforts directed at increasing the number of users in tramway rail systems with the creation of new routes, and those directed at the formation of bus vehicle fleets operating on renewable energy. On the other hand, the design of Eskişehir is more developed and productive in many aspects compared to other cities; the fact that municipalities in Turkey receive financial support from the central government

according to their population causes Eskişehir's local administration to run its transportation plans under more limited economic conditions.

**Table 8.11.** SWOT analysis of urban transport systems in Eskişehir.

| **Strengths** | **Weakness** |
|---|---|
| - The transportation master plan is being revised in compliance with the Sustainability Urban Mobility Planning (SUMP).<br>- Increased pedestrian fields and landscaped parks.<br>- Acceptance of railway transportation by the public.<br>- A large, new vehicle fleet compared to the population.<br>- The closure of vehicular traffic in the city centre. | - A high level of mobility. |
| **Opportunities** | **Threats** |
| - Works towards the integration of a ropeway to public transportation are being performed.<br>- It is a city focused on students.<br>- The dissemination of clean energy vehicles like tramways (12 new purchases are being planned).<br>- It is currently in compliance with the EU's criteria, and it is open to granting opportunities.<br>- New buses increase the comfort of public transportation.<br>- The municipal buses are planning to convert to electric and hybrid vehicles.<br>- Human beings' primary vision in the city.<br>- Due to a low number of car parking areas, the tramway journeys are more accessible to the public. | - Insufficient national financial investments for urban transportation systems. |

In order to achieve the targets of the Improve Vision in Eskişehir, the first stage is that new cycle tracks and sharing systems should start operation on suitable routes, and the initiation of the new light rail system extension lines project. In the second stage, cycle tracks need to be made into a continuous network, and after starting the operation of the new tramway line, bus services need to be brought to the neighbourhoods, where access to public transportation

is still limited. The most significant policy that needs to be started before the year 2025, on the other hand, is to ensure that 15% of the fleet must consist of buses operating on renewable energy. In the last stage, on reducing the air pollutants emitted into the environment; with the improvement of traffic flow in Eskişehir, the positions of all buses and tramways, passenger number information shall be made possible to view over Global Navigation Satellite System (GNSS) /Global Positioning System (GPS). In this manner, data shall be obtained via digital technologies through which necessary arrangements can be made to increase the number of users on public transportation systems.

**Table 8.12.** Micro-policy pathways of the Improve Vision in Eskişehir.

| Policy number | Eskişehir | Timescale |
|---|---|---|
| 6.2. | ➢ Construction of bicycle roads. | 2015 – 2020 |
| 6.2. | ➢ Use of bicycle rent stations. | |
| 6.2. | ➢ Determination of car park violation points in the city centre. | |
| 5.3. | ➢ Integration of bicycles into public transportation. | |
| 6.2. | ➢ A review of public transport routes and lines according to the density of motor vehicle traffic. | |
| 7.1. | ➢ Start the construction of the new light rail transit line. | |
| 6.2. | ➢ Formation of bicycle road networks. | 2020 – 2025 |
| 6.1. | ➢ Increase the accessibility of public transport buses where passengers cannot easily use tramway systems. | |
| 7.1. | ➢ The extension of tram lines into three separate regions (Fikirtepe-Yeniosman-Serefkoy, Sarayevler - Eskikoy and Bahcelievler – Ankara Yolu) for increasing the capacity of tramway journeys. | |
| 6.1., 7.1. | ➢ Activation of the ropeway transportation system. | |
| 5.3. | ➢ The integration of public transport systems with new tramway lines. | |
| 6.2. | ➢ Activation of the pedestrianisation works in some regions of the city. | 2025 – 2030 |
| 2.2. | ➢ To convert 15% of the municipal fleet to electric vehicles. | |
| 7.1. | ➢ The design of smart stations for all bus and tramway stations. | 2030 – 2035 |
| 5.1. | ➢ Increase green fields per individual. | |

Eskişehir sets ambitious targets for the construction of new light rail infrastructure. Three light rail line expansion will be developed in detail to enable construction to begin by 2020. The proposed routes include Fikirtepe-Yeniosman-Serefkoy, Sarayevler- Eskikoy and Bahcelievler-Ankara Yolu. New

parks and green areas need to be opened for zones in those areas. To provide for the integration of public transportation systems, firstly in 2015, the integration between public transportation systems and cycles needs to be improved and subsequently, with new tramway lines. The physical integration of buses needs to be ensured. In the stage of providing for the integration of public transportation systems among themselves, the designing bus transport with the new cable car project in an integrated manner, the accessibility to public transportation, and therefore, the number using these systems is expected to increase.

Additionally, Eskişehir's local administration needs to also put into operation a series of strategies to ensure that non-motor vehicle use increases in a significant manner in inner-city transportation. In 2015, on the roads where making cycle tracks were previously planned, these projects need to be put into operation. Additionally, in these areas using cycle sharing systems over the next 5-year time slot, the cycle tracks need to be made into a continuous network.

After the public transportation systems have a significant share in inner-city transport, in some areas, pedestrianisation projects should be started as of the year 2025. For public transportation systems to be used in the inner city by those going to work, first, the construction of the extension project for the nearly 20 km light rail line needs to be started. In between 2020 and 2025, given significantly increasing numbers in public transportation systems, completion of the expansion of rail systems into three different areas and the completion of the new cable car project should be planned. As of the year 2030, in turn, to increase the efficiency of public transportation systems, the traffic control centre needs to be established. With this control centre's digital information, such as the position of buses and proposals numbers, regular reviewing of bus routes and trips, the public transportation user numbers and their satisfaction can be increased.

### 8.3.3. İstanbul

The biggest advantages of the existing urban transportation systems in İstanbul are the availability of different fees and transfer systems, and the public's adoption of intelligent card systems, as presented in Table 8.13. The most notable disadvantages in the urban transportation systems seem to be that many transportation projects made far from the characteristic of being sustainable, and the absence of comfortable pavements. At the same time, it has been understood that different inner-city public transportation systems (sea, land, and rail) serve on the same lines and the integration problems in those transportation systems are distinct disadvantages to İstanbul.

The fact that İstanbul is a rich city in historical and cultural terms, that many locations have relevant connections to the sea, putting significant projects into operation which support public transportation systems are seen to be the greatest opportunities for the Improve Vision to achieve its objectives in inner city transport. The major threats for İstanbul to reach its sustainable inner-city transportation targets are: the city's hilly geography; dense urbanised areas; the time spent in traffic continuing to rise in a rapid manner; and with the new bridge, airport, and settlement area projects, the estimated possibility of a significant explosion in the city's population is very high.

**Table 8.13.** SWOT analysis of urban transport systems in İstanbul.

| **Strengths** | **Weakness** |
|---|---|
| - Application of different fares and transfer systems.<br>- Acceptance of the smart card system by the public. | - Some projects which were formed in previous plans are not sustainable.<br>- The presence of national and international road networks in İstanbul.<br>- The lack of pedestrian paths (physical and occupational).<br>- The bus stops' narrow pavements.<br>- Different transport modes work on the same line.<br>- The integration problems between rail, sea, and wheeled transport.<br>- Coordinating urban public transport systems by various authorities. |
| **Opportunities** | **Threats** |
| - It has access to the sea.<br>- New underground and ground railway projects.<br>- So many historical and cultural sites.<br>- The improvement of infrastructure integrations on intermodal passenger transport.<br>- Public transport priority roads are being constructed. | - Intensive construction.<br>- Hilly topography.<br>- The high increase in the population compared to the infrastructure.<br>- Higher possibility of population boom as a result of projects like the third Bosphorus bridge, new airport, and Channel İstanbul.<br>- The rush hour time in traffic is increasing.<br>- Capacity shortages in private vehicles.<br>- Uncontrolled growth of the residential area of İstanbul Central Region (oil stains form). |

Table 8.14 shows which policies need to be implemented in different 5-year time slices for the alternative transportation vision in İstanbul to achieve its targets. In the first stage, it should be ensured that activities directed at increasing the popularity of cycle transport systems in inner city transportation are made, and by dividing the city into different zones, creating low-emission areas should be facilitated. In between 2020 and 2025, which is the second stage, enhancing the connections of all transportation systems among themselves should draw the attention. For example, the integration of bicycle and sea transport, integrating the new airport with the rail systems of the city centre, and the strengthening the connection of pedestrian infrastructure to the

coast are needed. The third stage is to ensure that pedestrian transport in historical areas becomes a more efficient transportation mode. In the last stage, in turn, the aim of controlling traffic congestion in the Historical Peninsula in İstanbul would be reached by implementing optimum traffic congestion charges.

**Table 8.14.** Micro-policy pathways of the Improve Vision in İstanbul.

| **Policy number** | **İstanbul** | **Timescale** |
|---|---|---|
| 4.2. | ➢ The performance of bicycle events and activities. | 2015-2020 |
| 7.1. | ➢ Improvement of underground and ground railway systems. | |
| 5.2. | ➢ The creation of low emission zones. | |
| 6.2.<br>7.1. | ➢ Making private public transport lanes on some road corridors. | |
| 5.2. | ➢ To divide the city into different zones (high-density housing, commercial density, forestland, etc.) and evaluate each zone depending on their characteristics. | |
| 6.2. | ➢ Construction of bicycle roads near the seaside. | 2020-2025 |
| 8.1. | ➢ Distribution of free bicycles to students. | |
| 5.3. | ➢ Integration of coastal public transportation system with bikes. | |
| 7.1. | ➢ To connect the new airport with the city centre by new rail systems. | |
| 6.2. | ➢ Strengthening pedestrian infrastructures near the coastal sites. | |
| 6.2. | ➢ The performance of pedestrianisation works in historic areas. | 2025-2030 |
| 4.2. | ➢ To create High Occupancy Vehicle (HOV) lanes on the two Bosporus bridges. | |
| 1.2. | ➢ Implementation of traffic congestion charges on the Historical Peninsula. | 2030-2035 |
| 5.1. | ➢ To prevent the destruction of green areas as a result of the construction of the new airport and Bosporus Bridge. | |

Table 8.14 shows İstanbul is the single example city in this study which needs to put the traffic congestion fee into practice for the Improve Vision to achieve its targets. At the same time, it summarises to put the traffic congestion application into operation, the relevant projects for public transportation systems need to be put into action earlier, compared to other example cities. For example, various ongoing underground and surface rail system projects should

aim to be finished by the year 2020. Until that time slice, on the other hand, increasing the special lanes for public transportation should be ensured. In another important project directed at improving public transportation systems in the city, the airport and the city centre need to be connected with rail systems.

Local administration also needs to take steps directed at ensuring various awareness creations towards the efficient use of energy in sustainable transportation systems are made in society's lifestyle. With some changes in society's style of transportation via various activities and strategies, such awareness creation should be ensured. For example, to create different points of view regarding bicycle transportation, different organisations and activities need to be brought to life at once.

Also after the year 2025, social awareness can be created regarding the efficient use of energy in transportation on both of the Bosphorus Bridges that connect the Anatolian and European sides to each other and are used by approximately 500 thousand car drivers per day. It is assumed that by forming special vehicle lane(s), Bosphorus Bridge passes for personal automobiles used by at least 3-4 people ensure no bridge fee shall be taken.

To bring rapid urbanisation under control in places close to the new airport and Bosphorus Bridge projects, which have the potential for intense urbanisation in existing green areas, these non-central areas of the city need to be preserved. On the other hand, to create new social and business areas in the central and suburban parts of the city, bringing different zone practices shall facilitate the specific vision to achieve its objectives. With this zone practice, it can be made possible that high-residence settlement areas, commercial areas, and forestland regions can be evaluated within themselves. Additionally, with the announcement that the Historical Peninsula is a low-emission region, putting the congestion charge into practice in this region can be facilitated. For the local administration to support sustainable transportation systems, it needs

to arrange individual infrastructure systems as well. In such arrangements, first, in order to reach more public transportation user numbers, special transportation lanes need to be made.

For public transportation systems to be integrated with cycles in İstanbul, marine transport draws attention as a more important transportation mode in ensuring that integration. In subsequent years, strengthening the connection of pedestrian transport with the coast and making cycle tracks, especially from these regions, are needed. By the year 2025, advances should be made which are directed at limiting car traffic in the Historic Peninsula.

### 8.3.4. İzmir

According to Table 8.15, the strongest aspects of the existing urban transportation system in İzmir seem to be with the new cycling sharing systems made on the coastal road, reaching approximately 130 thousand users in a short time. The existence of a high satisfaction rate in public transportation systems, reduction in motor vehicle congestion with the banning of minibus systems within the city, and a rapid population increase are difficult due to the physical structure of the city. In turn, the conspicuous weak aspect of İzmir is that all social, commercial, service, and management activities in this city are restricted to a single region, like Alsancak.

The greatest opportunity in the name of ensuring sustainability in inner-city transportation is that the local administration desires developing pedestrian, bicycle, and public transportation systems and that the citizens of İzmir support the local government for these systems to become more prevalent. Additionally, the fact that there is significant tourism potential on the north and south axes of İzmir is seen to be an advantage for starting the construction of new rail systems in these places in a more rapid manner. On the other hand, with the relocation of

some attraction centres in İzmir's Alsancak Region to the Bayraklı Region, it may be possible to bring along new urban transportation problems.

**Table 8.15.** SWOT analysis of urban transport systems in İzmir.

| **Strengths** | **Weakness** |
|---|---|
| - The bicycle sharing system began in 2015 with 32 stations, and it gained 130,000 members.<br>- The pleasure using public transportation is 82%.<br>- Park and Ride systems are integrated with transfer centres.<br>- Different means of transportation like the sea, rail systems, bicycles, and pedestrian roads are incorporated.<br>- Since the mountains are vertical to the sea, new settlements cannot be established quickly.<br>- The removal of minibuses from the city centre.<br>- Rail systems provide more pedestrianised areas around some parts of the city. | - All social, commercial, and service areas are gathered in one spot. |
| **Opportunities** | **Threats** |
| - The presence of current qualified and willing personnel and officers/executers.<br>- The authorities claiming for city management have to present sustainable projects.<br>- The bike-rental stations are being increased by new cycling road projects.<br>- 400 cross sections will be introduced with Smart Traffic Management system until 2017.<br>- The desire for people to have more liveable cities.<br>- Planning new railways on north – south axis. | - Plans for the establishment new urban fields. |

Table 8.16 specifies that in order to reach the targets of the Improve Vision in İzmir over the next 20 years, it is necessary that in the first stage, cycling sharing systems are extended and that the roads at the furthermost cycling sharing stops reach the national standards. In the second stage, the

expansion of cycle tracks along the coastal road to advance towards the city's inner sections, and networking is ensured between the different cycle tracks in the inner sections. By 2025, by making sure that some important activities in Alsancak Region are moved to the Bayraklı Region, it will prevent all activities of the city becoming collected in one region. After 2030, the illegal settlements around the Kadife Kale located in İzmir centre would be removed, and a continuous pedestrian transportation network would be created in this region.

**Table 8.16.** Micro-policy pathways of the Improve Vision in İzmir.

| Policy number | İzmir | Timescale |
|---|---|---|
| 5.1. | ➢ Re-arrangement of recreational fields. | 2015-2020 |
| 6.2. | ➢ Making bicycle roads in compliance with national standards. | |
| 6.2. | ➢ Formation of access roads for the bike riders as a result of coastal arrangements. | |
| 6.2. | ➢ Enlargement of the bicycle sharing systems along the coast. | |
| 5.2. | ➢ Movement of the city centre's density to the Bayraklı region. | 2020-2025 |
| 6.2. | ➢ Formation of vertical bicycle road connections from coastal areas to the city centre. | |
| 5.3. | ➢ Integration of suburb and bus transportation with bicycles in all sub-provinces. | |
| 6.2. | ➢ The connection of the main bicycle artery roads with each other. | |
| 10.1. | ➢ To apply high parking charges around the bus stops in the city centre. | |
| 6.2. | ➢ To construct new bike sharing systems around the city centre. | |
| 6.2. | ➢ Provide priority for bicycles in narrow streets. | |
| 6.2. | ➢ Pedestrianisation of Bayraklı, which would be the new town centre. | 2025-2030 |
| 5.3. | ➢ Integration of public transportation with bicycles. | |
| 7.1. | ➢ Construction of metro lines from the city centre to North (Bergama) and to South (Ephesus) direction. | |
| 7.1., 10.1. | ➢ Activation of the metro system towards the west (İzmir Institute of Technology) areas. | |
| 6.2. | ➢ Pedestrianisation of the historical Kadife Castle. | 2030-2035 |

Towards increasing green areas in İzmir, efforts should be undertaken to green the arid areas, especially in the furthermost segments opening the coastal road, and the creation of park areas. For the realisation of policies directed at

creating new social and business areas, some social and business activities in the Alsancak Region, where all operations of the city are collected, should be moved to the Bayraklı Region, which is situated in another central region of the city.

To enable the integration between cycles and public transportation in İzmir in an efficient and comprehensive manner, firstly the integration of public transportation systems in district centres and cyclists shall be ensured. In the next stage, public transportation and cycling transportation shall be integrated at locations in the city's inner sections. Additionally, to enable integration in the last stage especially, as of the year 2020, for the cycle tracks on the coastal road, vertical cycle tracks need to be constructed towards the central parts of the city. These vertically extending cycle tracks, in turn, should be connected with the inner sections, and on the roads in between the bus and metro stops in these inner sections, car parameter fees should be kept high.

İzmir’s local administration needs to also develop certain strategies in different time slices, apart from ensuring more efficient bicycle-public transportation integration in between the vertical cycle tracks in the inner sections. It is understood that cycle tracks at the endpoints of the coastal road are not up to certain criteria and due to the fact that there are dirt roads in these segments, cyclists cannot go at adequate speeds. Therefore, firstly the cycle tracks in these sections need to be widened according to the criteria. Then on these expanded tracks, additional cycling sharing systems need to be placed, and in the next stage, cycling sharing systems need to be extended to the city's inner sections.

For the projects between 2025 and 2035, it should be ensured that projects exist which are directed to particularly improving pedestrian transport. For example, it was recommended that in 2025, infrastructure systems should be applied that are supportive of pedestrian transportation in the new settlement

region. Moreover, by the year 2035, the historical Kadife Kale region would be transformed into a pedestrianised region.

### 8.3.5. Konya

According to Table 8.17, Konya's advantages relating to constructing more efficient sustainable transport systems (especially for cycling), are seen to be the city’s flat topography. There is little city mobility, having adequate cycle tracks and the roads with adequate width for new cycles, pedestrians, and public transportation systems to be implemented. When looking at the disadvantages, on the other hand, it seems to be a closed society and is less open to novelty. Additionally, as the result of not integrating with local administrations in the new university and loan-based residential projects for retirees, which were made by the state in recent times, transportation problems have started to become quite conspicuous in these places. Moreover, due to the inadequacy of settlement areas in these regions, bus operation along this line has become problematic in financial terms.

There also are significant opportunities for realising the Improve Vision for inner-city transportation. These seem to be that the areas on the Mevlana Street, which is the busiest street in the city centre, are in the process of being closed for car use and that the new rail system shall start its operation. The most prominent threats for the Improve Vision to achieve its objectives are the pedestrianisation projects which were made in prior years were removed by some tradesmen using their political influence, and that in the number of per capita travel, it is estimated that there will be a remarkable increase in the future.

**Table 8.17.** SWOT analysis of urban transport systems in Konya.

| **Strengths** | **Weakness** |
|---|---|
| - The total length of the bicycle road is 240 km.<br>- Flat topography.<br>- The roads are wide enough for new sustainable transport projects.<br>- Low mobility.<br>- The size of the city; it is the biggest Turkish city in the surface area.<br>- High-potential green areas. | - Lack of a database in the city.<br>- A closed society.<br>- A lack of innovation.<br>- The emergence of transportation problems as a result of new university and the Mass Housing Development Project. |
| **Opportunities** | **Threats** |
| - The pedestrianisation works at Mevlana Avenue, known as the centre of Konya, are at feasibility stage.<br>- New tram and rail projects. | - Expectations of increasing the number of journeys made per individual.<br>- The cancellation of previous pedestrianisation projects resulting from political pressure by some shop owners. |

In Konya, for the Improve Vision to achieve its objective, in the first stage in the regions where the new university and the TOKİ residential projects are situated, new settlement areas need to be opened in the region. The most important strategies that need to be realised by 2020 and 2025, on the other hand, are directed at increasing both the comfort and the capacity of public transportation systems along with the new routes and starting the construction stage of the new monorail project. In the steps following 2025, around 500 minibuses in the city centre will be removed from traffic. In order for public transportation to become modeless perceived as a waste of time in the single centre city (journeys between different regions mostly run via the city centre route), developing social and business areas in some sidelined, and central parts of the city should be planned. In the last stage, car parking prices in some busy streets of the city centre need to be high.

**Table 8.18.** Micro-policy pathways of the Improve Vision in Konya.

| Policy number | Konya | Timescale |
|---|---|---|
| 5.2. | ➢ Providing the opening of new development in some particular areas (University and TOKI lines). | 2015-2020 |
| 6.2. | ➢ The completion of road construction works for bicycle transportation. | |
| 7.1. | ➢ To create better public transportation facilities between Meram Medical Faculty and the Bus Terminal. | |
| 7.1. | ➢ Increasing the capacity and comfort of public transportation systems. | 2020-2025 |
| 7.1. | ➢ The implementation of the monorail project, which provides great convenience for public transportation systems. | |
| 7.1. | ➢ Development of light railway systems and increasing the network length to 180 km. | |
| 7.1. | ➢ To create new bus routes. | |
| 5.2. | ➢ Improvement of social life and public culture around part of the city centre. | 2025-2030 |
| 2.2., 5..3 | ➢ The minibuses will be removed from the city centre. | |
| 7.1., 8.1. | ➢ After the conversion of minibuses to buses, an electronic fare system should start in the city. | |
| 10.1. | ➢ Prohibition of car parking on certain roads to decrease vehicle use. | 2030-2035 |

For creating integrated urban transportation systems in Konya and enabling public transportation fleets operating on fuels that use energy more efficiently, minibus and dolmuş vehicles need to be removed from inner-city traffic. However, before that practice can be realised, it has been understood that it is essential to make some applications directed at improving the public transportation systems. For example, firstly, the public transportation facilities between the inner city bus terminal and the Meram Medical School need to be developed. Additionally, in this time slice, in regions where bus operation costs show a deficit in inner city transport (new university and Toki residences), new areas open for settlement need to be created.

Other strategies directed at the development of public transportation systems are advances towards the improvement of the capacity and comfort of

these systems, a new monorail project being put into operation, and a review of bus routes and trips.

In between the years 2025 and 2030, with the removal of minibuses from the inner city transfer, starting to use electronic fee systems in the public transportation systems. In the determination of fees relating to the utilisation of these systems, they should also be made to encourage the lower income segment to the public transportation systems.

## 8.4. Summary

In this section, the required national and local policy developments for meeting the key objectives of the Improve Vision were revealed. These policies were specifically explained with possible practice time periods. Then, the chapter performed SWOT analyses and designed local policy pathways to inform other Turkish municipalities about the possible ways of creating such futures.

It was seen that numerous Turkish ministries and institutions are competent to do planning due to the law of their establishment, so there is a complexity arising from multiple sectors. The abundance of the legal regulations and the competent administrations related to planning causes the plans to be changed considerably. Moreover, any strategic connection between the upper scale plans in the jurisdiction of different institutions cannot be efficiently established in future transport planning. Additionally, the lack of financial resources can be listed among the problems which are faced by such institutions and organisations in the implementation of the plans. Hence a central authority which provide the harmony and coordination between many agencies is required to make the disorganised planning system efficient.

Meanwhile, it was noticed that the municipalities make their transport plans as part of their visions since the effect of the central authority on the local administrations is not adequate. For example, the use of minibuses (Dolmuş) was prohibited in İzmir. Instead, their commercial use between definite terminals in the suburban areas and the counties was allowed. However, the intense use of the urban minibuses in the other cities creates a critical traffic problem. When Ankara did not have any integration between the public transport systems or any smart card system, the smart card systems and the public transport integration applications were being used much earlier in other example cities.

Therefore, the policy measures of each city may suggest important points for other Turkish cities. For example, the key strategy for Ankara is to integrate cycling with metro and public transport systems, particularly at university stations, and to develop new smart card systems for all public transportation systems, with new rights and benefits for minibus drivers. This strategy may propose an important approach for other urban areas that have a high student population and residential districts that are far from the city centre. Eskişehir was a single case city that collaborates with the general security of the town for preventing car parks in cycle lanes. This collaboration is essential for many Turkish cities where cyclists cannot use their routes due to the occupation of cycle lanes by cars (even for Konya, which has 240 km of cycling paths). However, the city needs to construct safer cycle roads and cycle hire systems. The policy agenda of İstanbul includes new underground and ground railway systems and to implement a traffic congestion charge. İstanbul provides an important message to the other major car-dependent cities that it is important to develop initially public transport systems for changing public behaviour from car journeys into public transport systems and then to improve non-motorised transport systems. İzmir was the only city that does not allow minibuses to enter the city centre as a transport mode but does in the outer districts of the city. This practical application may offer a good point to other municipalities that have high traffic congestion due to a large number of minibuses. The city needs to reduce the high levels of traffic in Alsancak Region by creating a new settlement attraction in Bayrakli Region and Historical Kadife Castle Region for the use of pedestrians only. The topography and urban structure of Konya offers a better urban environment for cyclists and pedestrians. However, cars occupy many cycle lanes, and current pedestrian planning projects were terminated due to public pressure. Making the city centre more attractive for the public needs may promote car drivers to use more sustainable transport systems because

people in Konya must use some central parts of the city for their transit journeys.

The next chapter discusses the main findings of the research objectives and concludes the contribution of this research.

# CHAPTER NINE: CONCLUSION

## 9.0. Accomplished Work

The study described in this thesis explored the development of alternative transport visions for urban road transport systems in Turkey that place greater emphasis on walking and cycling. To this end, this thesis contributes to vision development in the context of the national foresight study by exploring the different ways of undertaking such a project in Turkey and how future public diversity and sustainable lifestyle efforts may be directed towards it.

The following sections of this chapter review the conclusions and main research findings, illustrate how the research aims and objectives were fulfilled, and finally, present ideas for further development of the research area.

## 9.1. Conclusions

The key conclusions of the research are as follows:

1) The selected methodology adopted an innovative approach in order to show that the current challenges to operating sustainable urban transport are connected to each other in some manner. It also proved successful in addressing the research objectives.

2) The content of the visions was meaningful and reasonable. Therefore the innovative method opened up several creative choices and alternatives that had never been studied before.

3) It is clear that in order to implement the policies a comprehensive approach needs to be coordinated between the public and private sector; however, this study uncovered a severe weakness in the coordination between Turkish public and private institutions.

## 9.2. Main Findings

It was found that the various processes associated with the approaches to future transport planning might be implemented successfully using the following:

### 9.2.1. Encouraging Public Involvement

- This study shows that the different transportation strategies identified could make various positive contributions to the new lifestyles and behaviour of the participants.

- Nearly 20 percent of car-driving participants claimed that, for a number of reasons, they would never make the shift to sustainable modes of transport (see Section 5.5.3). This means that when proposing visions for future transport, the minimum requirements for car drivers have to be protected.

- One of the more significant findings to emerge from this study was that there was a certain imbalance in the gender and age profile of active transport users in this study (and also in the country's general profile), while the non-motorised transport system in Germany shows a more balanced profile of age and gender. This comparison shows why it is crucial to focus on socio-economic groups in vision development work.

- The study found clear, significant differences in the views of the male and the female participants towards the proposed sustainable transport strategies. However, there was a little difference observed for some dependent factors such as age, education, and income group.

9.2.2. Alternative Visions

- Switching much of the population to more sustainable forms of transport for many journeys is entirely feasible, if such forms of transport are made accessible, comfortable, and can easily be integrated into the user's daily routine.

- Experts from different disciplines stated that the visions are universal and desirable for the future of Turkish cities. The general view of the experts is that the Avoid Vision seems like a transitional approach, the Shift Vision can only be implemented in very limited locations, and the Improve Vision appears to be the most sophisticated approach.

- The Improve Vision received the highest positive feedback from the participants about future key changes compared to the other two visions. The participants felt that four of the ten main types of future change were inconsistent with Improve Vision; namely, technology, energy, infrastructure, and safety.

- In general, the pedestrian participants thought that more active transport systems could easily be applied to some parts of university campuses (the Shift Vision). Cyclists preferred an infrastructure system that minimises the risk of collision either with other cyclists or other users (the Avoid Vision), rather than being allocated more urban road space. Comfortable and fast transport would be crucial at peak travel time for public transport users (the Improve Vision), and the other visions would only lead to more stressful conditions for them. Car drivers considered the less reformist approach (the Avoid Vision) as their preferred future, and they thought that narrowing some urban streets would only lead to worse traffic congestion on other urban streets. Shop owners all opposed the reduction of urban space for car drivers in front of their shops (the Shift Vision), but some of them did not oppose increasing the accessibility of public transport systems if it meant attracting more customers to their shops.

Shopkeepers in general would like to bring in more customers from the outer parts of cities.

- Although three future urban transport systems in this study were developed with much higher dependence on walking and cycling, the vision that most developed the public transport system was found to be most realistic by the participants.

### 9.2.3. Policy Development

- This work is the first central and local governance-oriented policy development exercise carried out with the goal of achieving a Turkish urban transport environment that emphasizes higher dependence on walking, cycling, and public transport.

- It is interesting to note that all five urban areas in this study would have to apply different key strategies to achieve their Improve Vision targets and that these local policy pathways could constitute exemplary approaches for many other Turkish cities.

- It is somewhat surprising that the prominent sustainable transport practices of some Turkish urban areas are not applied in other places. Minibuses (Dolmuş) have been prohibited in İzmir, but not elsewhere, despite being seen as the greatest cause of traffic jams in most of the case cities. The general security and transportation departments of Eskişehir collaborated to prevent car parking in cycle lanes; however, similar applications are not implemented in other cities. One unanticipated example was that smart card systems are not used in the capital, while other case cities have already adopted this innovation for promoting the use of affordable public transport systems.

## 9.3. Fulfilment of the Research Aim and Objectives

The purpose of this study was to generate alternative transport visions that focus on pedestrians, cyclists, and public transport users. The imaginary travel scenarios created for the future were developed in line with ideas from the public, and macro and micro policies which should be implemented to achieve the goals of a specific vision in urban areas were sought by the policy makers. To achieve this research aim, the project focussed on five main research questions:

### 9.3.1. What are the expectations of individuals regarding future transport systems and how does this influence their design?

In this study, a comprehensive survey was undertaken to ascertain the sustainable transport interventions that participants expected to see in the urban areas of Turkey within the following two decades. More than 200 different suggestions towards developing future transport visions in Turkey were considered for the purposes of answering the second research question. Examination of the participants' expectations for future Turkish urban transport systems contributed to the creation of a broad vision for future development that kept public involvement to a maximum. Keeping cycling routes separate from automobiles was found to be the most desirable future strategy. The other priorities were reduing car speed and restricting the use of private cars in some busy parts of the city centre.

9.3.2. What transportation measures help to create sustainable lifestyles and behaviours?

In this study, various strategies that might change the transportation behaviours and lifestyles of the participants were sought. Participants specified which potential strategies might make positive or partly positive changes in their transportation behaviours. The results show that the participants will have various positive effects on their transportation behaviour in all future visions, but specific transportation strategies that lead to any one of these different positive influences could not be found.

9.3.3. What are the possible elements of future alternative transport systems that could encourage different groups to use more sustainable transport systems in Turkish cities?

The study investigated whether the relative importance of different safety-, social-, and environmental-oriented factors vary significantly among different socio-economic groups. A one-way ANOVA showed that the only statistically significant correlations were between gender and the average scores of safety, social, and environmental factors. The findings of this analysis agreed with those of previous studies. In addition, the statistical results revealed strategies that should be effective in pushing gender groups to use more sustainable transport systems. However, the results only provided limited information about devising potential strategies that might be targeted at specific socio-economic groups (e.g. gender, age, income, and education).

9.3.4. How reliable are the alternative transport visions for 2035?

In this study, the proposed future travel visions were evaluated by considering public and expert views. Most of the public and expert participants considered all of the visions to be desirable future urban environments for Turkish cities. However, the prevailing view from the participants was that the vision that further improves public transport was more credible and even necessary for urban areas in Turkey, even though the intention of developing visions for the future was a radical increase in non-motorised transport systems.

9.3.5. What policies and legislation could be implemented to achieve the goals of one specific vision from the present to 2035?

This study first envisioned future approaches to transport in order to explore the essential national and local policies in the selected case cities. The findings extend academic knowledge and understanding of the future roles of various institutions in the development of desirable urban areas and successfully provided a useful example of how different Turkish local authorities could construct policy pathways that would enable them to realise the Improve Vision target by the year 2035.

## 9.4. Limitations

The design of the imagery pictures (and their scenario narratives) imposed several constraints on the project. First, the published scenario studies that support the sustainable transport systems in Turkey are very limited, so it was only possible to take the key driver changes from the worldwide published studies into account. Secondly, the pilot locations were chosen from particular cities that reflected the hypothetical characteristics of Turkish urban transport systems. The local policy designers in the other case areas were only informed

about future changes in the urban transport visions. The fundamental limitation that affects the research results is therefore as follows: the suggested travel scenarios for the development of future sustainable transport systems in Turkish cities are not available.

In addition, it is important to acknowledge several poor aspects of the visioning work that most public and expert participants did not have access to. The first criticism concerns the design error of the city centre in the Improve Vision. The fundamental problem is that mid-to-large-sized Turkish cities usually contain narrow main roads and streets, so the establishment of an effective public transportation network is not always possible for most parts of the city centre, which lie outside main road corridors. Accordingly, the construction of cycle paths to the left of bus roads was projected to reduce the risk of conflict at intersections; however, the researcher thinks that such a scenario is not ideal and that cycle pathways ought instead to be close to pedestrians (and that measures should be taken to reduce cycle/pedestrian and cycle/public transport conflicts). One noteworthy point is that although all three visions aimed to improve and extend the road space according to the requirements of sustainable transport users, in the Improve Vision, the pedestrian sidewalks in the city centre would not be any narrower than at present.

Another design oversight to be highlighted is the availability of pavements that are currently too wide. Such an approach was considered to demonstrate the consistent application of road reduction techniques by making the sidewalks wider, but it was observed that such broad sidewalks do not reflect the general urban transport conditions in Turkey. Finally, crossroads are critical and complicated infrastructural systems as they affect the maneuverability of motor vehicles; therefore, one of the most challenging aspects of the visualisations is to identify straight streets where 3D modeling

solutions for the intersection can easily be produced. It may be argued that applying the intersection model found in both the Shift and the Improve Vision would ease the vehicles' ability to turn, but the less reformist vision, the Avoid Vision, would provide better outcomes in decreasing the dependency on private cars. Consequently, the model applied in the Avoid Vision could be integrated into the Shift Vision and the Improve Vision.

Although the effect of several design errors came to light upon evaluation of the images, the participants' criticisms did not prevent them from stating or comparing their transport mode expectations with the visions. Hence, the Improve Vision was preferred by the public and experts, even though it contained most of the design errors, which may have negatively affected the assessment of the vision.

## 9.5. Recommendations for Further Work

Although the prospect of encouraging much of the population to switch to more sustainable forms of transport for many journeys seems feasible from this project, developing urban transport systems in Turkey with much higher dependence on walking and cycling may be still problematic. Therefore, it is recommended that further research should be undertaken in the following areas:

- To explore one of the visions designed for the future in detail and examine its practicability in the context of real-life developments in different European towns.
- Are there any more examples of cities that have changed in a similar way?
- Has such a change become universal (or more widely used)?

## 9.6. Summary

Undoubtedly, such developments would involve a considerable degree of consensus that such a future is achievable, that the existing transportation problems are real, and that radical approaches to tackling them are essential. However, it is important to emphasise that if the reliability of such radically different futures (and the implication of the pathways for this vision) is not confirmed, then it is less likely that such changes will be achieved in Turkish cities.

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# APPENDIX

**Appendix 1:** The general consent form for all survey and interview studies.

**Appendix 2**: The participant information sheet.

**Appendix 3:** The online survey questionnaire.

**Appendix 4:** Verbal outcome of the individuals with regard to future sustainable transport visions.

**Appendix 5:** Statistical outcome scores assigned to potential transport initiatives according to different groups.

**Appendix 6:** The generic pictures.

**Appendix 7:** Interview questions for justification the reliability of the visions.

**Appendix 8:** Interview questions for exploring macro- and micro-policy developments.

# Appendix 1

**The University of Birmingham**

**School of Civil Engineering**

## Consent form

I have designed in-depth surveys and interviews covering different aspects of future sustainable Turkish transport systems that you can assist to share your views, knowledge, and experiences.

The research does not anticipate that there are any risks associated with your participation, but you have the right to withdraw from the research at any time.

This consent form is essential for the researcher to ensure that you understand the purpose of your involvement and that you agree to the conditions of your participation. Would you, therefore, read the accompanying information sheet and please complete the consent form below.

Please tick (by ticking the box this states that you have understood the information and you are happy to participate in data collection for this research).

| | |
|---|---|
| I confirm I have read and understood the information sheet for the above study and have had the opportunity to ask questions. | ☐ |
| I understand that my participation is voluntary and that I am free to withdraw at any time. | ☐ |
| I understand my information will be kept confidentially on paper and/or electronic records in accordance with the Data Protection Act. The University of Birmingham's Data Protection Policy can be found at http://www.legalservices.bham.ac.uk/dppolicy/ | ☐ |
| I freely give my consent to participate in this research study | ☐ |

Name of participant: ……..…

Email: ……..…..

Signature……..…

*Contact Information*

This project has been reviewed and approved by the Birmingham University Research Ethics Board. If you have any further questions or concerns about this research, please contact:

Name of researcher: Can Bıyık

Full address: [redacted]

You can also contact (Researchers name) supervisor:

Name of researcher: Professor Miles Tight

[redacted]

What if I have concerns about this research?

If you are concerned about how it this research being conducted, you can contact [redacted]

[redacted]

# Appendix 2


**The University of Birmingham**

**School of Civil Engineering**

## Participant information sheet

You are being invited to take part in a research study as a potential participant. Before you agree to attend, it is crucial for you to learn why the project is being done and what it will involve. Please take your time to read the following information carefully and ask if you are not clear any part of the research or need more information.

**What is the purpose of the study?**

The aim of this research is to create alternative sustainable transport visions for the year 2035, which may bring about a significant change in the level of walking, cycling and public transport across Turkish cities.

**What are the objectives of the meetings?**

To justify the reliability of them taking into account public and expert opinions
To construct macro- and micro-pathways to demonstrate how the goals of one desirable vision could be achieved from the present to 2035.

**Why have you been approached to attend this study?**

We need to learn a wide variety of views from different disciplines (e.g., transportation planners, urban designers, lecturers, and civil society organizations) regarding the reliability of our future visions. The potential participants are being invited who have experiences or knowledge in sustainable transport projects.

We also need to understand how the target of one specific vision may achieve its target in the coming decades. Therefore, local and national policy-makers, who have knowledge in these matters and power to make decisions, where required.

**Do you have to take part in the study?**

Your participation is voluntary. You are not obliged to participate; you will be still free to withdraw at any time of the meeting without clarifying any reason. We have only approached potential participants with a view that they may be willing to contribute this study, this does not mean they have to.

**What will you have to do if you agree to take part?**

You will be asked to complete the attached response slip to the researcher by e-mail. Then, I will contact you so we can arrange to meet at a time and place that are appropriate for you. Then, I can hold the short interview. Otherwise, if you change your decision not to attend, you may ignore this letter, and no further question will be asked to you.

**How much of your time will participation involve?**

One survey and interview lasting no more than 10 and 45 minutes, respectively.

**Will your participation in the project remain confidential?**

Your name would be anonymous, and your information will not be disclosed to other parties. Your views and experiences will only be assessed for the objectives of this project.

**What are the likely benefits of taking part?**

Although you may find this project interesting, it is unlikely that there will not be any direct or indirectly advantageous to you.

**What will happen to the results?**

The results will be summarised and reported in a dissertation thesis and may be submitted for publication in an academic Transportation journals.

**Are there any risks?**

There are likely no risks anticipated with participating in this research. However, if you experience any distress following participation you may contact with the researcher and contact the resources provided at the end of this sheet.

**Who has reviewed the project?**

This investigation was granted ethical approval by the University of Birmingham Ethics Committee.

**Complaints**

If you need to contact an independent person for your concerns or questions regarding this study, you can contact the

**Thank you for taking the time to read this Information Sheet.**

# Appendix 3


**Sustainable transport research study** **Survey volunteer ID:** | | | | |

**1. What is your gender?**

☐ Female ☐ Male

**2. What is your age group?**

☐ 18 – 25 ☐ 26 – 35 ☐ 36 – 45 ☐ 46 – 55 ☐ 56 – 65

**3. What is your education level?**

☐ Primary ☐ Secondary ☐ High School ☐ Bachelor ☐ Master ☐ Doctoral

**4. What is your occupation?**

☐ Managers ☐ Professionals ☐ Technicians and associate professionals
☐ Clerical support workers ☐ Service and sales workers ☐ Skilled workers ☐ Semi-skilled workers
☐ Unskilled workers ☐ Elementary occupations

**5. What is your employment status?**

☐ Working ☐ Unemployed ☐ Housewife ☐ Student ☐ Retired ☐ Other

**6. What is your average monthly income?**

☐ Under 1000 TL ☐ 1000– 1999 TL ☐ 2000– 2999 TL ☐ 3000- 3999 TL ☐ Over 4000 TL

**7. In which city do you live?**

☐ İstanbul ☐ Ankara ☐ İzmir ☐ Konya ☐ Eskişehir

**8. In which area do you usually use for your journey?**

☐ City Centre ☐ Edge of City Centre ☐ Residential Suburbs ☐ Out of City Centre

**9. Which of the following transport mode best describes your journey?**

☐ Pedestrians ☐ Cyclist ☐ Non-Cyclist

**10. What is the main purpose of your journey? (Please tick relevant boxes)**

☐ Work ☐ Education ☐ Personal Business (e.g. bank, post office, dentist) ☐ Social-visiting

☐ Shopping ☐ Leisure or Recreation ☐ Sport

**11. On average how many days in a week do you commute by bicycle?**

☐ Less than once a week ☐ 1 - 2 days ☐ 3-5 days ☐ More than 5 days

**12. On average how many days in a week do you commute by walking?**

☐ Less than once a week ☐ 1 - 2 days ☐ 3-5 days ☐ More than 5 days

**13. What is the average distance of your single journey? (Please consider your answer on the 9th question)**

☐ Less than 3 km ☐ 3-5 km ☐ 6 – 10 km ☐ 11 - 20 km ☐ 21 - 40 km ☐ More than 40 km

**14. Which of the following changes would most motivate you to cycle?**

| | **Strongly disagree** | **Disagree** | **Neither** | **Agree** | **Strongly agree** |
|---|---|---|---|---|---|
| Traffic light priority for cyclists | | | | | |
| More shared-use cycling paths | | | | | |
| More cycling paths separate from road traffic | | | | | |
| integrated mobility system | | | | | |
| Improved bicycle parking facilities | | | | | |
| Better cycle facilities (e.g. showers, lockers, covered cycle racks) | | | | | |
| Financial incentives | | | | | |

**15. Which of the following changes would most motivate you to walk?**

| | Strongly Disagree | Disagree | Neither | Agree | Strongly agree |
|---|---|---|---|---|---|
| Greater priority is given to pedestrians | | | | | |
| Good street lighting | | | | | |
| Add more suitable footways | | | | | |
| Information on walking routes | | | | | |
| Pedestrian Crossing | | | | | |
| Better design of the neighbourhood | | | | | |
| Rest places and seats | | | | | |

**16. What are the barriers that discourage you to cycle and walk?**

| | Strongly disagree | Disagree | Neither | Agree | Strongly agree |
|---|---|---|---|---|---|
| Lack of safety awareness | | | | | |
| The lack of sustainable transportation culture | | | | | |
| Bad road surfaces | | | | | |
| Weather conditions | | | | | |
| Urban structure | | | | | |
| Topography | | | | | |
| Distance | | | | | |

**17. How safe do you feel sharing the road with cars?**

☐ Quite safe ☐ Just safe ☐ Not safe at all ☐ Dangerous ☐ Very dangerous

**18. Do you think it should be illegal not to wear a helmet?**

☐ Yes, it should be legal requirement ☐ No, it should be personal choice ☐ Not sure

**19. What are the most important safety concerns with cycling and/or walking on the roads?**

| | Strongly disagree | Disagree | Neither | Agree | Strongly agree |
|---|---|---|---|---|---|
| Speed of cars | | | | | |
| Volume of cars | | | | | |
| Lack of designated cycle and pedestrian lanes | | | | | |
| Difficult to cross a road | | | | | |
| Share the road with motor vehicles | | | | | |
| Using a busy roundabout | | | | | |
| Making turns on multi-lane roads | | | | | |

**20. What can be done to make roads safer for pedestrians and cyclists?**

| | Strongly disagree | Disagree | Neither | Agree | Strongly agree |
|---|---|---|---|---|---|
| More streets with bicycle and pedestrian paths | | | | | |
| Roundabout with safe cycling and walking facilities | | | | | |
| Better cycling and walking facilities | | | | | |
| Designed to be the most direct route | | | | | |
| Intersection Improvements for cyclists and pedestrians | | | | | |
| Smart design | | | | | |
| Redesigned some of the road capacity to walk and cycle priority | | | | | |

**21. How important do you think aesthetic issues is in building cycling and walking environment?**

☐ Very important ☐ Important ☐ Neither important nor unimportant ☐ Not at all important ☐ Do not know

**22. How important do you think land use mix is in building cycling and walking environment?**

☐ Very important ☐ Important ☐ Neither important nor unimportant ☐ Not at all important ☐ Do not know

**23. How important do you think any of these built forms in your cycling and walking trips?**

| | **Very important** | **Important** | **Neither important nor unimportant** | **Not at all important** | **Do not know** |
|---|---|---|---|---|---|
| Residential buildings (e.g., terraces, flats) | | | | | |
| Non-residential buildings (e.g. restaurants, cafes, offices, shopping malls, mosques) | | | | | |
| Jobs nearby | | | | | |
| Infrastructure (e.g., roads, pavement, bridges) | | | | | |
| Other structures (e.g., towers, business places) | | | | | |
| Sidewalks along streets | | | | | |
| Parking Areas | | | | | |

**24. Which do key factors you consider are needed to create environmental strategies for future Turkish sustainable transport system?**

| | **Very important** | **Important** | **Neither important nor unimportant** | **Not at all important** | **Do not know** |
|---|---|---|---|---|---|
| Electric bicycles | | | | | |
| Alternative energy | | | | | |
| Hybrid and fuel cells | | | | | |
| Electric vehicles | | | | | |
| Better Public transport system | | | | | |
| Smart use of information technology | | | | | |
| Increasing environmental quality and aesthetics | | | | | |

**25. What changes do you think would most help you to reduce your use of the private car for your commute? (Please select all that apply)**

| | Strongly disagree | Disagree | Neither | Agree | Strongly agree |
|---|---|---|---|---|---|
| A car-sharing scheme | | | | | |
| More cycle paths and sidewalks | | | | | |
| Better public transport (e.g. frequency, network coverage) | | | | | |
| Better cycle facilities (e.g. showers, lockers, covered cycle racks) | | | | | |
| Increase the price of fuel | | | | | |
| Increase parking prices | | | | | |
| Focus on approving more compact urban development | | | | | |

**26. If your local governments encourage you to reduce your use of a car, how might this change affect your behaviour?**

…….

**27. What matters are required to overcome this behaviour change?**

…….

**28. In your opinion, what are the most useful strategies to develop walking systems in your Turkish urban areas?**

…….

**29. In your opinion, what are the most useful strategies to develop cycling systems in your Turkish urban areas?**

…….

**30. If I want to do some further survey work at a later stage, would you be willing to take part? If yes, please provide your email address in the box below.**

**Thank you for taking the time to complete this questionnaire.**

# Appendix 4

**Table 1.** Preventing Car Use.

| Key factor | Response number |
|---|---|
| Passenger cars | |
| Reducing private car usage | 5 |
| - In city centre | 2 |
| Reducing vehicle speed | 53 |
| A limited parking ban in a city centre | 3 |
| Resolving parking problems | 4 |
| Increasing petrol prices | 7 |
| A reduction in the number of cars parked | 2 |
| Complicating car purchase | 1 |
| Making harder to get car license | 1 |
| Speed control | 5 |
| - In residential areas | 4 |
| - City center | 1 |
| Annual quota system for vehicle usage | 1 |
| Decreasing vehicle reduction | 35 |
| Restrictions for cars within the city centre | 43 |
| Designing small cars | 3 |
| Deceleration of private cars in the crosswalk | 1 |

**Table 2.** Public Transport Systems.

| Key factor | Response number |
|---|---|
| Public transport | 90 |
| Public transport | 25 |
| Better planned public transport system | 4 |
| Modern public transport systems | 2 |
| Increasing the number of public transport buses | 3 |
| Improving the quality of public transport services | 3 |
| Increasing public transport comfort | 1 |
| Improving public transport facilities | 1 |
| Intelligent public transport systems | 1 |
| Renewal of public transport vehicles | 2 |
| Upgrading public transport vehicles | 1 |
| Safer transport systems | 2 |
| More quiet transport systems | 2 |
| More enjoyable transport systems | 1 |
| Traffic management centre implements | 1 |
| Alternative systems | 2 |
| Intelligent road design | 3 |
| Smart design | 4 |
| Integrating cycling and public transportation | 9 |
| Technology advancements in public transport | 2 |
| Public transport users should respect each other | 1 |
| Reduced fare program | 2 |
| Minibuses | 1 |
| Tramway | 3 |

| | |
|---|---|
| Metro | 3 |
| Accelerating tram | 1 |
| Systematic road transportation systems | 1 |
| Increasing the frequency of time | 1 |
| Increasing the frequency of times during business hours | 2 |
| Public transport management service | 1 |
| Dissemination about public transport services | 2 |
| More accessible public transport systems | 1 |
| Increasing the share of renewable energy in public transport services | 1 |
| Route improvement project | 1 |

**Table 3.** Cycling.

| Key factor | Response number |
|---|---|
| Bicycle | |
| Lowering the price of bicycles | 2 |
| Dissemination on cycling awareness | 13 |
| Safe bike paths | 19 |
| Aesthetic bike paths | 1 |
| Bicycle lifts | 1 |
| Electric bikes | 1 |
| Bike hire | 2 |
| Separate bike paths | 72 |
| Expansion of bike paths | 2 |
| Safety strips | 1 |
| More bike paths | 44 |
| Comfortable bike lanes | 3 |
| Safe bicycle parks | 1 |
| Security cameras near bike parking space | 3 |
| Bicycle parking spaces | 30 |
| Warning signs at the junction | 2 |
| Do not allow pedestrians to walk on bike paths | 4 |
| Bicycle police | 1 |
| Signalized intersections | 2 |
| Traffic light priority for cyclists | 1 |
| Inserting helmet | 3 |
| Shower facilities | 2 |
| Improvement of bike paths | 4 |

| | |
|---|---|
| Creating complete bicycling networks | 6 |
| Better quality bike paths | 2 |

**Table 4.** Walking.

| Key factor | Response number |
|---|---|
| Pedestrians | |
| Increasing pedestrian paths | 4 |
| Safe pedestrian paths | 2 |
| Expansion of pedestrian paths | 15 |
| Giving priority to pedestrians | 2 |
| Seat benches | 3 |
| Reduction of the defect in the pedestrian path | 2 |
| Comfortable pedestrian paths | 1 |
| Better pedestrian paths | 3 |
| More comprehensive pedestrian paths | 2 |
| Regular pavement | 1 |
| Better pedestrian infrastructures in suburban areas | 4 |
| Less waiting times for pedestrians | 1 |
| Tree-lined pathways | 1 |
| Prevention of invasion of pedestrian paths | 23 |
| - *By motor vehicles* | 19 |
| - *By electric poles* | 1 |
| - *By cyclists* | 4 |
| Improvement of crossroads | 25 |
| - *Suburban areas* | 3 |
| More comfortable bike pathways for elderly | 3 |
| More comfortable bike pathways for disabled | 2 |

| | |
|---|---|
| Encouraging walking | 1 |
| Pedestrian crossing | 31 |
| Pedestrian signs | 2 |
| Designing more direct routes | 6 |
| Walking maps | 4 |
| Facilitating pedestrian access in hilly areas | 2 |
| Street lighting | 8 |
| Running parks | 1 |
| Editing underpasses and overpasses on the roads | 3 |
| - For pedestrians | 1 |
| - For cyclists | 2 |

**Table 5.** Urban Features.

| Key factor | Response number |
|---|---|
| City | |
| Increasing aesthetic | 16 |
| Park areas | 4 |
| Green areas | 5 |
| New modern squares | 4 |
| Visual beauty | 1 |
| More social and business places in residential areas | 3 |
| Urban design for family securities | 3 |
| More compact cities | 1 |
| Decreasing the population of major cities | 4 |
| - By shifting into another city | 3 |
| Industries should be relocated outside of cities | 3 |
| Fixing distorted urban land | 2 |
| Improvement of urban environments | 2 |
| - *for better air quality* | 1 |
| - *for decreasing noise pollution* | 1 |
| City and regional planning for public | 1 |
| Ensuring security in the streets | 2 |
| Reduction of the population densities in major cities | 2 |
| Artistic places in major cities | 3 |

**Table 6.** Sustainable Transport Strategies.

| Key factor | Response number |
|---|---|
| Strategies | |
| Cyclists should have more rights | 3 |
| Protecting all rights of pedestrians | 2 |
| Preventing society from crazy young drivers | 1 |
| Penalty sanctions | 4 |
| Each transport mode users should comply with traffic rules | 3 |
| Improving the conditions of cyclists | 2 |
| Increasing the rules | 1 |
| Arrangements about passenger cars | 3 |
| Development of traffic laws | 2 |
| Development of local sustainable transport policies | 4 |
| Development of national sustainable transport policies | 6 |
| Ensure the observance of traffic signs | 1 |
| More comprehensive bicycle strategies | 2 |
| Developing bicycle culture in urban areas | 1 |
| Prevention of invasion of bike paths | 6 |
| - *By pedestrian* | 1 |
| - *By motor vehicles* | 5 |
| Tax incentives for cyclists | 1 |
| Cycling license law | 2 |
| The application of deterrent sanctions | 1 |
| Improvement of pedestrian rights | 1 |

| | |
|---|---|
| Making mandatory the use of pedestrian crossings | 3 |
| Penalising car drivers who do not respect cyclists | 1 |
| Penalising car drivers who do not give way to pedestrians | 4 |
| Campaigns and education | 6 |
| Different cultural campaigns based on sustainable transport | 2 |
| Giving bike education in kindergarten | 1 |
| Improving municipal management for cities to succeed | 1 |
| Shifting investments to small towns | 1 |
| People should live in or near areas where jobs are concentrated | 1 |

**Table 7.** Incentives.

| **Key factor** | **Response number** |
|---|---|
| Incentives | |
| - Economic | 4 |
| - For walking | 2 |
| - For public transport | 4 |
| - For decreasing passenger cars | 2 |
| - For cycling | 1 |

**Table 8.** Public Awareness.

| Key factor | Response number |
|---|---|
| Increasing awareness of sustainable transport issues | |
| Related to walking and cycling issues | 33 |
| Increasing the awareness of bicycle use | 1 |
| Awareness of pedestrians | 1 |
| Awareness of motor vehicles | 3 |
| - Towards using walking and cycling for short trips | 1 |
| - Towards sharing roads with cyclists | 1 |
| - Towards respecting pedestrians in the pedestrian crossing | 1 |
| Expert and public events towards dissemination of walking and cycling as transport modes | 1 |
| Public spots for increasing the awareness of pedestrians | 2 |
| Dissemination of cycling | 4 |
| Organised cultural events for cycling | 5 |
| Extraction of traffic laws that increase people's consciousness | 2 |
| Increasing respect towards pedestrians | 2 |
| Increasing respect towards cyclists | 6 |
| Cyclists should have more rights | 3 |
| Protecting all rights of pedestrians | 1 |
| Organised cultural events for cycling | 3 |
| Cultural changes | 1 |
| People respect each other | 1 |
| Conscious and trained drivers | 1 |
| Prevention of unnecessary horn-blowing | 1 |
| Cultural innovation for a sustainable future | 1 |
| Public awareness | 1 |
| Training of public transport drivers | 1 |

| | |
|---|---|
| Solving social dimension problems | 1 |
| Giving importance to education | 1 |
| Health campaign for people using private vehicles | 1 |
| Training of people | 1 |
| Regular trainings | 1 |
| Granting of traffic education in schools | 1 |
| Public spot that expresses walking is good for heart health | 1 |
| Raise awareness about sustainable energy trends | 2 |
| Public spotlight on carbon emissions | 1 |
| Public spotlight on obesity | 1 |
| Raise awareness about sustainable energy trends | 1 |
| Public spotlight on carbon emissions | 1 |
| Education | 1 |
| Preventing society from crazy young drivers | 1 |
| Improving people attitudes towards less polluting public vehicles | 1 |

**Table 9.** Special Groups.

| Key factor | Response number |
|---|---|
| Specific groups | |
| - Convenience for families with babies | 2 |
| - Providing safety for child and young cyclists | 3 |
| - Encouraging low-income people to use cycle | 1 |
| - Electric bikes for adults | 1 |
| - Better systems for disabled people | 2 |
| - Build a shelter for stray dogs | 1 |

# Appendix 5

**Table 1.** Results of one-way ANOVA for gender groups on safety practices.

| | **Female mean (SD)** | **Male mean (SD)** | **df** | **F** | **P** |
|---|---|---|---|---|---|
| Speed reduction | 4.36 (.93) | 4.08 (1.06) | 826 | 12.238 | .000 |
| Traffic light priority for cyclists | 4.06 (1.11) | 3.70 (1.36) | 890 | 13.385 | ≤ 0.01 |
| More cycling paths separate from road traffic | 4.58 (.95) | 4.48 (1.05) | 897 | 1.463 | 0.227 |
| Good street lighting | 4.23 (1.02) | 4.04 (1.15) | 884 | 4.908 | 0.027 |
| Pedestrian crossing | 4.24 (1.03) | 4.12 (1.11) | 885 | 2.001 | 0.158 |
| Roundabout with safe cycling facilities | 4.78 (.63) | 4.61 (.81) | 830 | 8.172 | ≤ 0.01 |
| Intersection Improvements for cyclists and pedestrians | 4.62 (.69) | 4.39 (.89) | 826 | 12.703 | ≤ 0.01 |
| Redesigned some of the road capacity to walk and cycle priority | 4.57 (.74) | 4.37 (.95) | 828 | 8.443 | ≤ 0.01 |
| Making turns on multi-lane roads more comfortable | 4.45 (.85) | 4.12 (1.00) | 826 | 18.369 | ≤ 0.01 |

**Table 2.** Results of one-way ANOVA for age groups on safety practices.

| | **18 – 25 mean (SD)** | **26 – 35 mean (SD)** | **36 – 45 mean (SD)** | **46 – 55 mean (SD)** | **56 – 65 mean (SD)** | **df** | **F** | **P** |
|---|---|---|---|---|---|---|---|---|
| Speed reduction | 4.16 (1.08) | 4.13 (1.04) | 4.18 (.97) | 4.19 (.95) | 4.21 (1.12) | 823 | .111 | .979 |
| Traffic light priority for cyclists | 3.88 (1.29) | 3.72 (1.30) | 3.78 (1.32) | 3.78 (1.37) | 3.53 (1.25) | 887 | .694 | .596 |
| More cycling paths separate from road traffic | 4.52 (1.00) | 4.50 (1.04) | 4.47 (1.09) | 4.56 (.96) | 4.60 (1.06) | 894 | .141 | .967 |
| Good street lighting | 4.07 (1.20) | 4.13 (1.11) | 4.03 (1.04) | 4.10 (1.01) | 4.14 (1.03) | 881 | .268 | .880 |
| Pedestrian crossing | 4.23 (1.09) | 4.13 (1.10) | 4.02 (1.10) | 4.19 (1.01) | 4.21 (1.12) | 882 | 1.006 | .403 |
| Roundabout with safe cycling facilities | 4.68 (.81) | 4.67 (.70) | 4.58 (.87) | 4.68 (.57) | 4.43 (1.09) | 827 | .758 | .553 |
| Intersection Improvements for cyclists and pedestrians | 4.46 (.89) | 4.48 (.79) | 4.38 (.92) | 4.46 (.73) | 4.21 (1.05) | 823 | .590 | .670 |
| Redesigned some of the road capacity to walk and cycle priority | 4.48 (.89) | 4.39 (.94) | 4.36 (.94) | 4.46 (.73) | 4.50 (1.09) | 825 | .575 | .681 |
| Making turns on multi-lane roads more comfortable | 4.24 (.99) | 4.28 (.89) | 4.06 (1.06) | 4.12 (.99) | 4.14 (1.10) | 823 | 1.550 | .186 |

**Table 3.** Results of one-way ANOVA for education groups on safety practices.

| | **Primary mean (SD)** | **Secondary mean (SD)** | **High school mean (SD)** | **Bachelor mean (SD)** | **Master mean (SD)** | **Doctoral mean (SD)** | **df** | **F** | **P** |
|---|---|---|---|---|---|---|---|---|---|
| Speed reduction | 4.00 (1.00) | 3.25 (1.67) | 4.00 (1.19) | 4.18 (1.00) | 4.33 (.92) | 3.93 (1.08) | 822 | 3.035 | .013 |
| Traffic light priority for cyclists | 3.80 (1.64) | 3.78 (1.48) | 3.57 (1.42) | 3.82 (1.28) | 3.90 (1.23) | 3.67 (1.42) | 886 | 1.133 | .341 |
| More cycling paths separate from road traffic | 4.60 (.55) | 4.56 (1.33) | 4.19 (1.31) | 4.57 (.92) | 4.62 (.96) | 4.32 (1.30) | 889 | 1.624 | 0.185 |
| Good street lighting | 4.50 (.58) | 4.25 (1.39) | 3.95 (1.26) | 4.10 (1.11) | 4.14 (1.01) | 4.10 (1.16) | 880 | 0.588 | .709 |
| Pedestrian crossing | 4.50 (.58) | 4.00 (1.32) | 3.98 (1.28) | 4.19 (1.07) | 4.19 (.98) | 4.08 (1.11) | 881 | 0.907 | .476 |
| Roundabout with safe cycling facilities | 4.67 (.58) | 4.44 (1.33) | 4.51 (1.06) | 4.68 (.70) | 4.70 (.69) | 4.66 (.70) | 826 | 1.135 | .546 |
| Intersection Improvements for cyclists and pedestrians | 4.67 (.58) | 4.22 (1.30) | 4.31 (1.08) | 4.48 (.77) | 4.53 (.84) | 4.24 (.93) | 822 | 1.704 | 0.185 |
| Redesigned some of the road capacity to walk and cycle priority | 4.67 (58) | 4.22 (1.30) | 4.29 (1.14) | 4.45 (.84) | 4.43 (.91) | 4.43 (.89) | 824 | .773 | 0.013 |
| Making turns on multi-lane roads more comfortable | 4.00 (.82) | 4.38 (1.06) | 4.04 (1.20) | 4.26 (.90) | 4.21 (.97) | 4.02 (1.09) | 822 | 1.415 | .217 |

**Table 4.** Results of one-way ANOVA for income groups on safety practices.

| | **No income mean (SD)** | **Less than €300 mean (SD)** | **€300 – €600 mean (SD)** | **€600 – €900 mean (SD)** | **€900 – €1,200 mean (SD)** | **Over €1,200 mean (SD)** | **df** | **F** | **P** |
|---|---|---|---|---|---|---|---|---|---|
| Speed reduction | 4.11 (1.15) | 4.14 (.99) | 4.11 (1.15) | 4.28 (.88) | 4.14 (1.01) | 4.09 (1.01) | 822 | .775 | .569 |
| Traffic light priority for cyclists | 3.69 (1.37) | 3.89 (1.28) | 3.88 (1.27) | 3.79 (1.25) | 3.80 (1.30) | 3.65 (1.40) | 886 | .747 | .588 |
| More cycling paths separate from road traffic | 4.32 (1.22) | 4.65 (.79) | 4.44 (1.13) | 4.58 (.88) | 4.62 (.98) | 4.48 (1.08) | 893 | 2.219 | .050 |
| Good street lighting | 3.91 (1.26) | 4.04 (1.18) | 4.17 (1.17) | 4.17 (.98) | 4.14 (1.07) | 4.04 (1.05) | 880 | 1.349 | .241 |
| Pedestrian crossing | 3.98 (1.23) | 4.23 (1.01) | 4.18 (1.16) | 4.25 (.95) | 4.19 (1.05) | 4.03 (1.11) | 881 | 1.544 | .174 |
| Roundabout with safe cycling facilities | 4.54 (.97) | 4.74 (.60) | 4.68 (.80) | 4.67 (.71) | 4.65 (.72) | 4.67 (.70) | 826 | .937 | .456 |
| Intersection Improvements for cyclists and pedestrians | 4.33 (1.03) | 4.49 (.76) | 4.52 (.83) | 4.48 (.75) | 4.44 (.88) | 4.39 (.83) | 822 | 1.043 | 0.391 |
| Redesigned some of the road capacity to walk and cycle priority | 4.32(1.06) | 4.53 (.75) | 4.51 (.85) | 4.43 (.80) | 4.41 (.99) | 4.31 (1.01) | 824 | 1.295 | .264 |
| Making turns on multi-lane roads more comfortable | 4.17 (1.05) | 4.31 (.85) | 4.31 (.98) | 4.19 (.92) | 4.15 (1.03) | 4.09 (1.00) | 822 | 1.013 | .409 |

**Table 5.** Results of one-way ANOVA for gender groups on social practices.

| | **Female mean (SD)** | **Male mean (SD)** | **df** | **F** | **P** |
|---|---|---|---|---|---|
| Improved bicycle parking facilities | 4.33 (.98) | 4.23 (1.08) | 889 | 1.834 | 0.176 |
| Information of walking routes | 4.01 (1.07) | 3.72 (1.22) | 881 | 10.454 | ≤ 0.01 |
| Better urban design | 4.10 (1.00) | 3.93 (1.10) | 892 | 4.433 | 0.36 |
| Rest places and seats | 4.18 (1.03) | 4.10 (1.11) | 885 | 4.733 | 0.030 |
| Better walking and cycling facilities | 4.48 (.87) | 4.30 (1.02) | 824 | 5.693 | 0.017 |
| Public transport link | 4.19 (1.00) | 3.97 (1.07) | 822 | 7.450 | ≤ 0.01 |
| Wider pavements | 4.52 (.82) | 4.45 (.91) | 826 | .770 | .381 |
| Illegal occupation of sidewalks | 4.43 (.88) | 4.22 (1.04) | 825 | 7.396 | .007 |
| Increasing parking price | 2.48 (1.33) | 2.43 (1.41) | 743 | .194 | .660 |
| Increasing fuel price | 2.44 (1.31) | 2.30 (1.38) | 744 | 1.559 | .212 |
| Raising public awareness about cycling | 4.52 (.85) | 4.41 (.96) | 731 | 2.248 | .134 |
| Focus on approving more compact urban development | 4.44 (.88) | 4.38 (.89) | 722 | .545 | .461 |
| More cycle paths and sidewalks | 3.99 (1.27) | 3.98 (1.34) | 658 | .010 | .920 |
| Pedestrianization of urban areas | 4.34 (.94) | 4.18 (1.06) | 654 | 3.325 | .069 |

**Table 6.** Results of one-way ANOVA for age groups on social practices.

| | **18 – 25 mean (SD)** | **26 – 35 mean (SD)** | **36 – 45 mean (SD)** | **46 – 55 mean (SD)** | **56 – 65 mean (SD)** | **df** | **F** | **P** |
|---|---|---|---|---|---|---|---|---|
| Improved bicycle parking facilities | 4.32 (1.06) | 4.26 (1.04) | 4.11 (1.16) | 4.28 (.91) | 4.07 (1.07) | 886 | 1.084 | .363 |
| Information of walking routes | 3.86 (1.22) | 3.76 (1.19) | 3.71 (1.17) | 3.78 (1.04) | 4.00 (1.30) | 878 | .604 | .660 |
| Better urban design | 4.04 (1.06) | 4.07 (.99) | 4.10 (.94) | 4.02 (.95) | 4.13 (1.06) | 889 | .141 | .967 |
| Rest places and seats | 4.07 (1.12) | 3.98 (1.12) | 4.07 (1.04) | 4.13 (.96) | 4.43 (1.09) | 882 | .931 | .445 |
| Better walking and cycling facilities | 4.39 (.99) | 4.40 (.93) | 4.15 (1.12) | 4.44 (.79) | 3.86 (1.29) | 821 | 2.901 | .047 |
| Public transport link | 3.89 (1.20) | 3.81 (1.22) | 3.55 (1.23) | 3.93 (1.09) | 3.93 (1.07) | 819 | 2.231 | .064 |
| Wider pavements | 4.46 (.94) | 4.25 (.74) | 4.60 (1.11) | 4.46 (.60) | 4.33 (1.11) | 823 | 3.383 | .010 |
| Illegal occupation of sidewalks | 4.27 (1.06) | 4.06 (.97) | 4.37 (1.05) | 4.33 (.75) | 4.21 (1.05) | 822 | 2.403 | .048 |
| Increasing parking price | 2.70 (1.50) | 2.25 (1.30) | 2.38 (1.39) | 2.30 (1.21) | 2.50 (.80) | 740 | 3.850 | .001 |
| Increasing fuel price | 2.56 (1.50) | 2.49 (1.38) | 2.28 (1.35) | 2.34 (1.21) | 2.50 (.90) | 741 | 2.162 | .058 |
| Raising public awareness about cycling | 4.38 (1.01) | 4.55 (.85) | 4.27 (1.04) | 4.62 (.56) | 4.40 (1.06) | 731 | 3.381 | .009 |
| Focus on approving more compact urban development | 4.38 (.96) | 4.40 (.91) | 4.48 (.78) | 4.39 (.69) | 4.00 (1.08) | 722 | .936 | .443 |
| More cycle paths and sidewalks | 3.93 (1.39) | 3.99 (1.28) | 4.11 (1.24) | 4.00 (1.38) | 3.60 (1.40) | 658 | .793 | .530 |
| Pedestrianization of urban areas | 4.22 (1.08) | 4.23 (1.03) | 4.04 (.97) | 4.10 (.96) | 4.04 (1.05) | 654 | .025 | .999 |

**Table 7.** Results of one-way ANOVA for education groups on social practices.

| | **Primary mean (SD)** | **Secondary mean (SD)** | **High school mean (SD)** | **Bachelor mean (SD)** | **Master mean (SD)** | **Doctoral mean (SD)** | **df** | **F** | **P** |
|---|---|---|---|---|---|---|---|---|---|
| Improved bicycle parking facilities | 4.60 (.55) | 4.44 (1.33) | 3.95 (1.31) | 4.32 (.98) | 4.31 (1.01) | 4.13 (1.16) | 885 | 2.989 | 0.024 |
| Information of walking routes | 4.50 (.58) | 3.78 (1.30) | 3.62 (1.32) | 3.84 (1.16) | 3.80 (1.11) | 3.69 (1.29) | 877 | 1.088 | .365 |
| Better urban design | 4.20 (.58) | 3.92 (1.39) | 3.99 (1.27) | 4.12 (.95) | 4.19 (.84) | 4.03 (1.02) | 888 | 4.469 | $\leq 0.01$ |
| Rest places and seats | 4.50 (.58) | 4.00 (1.41) | 3.94 (1.21) | 4.06 (.95) | 4.09 (1.00) | 4.00 (1.15) | 881 | 0.476 | .795 |
| Better walking and cycling facilities | 4.67 (.58) | 4.13 (1.36) | 4.25 (1.15) | 4.38 (.94) | 4.36 (1.00) | 4.19 (.95) | 820 | .729 | .602 |
| Public transport link | 4.67 (.58) | 3.13 (1.64) | 3.73 (1.22) | 4.09 (.75) | 4.14 (.69) | 3.63 (1.26) | 818 | 2.549 | .047 |
| Wider pavements | 4.33 (.58) | 4.56 (1.33) | 4.15 (1.16) | 4.54 (.79) | 4.50 (.83) | 4.39 (1.11) | 822 | 3.815 | .023 |
| Illegal occupation of sidewalks | 4.33 (.58) | 4.44 (1.33) | 4.13 (1.17) | 4.26 (1.01) | 4.40 (.87) | 4.32 (.81) | 821 | 1.015 | .408 |
| Increasing parking price | 4.25 (.96) | 4.56 (1.33) | 4.34 (1.22) | 4.68 (.68) | 4.65 (.78) | 4.53 (.86) | 831 | 3.633 | .067 |
| Increasing fuel price | 2.58 (1.49) | 2.43 (1.44) | 2.55 (1.43) | 2.09 (1.10) | 2.11 (1.35) | 2.57 (1.46) | 740 | 1.448 | .619 |
| Raising public awareness about cycling | 4.33 (.58) | 4.56 (1.33) | 4.21 (1.14) | 4.48 (.88) | 4.44 (.95) | 4.58 (.78) | 731 | 1.674 | .138 |
| Focus on approving more compact urban development | 4.67 (.58) | 3.71 (1.50) | 4.34 (.99) | 4.44 (.86) | 4.39 (.86) | 4.20 (1.00) | 722 | 1.573 | .165 |
| More cycle paths and sidewalks | 4.60 (.55) | 4.11 (1.76) | 3.82 (1.45) | 4.00 (1.30) | 4.13 (1.22) | 3.65 (1.47) | 658 | 1.624 | .151 |
| Pedestrianization of urban areas | 4.51 (.58) | 4.61 (1.30) | 4.31 (1.24) | 4.23 (1.01) | 4. 35 (.87) | 4.15 (1.02) | 654 | 2.400 | .036 |

**Table 8.** Results of one-way ANOVA for income groups on social practices.

| | **No income mean (SD)** | **Less than €300 mean (SD)** | **€300 – €600 mean (SD)** | **€600 – €900 mean (SD)** | **€900 – €1,200 mean (SD)** | **Over €1,200 mean (SD)** | **df** | **F** | **P** |
|---|---|---|---|---|---|---|---|---|---|
| Improved bicycle parking facilities | 4.11 (1.22) | 4.42 (.88) | 4.22 (1.18) | 4.33 (.87) | 4.34 (.98) | 4.10 (1.16) | 885 | 2.076 | 0.066 |
| Information of walking routes | 3.66 (1.28) | 3.94 (1.18) | 3.80 (1.20) | 3.86 (1.09) | 3.84 (1.12) | 3.63 (1.24) | 877 | 1.345 | .243 |
| Better urban design | 3.92 (1.17) | 4.16 (.91) | 3.90 (1.16) | 4.15 (.83) | 4.15 (.89) | 4.18 (.90) | 888 | 2.618 | .020 |
| Rest places and seats | 4.02 (1.14) | 4.14 (1.07) | 3.99 (1.15) | 4.07 (1.01) | 4.12 (1.05) | 3.94 (1.14) | 881 | .614 | .689 |
| Better walking and cycling facilities | 4.31 (1.10) | 4.49 (.76) | 4.41 (.94) | 4.31 (.98) | 4.27 (1.07) | 4.29 (1.00) | 820 | .887 | .489 |
| Public transport link | 3.88 (1.20) | 3.83 (1.19) | 4.03 (1.10) | 3.83 (1.22) | 3.41 (1.25) | 3.67 (1.23) | 818 | 3.990 | .002 |
| Wider pavements | 4.38 (1.02) | 4.46 (.89) | 4.53 (.86) | 4.54 (.73) | 4.52 (.91) | 4.31 (1.00) | 822 | 1.367 | .234 |
| Illegal occupation of sidewalks | 4.22 (1.15) | 4.32 (.96) | 4.32 (1.02) | 4.29 (.97) | 4.24 (1.03) | 4.23 (.81) | 821 | .259 | .935 |
| Increasing parking price | 2.67 (1.50) | 2.66(1.51) | 2.63(1.39) | 2.20(1.16) | 2.18(1.39) | 2.32(1.38) | 739 | 3.759 | .003 |
| Increasing fuel prices | 2.58 (1.49) | 2.43(1.44) | 2.55(1.43) | 2.09(1.10) | 2.11(1.35) | 2.27(1.36) | 740 | 3.448 | .005 |
| Raising public awareness about cycling | 4.37 (1.00) | 4.40 (.91) | 4.37(1.37) | 4.53 (.77) | 4.54 (.86) | 4.43 (.98) | 731 | 1.005 | .414 |
| Focus on approving more compact urban development | 4.23 (1.12) | 4.40 (.92) | 4.53 (.73) | 4.42 (,79) | 4.46 (.86) | 4.33 (.90) | 722 | 1.881 | .095 |
| More cycle paths and sidewalks | 3.87 (1.42) | 3.93 (1.37) | 3.97 (1.34) | 4.13 (1.16) | 3.91 (1.38) | 3.99 (1.34) | 658 | .889 | .488 |
| Pedestrianization of urban areas | 4.19 (1.16) | 4,26 (1.00) | 3,87 (1.16) | 4.05 (.85) | 4.31 (.97) | 4.27 (1.00) | 654 | .865 | .504 |

**Table 9.** Results of one-way ANOVA for gender groups on environmental practices.

| | **Female mean (SD)** | **Male mean (SD)** | **df** | **F** | **P** |
|---|---|---|---|---|---|
| Electric bicycles | 3.78 (1.11) | 3.76 (1.20) | 749 | .041 | .840 |
| Electric vehicles | 3.99 (1.03) | 4.11 (1.05) | 745 | 1.774 | .183 |
| Better Public transport system | 4.49 (.89) | 4.49 (.84) | 747 | .000 | .985 |
| Increasing environmental quality and aesthetics | 4.42 (.91) | 4.25 (.99) | 752 | 4.630 | .032 |
| A car sharing scheme | 3.56 (1.12) | 3.20 (1.22) | 735 | 12.982 | .000 |
| Reduction of passenger cars | 4.43 (.91) | 4.18 (1.05) | 829 | 9.687 | .002 |
| Renewable fuel vehicle | 4.46 (.80) | 4.51 (.72) | 748 | .001 | .9710 |
| Hybrid and fuel cells | 3.89 (1.07) | 3.95 (1.07) | 698 | .487 | .485 |
| Alternative energy vehicle | 4.52 (.79) | 4.38 (.92) | 605 | 4.468 | .035 |
| Green parks | 4.18 (.92) | 4.05 (.06) | 655 | 3.064 | .080 |

**Table 10.** Results of one-way ANOVA for age groups on environmental practices.

| | **18 – 25 mean (SD)** | **26 – 35 mean (SD)** | **36 – 45 mean (SD)** | **46 – 55 mean (SD)** | **56 – 65 mean (SD)** | **df** | **F** | **P** |
|---|---|---|---|---|---|---|---|---|
| Electric bicycles | 3.69 (1.27) | 3.76 (1.18) | 3.82 (1.14) | 3.97 (.90) | 4.00 (.95) | 746 | 1.021 | .302 |
| Electric vehicles | 4.09 (1.08) | 3.98 (1.11) | 4.15 (.97) | 4.31 (.82) | 4.00 (.95) | 742 | 1.590 | .175 |
| Better Public transport system | 4.49 (.88) | 4.42 (.93) | 4.62 (.77) | 4.59 (.63) | 4.46 (.52) | 744 | 1.417 | .106 |
| Increasing environmental quality and aesthetics | 4.28 (1.00) | 4.21 (1.05) | 4.44 (.79) | 4.49 (.71) | 3.86 (1.29) | 749 | 2.689 | .047 |
| A car sharing scheme | 3.32 (1.27) | 3.33 (1.15) | 3.24 (1.18) | 3.12 (1.19) | 3.30 (1.25) | 732 | .551 | .698 |
| Reduction of passenger car traffic | 4.27 (1.01) | 4.25 (1.02) | 4.15 (1.09) | 4.30 (.90) | 4.27 (1.03) | 825 | .422 | .793 |
| Renewable fuel vehicle | 4.48 (.86) | 4.48 (.78) | 4.40 (.82) | 4.42 (.73) | 4.33 (.89) | 745 | .420 | .794 |
| Hybrid and fuel cells | 3.94 (1.11) | 3.87 (1.12) | 4.05 (.95) | 3.97 (.92) | 3.83 (1.03) | 698 | .287 | .592 |
| Alternative energy vehicle | 4.43 (.95) | 4.45 (.80) | 4.30 (.98) | 4.47 (.74) | 4.21 (1.12) | 605 | .980 | .417 |
| Green parks | 4.14 (1.06) | 3.83 (1.00) | 4.04 (1.05) | 4.24 (.93) | 4.01 (1.11) | 655 | 1.015 | .398 |

**Table 11.** Results of one-way ANOVA for education groups on environmental practices.

| | **Primary mean (SD)** | **Secondary mean (SD)** | **High school mean (SD)** | **Bachelor mean (SD)** | **Master mean (SD)** | **Doctoral mean (SD)** | **df** | **F** | **P** |
|---|---|---|---|---|---|---|---|---|---|
| Electric bicycles | 3.69 (1.15) | 3.71 (1.60) | 3.65 (1.27) | 3.76 (1.18) | 3.96 (1.08) | 3.70 (1.11) | 745 | 1.856 | .186 |
| Electric vehicles | 4.09 (.58) | 4.43 (.79) | 3.98 (1.10) | 4.10 (1.07) | 4.12 (.92) | 3.96 (1.15) | 741 | .631 | .676 |
| Better Public transport system | 4.49 (.58) | 4.33 (.82) | 4.36 (1.01) | 4.48 (.87) | 4.64 (.68) | 4.64 (.75) | 743 | 2.195 | .034 |
| Increasing environmental quality and aesthetics | 4.28 (1.00) | 4.00 (1.51) | 4.33 (.97) | 4.28 (.96) | 4.36 (.94) | 4.27 (1.04) | 748 | .358 | .877 |
| A car sharing scheme | 3.32 (.58) | 3.50 (1.05) | 3.29 (1.28) | 3.30 (1.18) | 3.36 (1.17) | 2.95 (1.36) | 731 | .861 | .507 |
| Reduction of passenger cars | 4.33 (.58) | 3.22 (1.56) | 4.12 (1.16) | 4.29 (.98) | 4.24 (.96) | 4.27 (1.01) | 825 | 2.385 | .037 |
| Renewable fuel vehicle | 4.48 (.58) | 4.57 (.79) | 4.42 (.98) | 4.50 (.75) | 4.42 (.80) | 4.20 (1.02) | 744 | 1.264 | .277 |
| Hybrid and fuel cells | 3.67 (.58) | 4.00 (1.00) | 3.78 (1.12) | 3.98 (1.07) | 3.89 (1.07) | 3.98 (1.03) | 698 | .459 | .498 |
| Alternative energy vehicle | 4.67 (.58) | 4.13 (1.36) | 4.16 (1.13) | 4.46 (.82) | 4.50 (.85) | 4.37 (.85) | 605 | 2.586 | .025 |
| Green parks | 3.71 (1.22) | 3.46 (1.33) | 3.71 (1.20) | 4.22. (98) | 4.12 (1.02) | 4.01 (1.03) | 655 | 1.712 | .129 |

**Table 12.** Results of one-way ANOVA for income groups on environmental practices.

| | **No income mean (SD)** | **Less than €300 mean (SD)** | **€300 – €600 mean (SD)** | **€600 – €900 mean (SD)** | **€900 – €1,200 mean (SD)** | **Over €1,200 mean (SD)** | **df** | **F** | **P** |
|---|---|---|---|---|---|---|---|---|---|
| Electric bicycles | 3.76 (1.23) | 3.68 (1.24) | 3.66 (1.31) | 3.78 (1.08) | 3.91 (1.03) | 3.89 (1.14) | 745 | .815 | .539 |
| Electric vehicles | 4.02 (1.16) | 4.08 (1.05) | 4.10 (1.02) | 4.07 (.98) | 4.03 (1.20) | 4.22 (.87) | 741 | .447 | .815 |
| Better Public transport system | 4.49 (.92) | 4.45 (.85) | 4.45 (.87) | 4.42 (.92) | 4.62 (.85) | 4.65 (.55) | 743 | 1.399 | .223 |
| Increasing environmental quality and aesthetics | 4.35 (1.01) | 4.09 (1.09) | 4.38 (.95) | 4.25 (.95) | 4.39 (.91) | 4.31 (.90) | 748 | 1.530 | .178 |
| A car sharing scheme | 3.35 (1.20) | 3.38 (1.27) | 3.53 (1.07) | 3.17 (1.16) | 3.13 (1.30) | 3.14 (1.27) | 731 | 2.271 | .046 |
| Reduction of passenger cars | 4.37 (1.00) | 4.40 (.91) | 4.37 (1.07) | 4.53 (.77) | 4.54 (.86) | 4.43 (.98) | 829 | .140 | .983 |
| Renewable fuel vehicle | 4.30 (1.02) | 4.57 (.77) | 4.57 (.66) | 4.49 (.74) | 4.52 (.77) | 4.27 (.87) | 744 | 3.101 | .001 |
| Hybrid and fuel cells | 3.94 (1.18) | 3.88 (1.10) | 3.96 (1.08) | 3.91 (.99) | 3.96 (1.07) | 3.97 (1.03) | 698 | .071 | .790 |
| Alternative energy vehicle | 4.34 (1.06) | 4.41 (.89) | 4.41 (.91) | 4.45 (.75) | 4.40 (.94) | 4.50 (.75) | 605 | .451 | .813 |
| Green parks | 3.88 (1.21) | 4.31 (.87) | 3.94 (1.10) | 4.35 (.81) | 4.30 (.92) | 3.29 (1.22) | 655 | 2.434 | .033 |

## Appendix 6

**Figure 1.** Visualization of characteristic residential areas in 2015.

**Figure 2.** Visualization of characteristic universities in 2015.

**Figure 3.** Visualization of characteristic city centres in 2015.

**Figure 4.** Visualization of characteristic residential areas in the Avoid Vision.

**Figure 5.** Visualization of characteristic universities in the Avoid Vision.

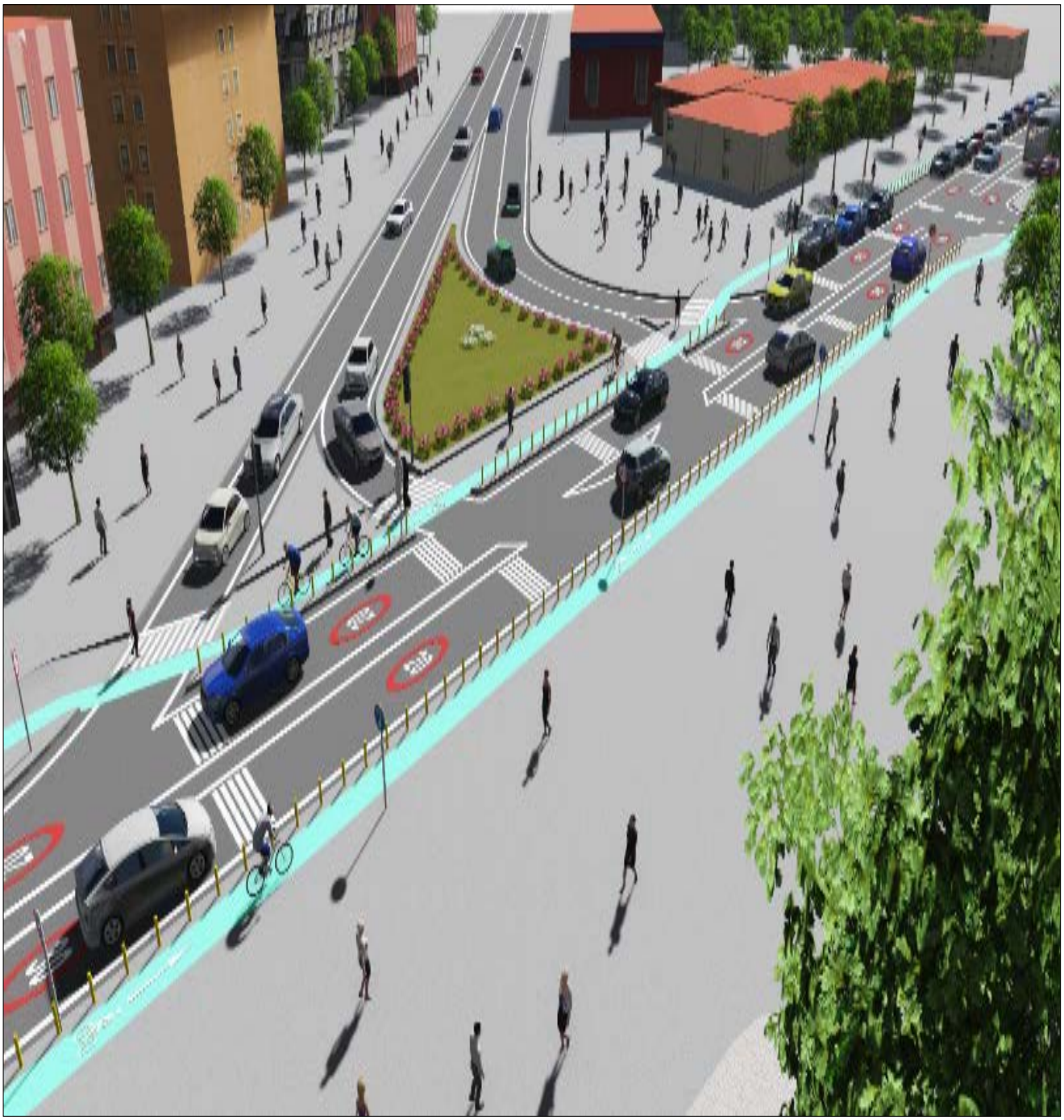

**Figure 6.** Visualization of characteristic city centers in the Avoid Vision.

**Figure 7.** Visualization of characteristic residential areas in the Shift Vision.

**Figure 8.** Visualization of characteristic universities in the Shift Vision.

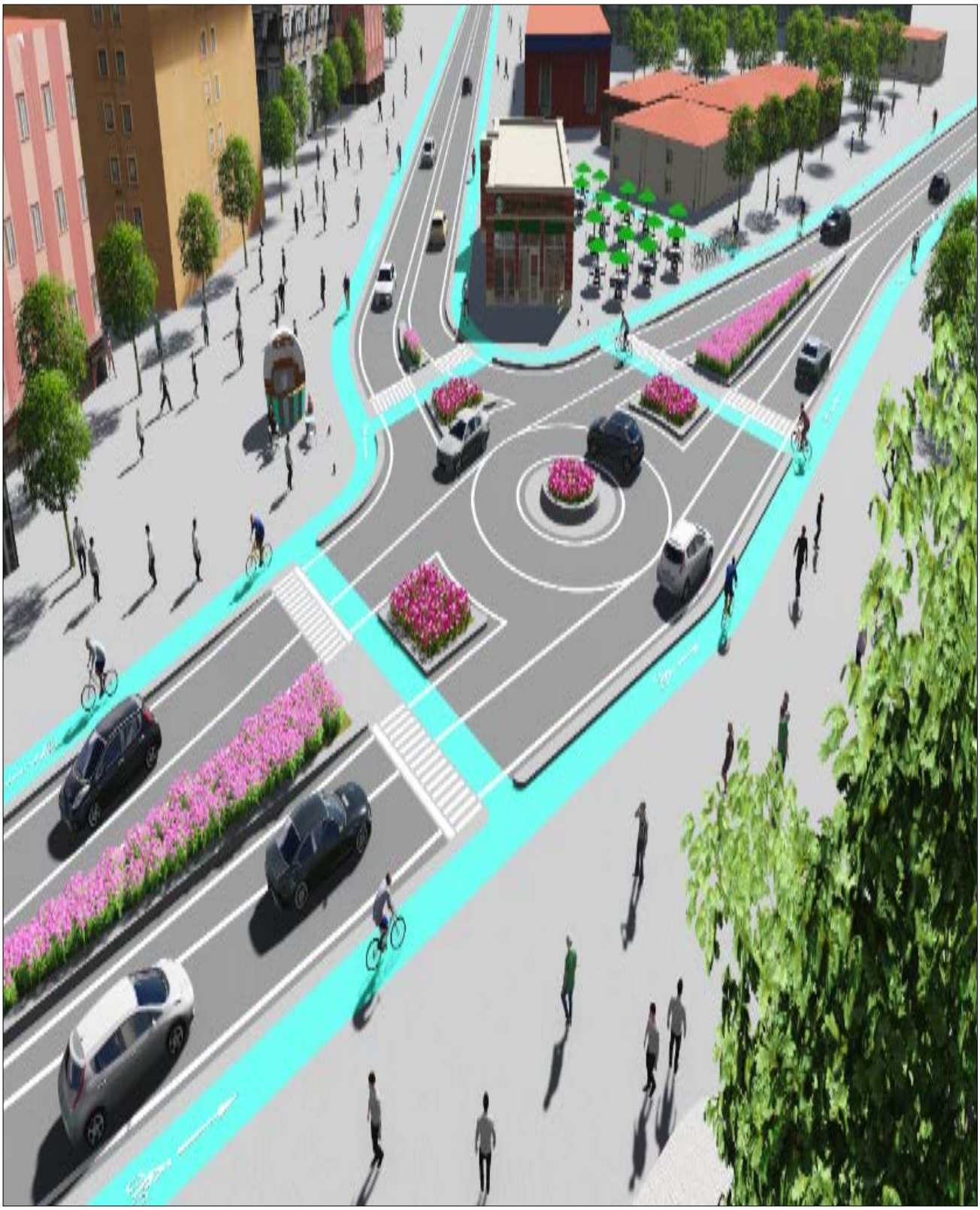

**Figure 9.** Visualization of characteristic city centres in the Shift Vision.

**Figure 10.** Visualization of characteristic residential areas in the Improve Vision.

**Figure 11.** Visualization of characteristic universities in the Improve Vision.

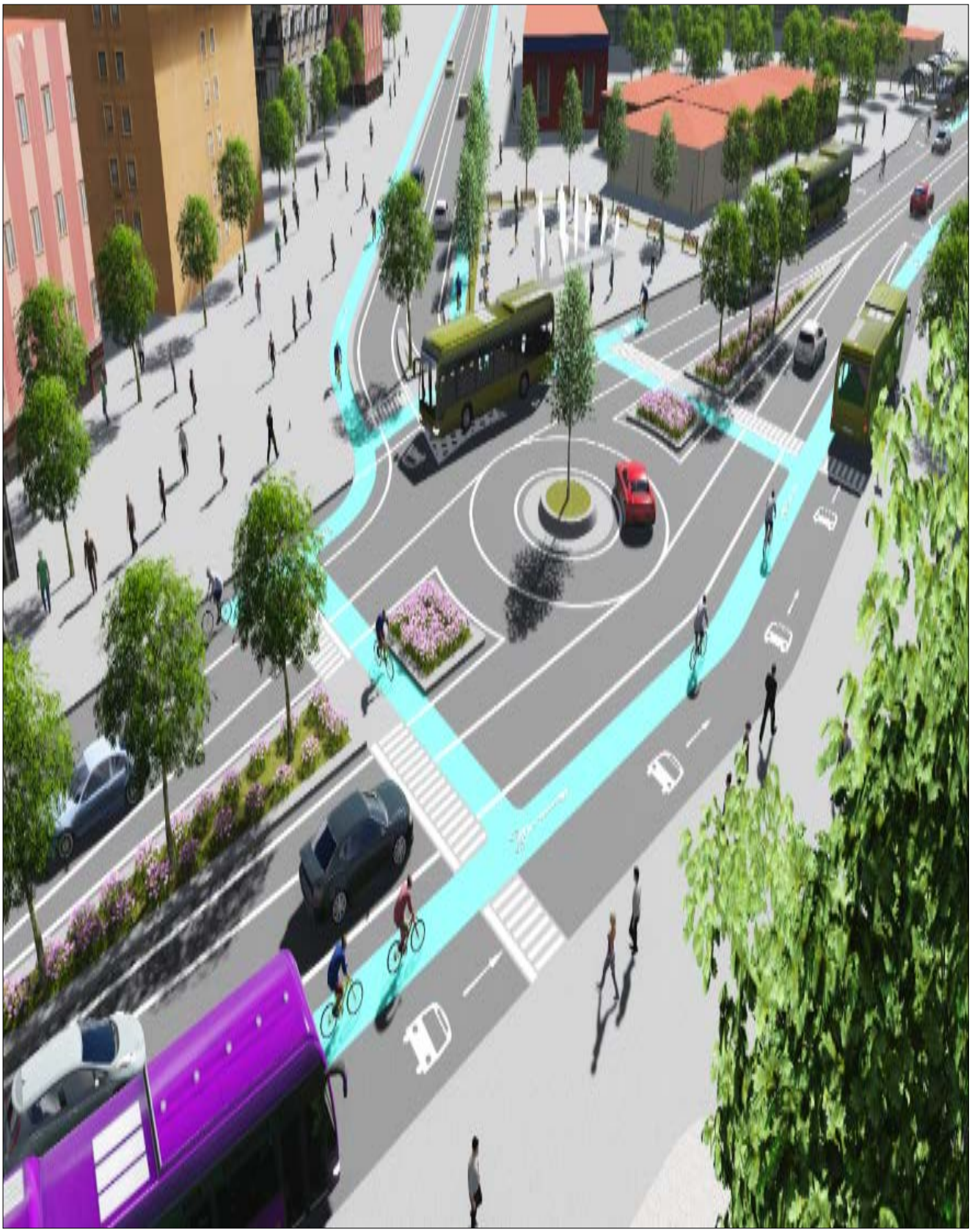

**Figure 12.** Visualization of characteristic city centers in the Improve Vision.

# Appendix 7

## Interview protocol
## (Vision justifications)

**Identification**

Interview Code Number:

Participant position (for experts):

Participant travel modes (for public):

Location:

Date:

Length in min:

**Introduction**

Hello, my name is Can Bıyık. I have designed different alternative visions with much higher dependence on sustainable transport systems. In order to justify the reliability of these visions, we would need your views and experiences from your travel behaviour (for public participants) or work experiences (for expert participants).

There are no correct or wrong answers, and this interview does not evaluate an interviewer's skills or performances. Please feel completely free and to share your opinions and suggestions even if it may vary from what other interviewers have shared.

**Welcome**

Welcome and thank you for your participation today.

Have you read the consent form that was sent to you?

Do you have any questions before we begin?

I am a tape-recording conversation because I do not want to miss any of your speech. Participants often mention very critical and helpful things in the session, and we may not take a note fast enough to get them all down.

**Then I would like to ask your permission to begin the interview.**

## Interview questions

During this interview, I would like to discuss the following topics: (i) explaining the imaginary future transport scenarios; (ii) understanding the general views about the visions.

Brief notes will be taken throughout this study. This interview is assumed to take 45 minutes for experts and 5 minutes for the public.

### I) Imaginary future travel scenarios

Imaginary future travel scenarios were first described to the both public and expert participants. As shown in Table 1, this part was explained in the different process for each group and designed for understanding the general views on the visions.

**Table 1.** The explanation of imaginary travel scenarios for public and expert.

| Public | Expert |
|---|---|
| ▪ Demonstrated the current and future visions of one specific location where the interview was conducted.<br>▪ It is roughly explained what the future visions of one specific location tell.<br>▪ We only try to be sure whether participants know the specific location where the interview was done.<br>▪ We try to learn daily transportation mode of voluntary participants. | ▪ All current and future visions were explained for all three street pictures.<br>▪ The characteristic features of the locations were explained.<br>▪ They were informed to answer the interview questions based on the hypothetical characteristics of Turkish urban areas.<br>▪ At the first stage, the explanations of the visions were more explained and then the imaginary pictures were more specifically described with the explanation of their scenario narratives at the same time. |

**Questions (for both public and professionals)**

1. What are your views about the visions?
2. Are these visions desirable?
3. What differences would you like to see regarding these systems?

**II) Imaginary future travel scenarios**

This part was initially designed to understand what type of changes Turkish urban areas have to implement such visions in the future and to explore any conflicts or inconsistent issues in the visions.

**Questions (for both public and professionals)**

1. Do participants think the scenarios are consistent with their internal expectations?
2. Which motivations are needed for different lifestyles?
3. What should central and local governments do?
4. What kinds of problems are there available in order to carry out these scenarios in the 2035 year?
5. How can these problems be overcome?
6. What kind of radical decisions should be taken in order to make these scenarios realistic?
7. Are there any points that you want to specify related to these alternative transport visions?

**Thank you for taking the time to complete this interview.**

# Appendix 8

## Interview protocol
## (Policy development)

**Identification**

Interview Code Number:

Participant position (for experts):

Participant travel modes (for public):

Location:

Date:

Length in min:

**Introduction**

Hello, my name is Can Bıyık. I have designed different alternative visions with much higher dependence on sustainable transport systems. In order to justify the reliability of these visions, we would need your views and experiences based on your travel behaviour (for public participants) or knowledge and experiences (for expert participants).

There are no correct or wrong answers, and this interview does not evaluate an interviewer's skills or performances. Please feel completely free and to share your opinions and suggestions even if it may vary from what other interviewers have shared.

**Welcome**

Welcome and thank you for your participation today.
Have you read the consent form that was sent to you?
Do you have any questions before we begin?
I am a tape-recording conversation because I do not want to miss any of your speech. Participants often mention very critical and helpful things in the session, and we may not take a note fast enough to get them all down.

**Then I would like to ask your permission to begin the interview.**

**Interview questions**

During this interview, I would like to discuss the following topics: (i) learning the existing sustainable transport systems in the cities where local policy-makers are located; (ii) exploring which strategies need to be carried out step by step; (iii) understanding the role of central governments for the key objectives of the scenario narratives.

Brief notes will be taken throughout this study. This interview is assumed to take 45 minutes.

**(I) Existing sustainable transport systems**

This part is designed to understand the main and distinctive problems regarding sustainable transport systems in each selected city. Participants were asked to explain the present sustainable transportation systems freely in their local cities, by considering the Improve Vision.

**Table 1.** Key differences in approaches to local- and national policymakers.

| Local policy-makers | National policy-makers |
|---|---|
| ▪ The imaginary pictures of Vision Three and its scenario narratives were specifically explained at the same time.<br>▪ The imaginary future pictures gave crucial ideas for their local urban areas.<br>▪ They were given more chance to speak about their cities, more separately from the interview format. | ▪ The full sentences of the key objectives in Improve Vision were demonstrated.<br>▪ The key objectives were considered for the condition of the whole country.<br>▪ They were asked to answer the questions based on interview format. |

**Questions for local policy-makers**

1. What are the barriers for urban sustainable transport systems in your city?
2. What contributes to your city's process towards urban sustainable transport system?
3. What changes were needed to promote sustainable transport systems to work?

**(II) Exploring micro-policies**

**Questions for local policy-makers**

1. What local policies would your city implement between now and 2035 in order to develop walking transport systems for achieving Improve Vision?
2. What policies would your city implement between now and 2035 in order to develop cycling transport systems for achieving Improve Vision?
3. What policies would your city implement between now and 2035 in order to develop public transport systems for achieving Improve Vision?
4. What policies would your city implement between now and 2035 in order to reduce car use for achieving Improve Vision?

**(III) Exploring macro-policies**

**Questions for local and national policy-makers**

1. What central policies would your city implement between now and 2035 in order to develop sustainable transport systems for achieving Improve Vision?
2. Which institutions are responsible for carrying out the targets of Improve Vision?
3. Which ministries need to work coordinately between now and 2035 for achieving the goals of Improve Vision?

**Questions for national policymakers**

1. Which macro-policies would be required to meet the following objectives?

**Table 2.** The key objectives of the Improve Vision.

| Key factors | Description |
|---|---|
| Environmental | Automobiles will become smaller and consume fuel more efficiently than the current models. |
| | Extra charges will be applied to limit vehicle use during rush hours. |
| Technology | New vehicles would operate on renewable energies |
| | New, smaller and more energy-efficient public buses would be designed. |
| | Solar panels on the top of some bus stops would store energy, which will be then used to illuminate its surroundings. |
| Digital technology | Free-of-charge Wi-Fi systems would spearhead public transportation systems, and many more applications would be available on public buses (Internet, e-mail, radio, television, music, event pages, etc.) |
| Energy | High energy demand would pose enormous hardships for private and public agencies in Turkey. |
| | The government needs to overcome the difficulty of procuring energy by investing in public transportation systems and would increase awareness about sustainable energy trends. |
| Urban structure | The number of green fields would be increased, and local administrations would reserve areas like parks or forestland to prevent rapid population growth from quickly spreading into the outer parts of the city. |
| | New social and business settlement formation on the outer parts of the city would be more appealing. |
| | Public transportation systems will be integrated with bicycles. |
| Infrastructure improvements | Better public transport journeys become integrated by easy-to-use ticketing systems. |
| | Municipalities would begin to work towards strengthening the infrastructure of non-motorized transport systems. |
| Mode share | Public transport systems, school buses, and institutions' service buses would cover 50% of the daily journeys in urban areas. |
| Special groups | Improvement of public transportation systems for low-income groups. |
| Safety | Public transport drivers will be trained on the presence of cyclists as part of their driver training |
| Policy | Central and local administrations will implicate a series of important |

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|---|---|
| co-ordination | strategies to complicate car purchase. |